Microsoft

Student Guide

40571A
Microsoft Excel expert 2019

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Module 1: Managing and formatting data

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Module overview

Description

Sharing data is a common requirement of daily communication. You must be able to consolidate the data you work with and present it in a way that makes it easier for viewers to understand.

When you reach the end of this module, you'll be able to apply advanced conditional formatting rules; format, summarize, and validate data; and use and configure language options.

Lesson	Learning objective	Exam objective(s)
Understanding conditional formatting rules	Apply advanced conditional formatting.	• 2.3.1 • 2.3.2
Managing rules and customizing formats	Manage advanced conditional formatting and apply custom number formatting.	• 2.3.3 • 2.2.1
Grouping data	Group and ungroup data.	• 2.2.3 • 2.2.4
Consolidating data and configuring language options	Summarize data and use and configure language options.	• 3.4.1 • 1.3.2 • 1.3.1

Lesson	Learning objective	Exam objective(s)
Cornerstone: Depicting energy consumption	Apply advanced conditional formatting, format and validate data, and use and configure language options.	• 2.3.1 • 2.3.2 • 2.3.3 • 2.2.1 • 2.2.3 • 2.2.4 • 3.4.1 • 1.3.2 • 1.3.1

Table 1: Objectives by lesson

Scenario

Munson's Pickles and Preserves farm is committed to sustainable energy production and water conservation. The location of the farm has an extremely favorable climate for natural energy production. Last year they invested in a solar array to provide electricity for their current needs. They are considering wind energy for future farm expansion.

As part of an international community of farm-to-table producers, Munson's needs to share the data on energy consumption report with farmers across multiple countries/regions. A colleague has collected data and needs your help to depict the energy productions, consumption, and related costs and to see totals at a glance.

Cornerstone

This module concludes with a Cornerstone in which you'll update the application form for the upcoming summer camp at Munson's. In the cornerstone, you'll:

- Create custom conditional formatting rules and conditional formatting rules that use formulas.
- Manage conditional formatting rules and create custom number formats.
- Group and ungroup data and calculate data by inserting subtotals and totals.
- Summarize data from multiple ranges by using the **Consolidate** feature, use language-specific features, and configure editing and display languages.

Lesson 1: Understanding conditional formatting rules

Overview

Conditional formatting makes it easier to highlight specific values or make certain cells stand out. This changes the appearance of a cell range based on a condition (or criteria) that you specify. In this lesson, you'll learn to create custom conditional formatting.

Warm-up

Use these questions to find out what you already know about this lesson's topics.

1. What's another name for the conditions used in conditional formatting?

   Select the correct option.

   a. Specifics

   b. Criteria

   c. Labels

   d. Situation

2. You can use conditional formatting to change the _____ of cell(s) based on a conditional rule.

   Fill in the blank space.

Topic 1: Customize conditional formatting rules

By using conditional formatting in Microsoft Excel 2019, you can quickly highlight data based on some prebuilt rules. In this topic, you'll learn how to apply and modify built-in conditional formatting rules.

Create custom conditional formatting rules

To create a custom conditional formatting rule in the Excel User Interface (UI), perform the following steps:

1. Open the Excel 2019 spreadsheet you want to work in.

2. Select the cells you want to apply conditional formatting to.

3. On the **Home** tab, in the **Styles** group, select the **Conditional Formatting** drop-down box, and then select **New Rule**. The following screenshot depicts this process.
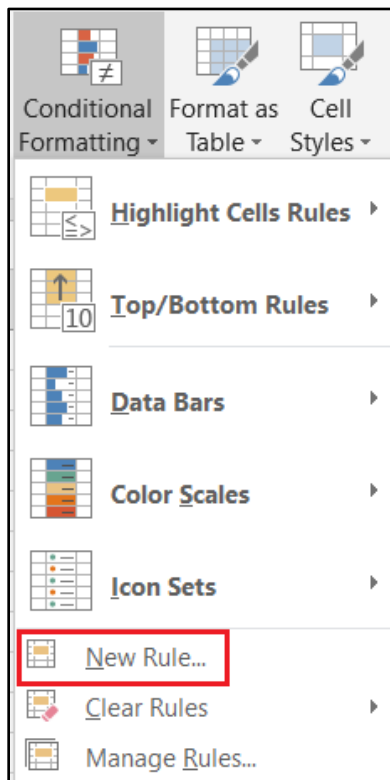
*Figure 1: **New Rule** option in the **Conditional Formatting** drop-down box*

4. In the **New Formatting Rule** dialog box, in the **Select a Rule Type** box, select a rule type, as the following screenshot depicts.
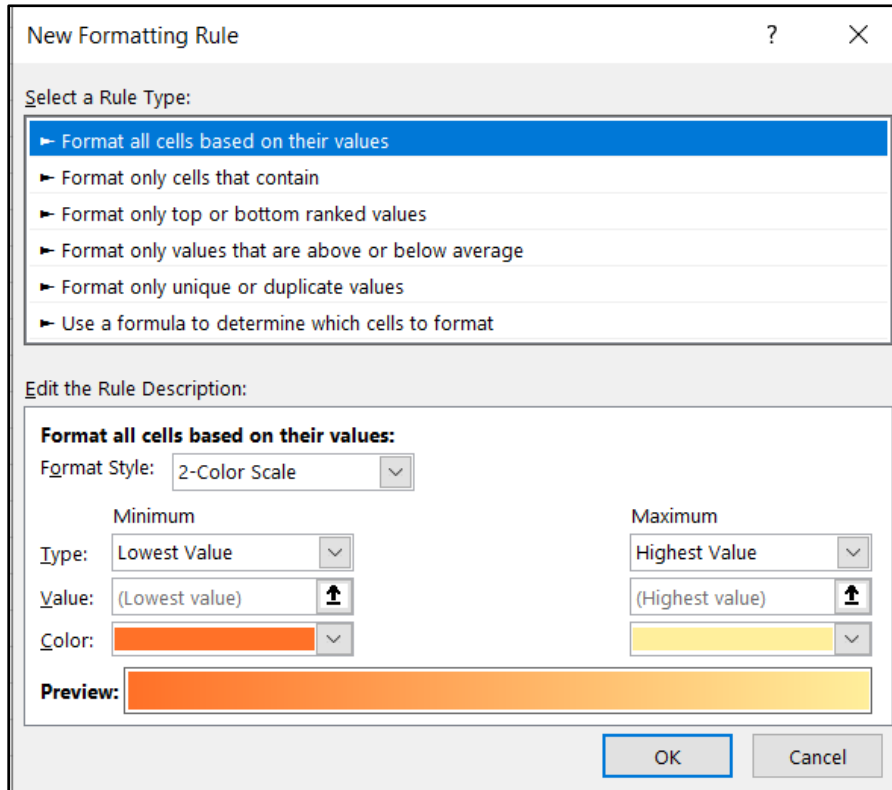
*Figure 2: **New Formatting Rule** dialog box*

5. In the **Edit the Rule Description** section, make the changes you need.

6. Select **OK**.

Additional information

To review the tutorial on conditional formatting, go to: Highlight patterns and trends with conditional formatting

Video

To review the video on conditional formatting, go to: Use conditional formatting

To review the video on intermediate conditional formatting, go to: Intermediate conditional formatting

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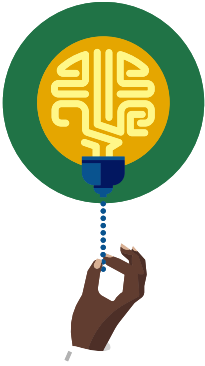
Did you know?

You can use the prebuilt options in the **Conditional Formatting** drop-down box to quickly create rules to format your cells. In just a few steps, you can highlight the data by using data bars, color scales, or icon sets.

Activity: Think-pair-share

In this activity, the teacher will demonstrate how to customize conditional formatting to meet unique criteria.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to customize conditional formatting.

2. Ask the teacher clarifying questions. An example is: How can I highlight the largest value?

3. Think about how you might customize the teacher's example to make it better; consider recording your idea(s) on a sticky note(s) or in a Word document.

4. Trade your idea(s) with the student(s) next to you.

Try-it: Customize conditional formatting rules

In this standalone try-it activity, you'll create a custom formatting rule to highlight the highest and lowest values in a range of cells.

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Try-it

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try_energy_costs_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Add a conditional formatting rule to highlight the highest value in cells **B2:H13** on the **Energy Consumption** worksheet.

2. Format the cells as **Bold** with the background color as **Blue, Accent 2, Lighter 80%**.

3. Add a conditional formatting rule to highlight the lowest value in cells **B2:H13** on the **Energy Consumption** worksheet.

4. Format the cell as **Bold** with the background color as **Blue, Accent 2, Lighter 80%**.

Topic 2: Use formulas for conditional formatting

Excel provides many drop-down box options for creating custom conditional formatting. However, by using formulas, you can create unique conditional formatting rules. In this topic, you'll learn to use formulas for conditional formatting rules.

Create custom conditional formatting rules with formulas

To create a custom conditional formatting rule by using formulas, perform the following steps:

1. Select the cells you want to apply conditional formatting to.

2. On the **Home** tab, in the **Styles** group, select the **Conditional Formatting** drop-down box, and then select **New Rule**.

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3. In the **New Formatting Rule** dialog box, in the **Select a Rule Type** box, select **Use a formula to determine which cells to format**.
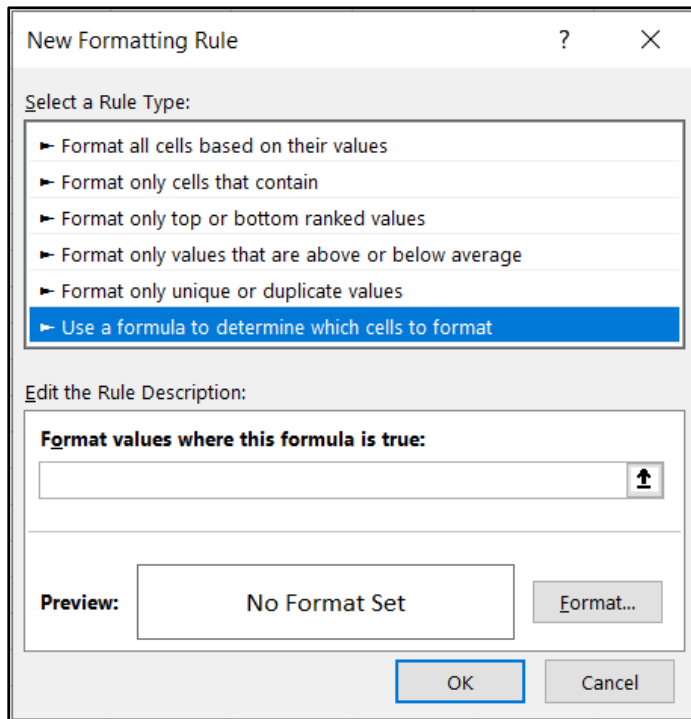
*Figure 3: **Select a Rule Type** box*

4. In the **Edit the Rule Description** section, in the **Format values where this formula is true** box, enter the formula.

5. Set formatting as desired.

6. Select **OK**.

Additional information

To review the tutorial on conditional formatting with formulas, go to: Use conditional formatting to highlight information

Video

To review the video on conditional formatting with formulas, go to: Use formulas to apply conditional formatting

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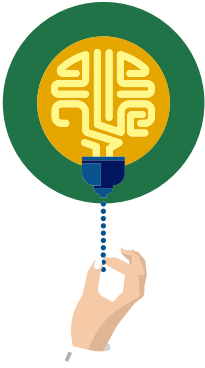
Did you know?

If you took the Excel associate 2019 course, you can use the formulas you learned to create custom conditional formatting. You can also use the advanced formulas you'll learn in Module 2 of this course to create custom conditional formatting.

Activity: Show and learn

In this activity, your teacher will demonstrate how to use a formula for the criteria for conditional formatting rules.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to customize conditional formatting using a formula.

2. Ask the teacher clarifying questions. An example is: How can I highlight all values above a certain amount?

3. Think of formulas that you might use to highlight data in a range of cells.

Try-it: Use formulas for conditional formatting

In this standalone try-it activity, you'll use a formula to highlight the above-average values in a range of cells.

Try-it

Resources

You'll need the following resources for this try-it:

- Open **L1_T2_try_energy_costs_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Add a conditional formatting rule to highlight the above-average values in cells **B2:H13** on the **Energy Consumption** worksheet.

2. Format these cells as **Bold**, **Blue, Accent 2, Lighter 80%**.

Wrap-up

Use these questions to check what you learned in this lesson:

1. What is the name of the dialog box in which you select a rule type for a new rule?

   Select the correct option.

   a. New Conditional Rule

   b. New Rule

   c. New Formatting Rule

   d. New Description

2. Prebuilt conditional formatting rules include:

   Select all that apply.

   a. Sparklines

   b. Icon sets

   c. Data bars

   d. Color scales

3. When you're creating a new conditional formatting rule, you must edit the rule _____

   Fill in the blank space.

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Lesson 2: Managing rules and customizing formats

Overview

When you get to the end of this lesson, you'll be able to manage advanced conditional formatting and apply custom number formatting. Conditional formatting rules allow you to control how you highlight and call out information on your worksheets.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. What is the maximum number of sections a number format can have?

   Select the correct option.

   a. One

   b. Five

   c. Four

   d. Seven

2. What must you use to separate sections of a number format?

   Select the correct option.

   a. Comma

   b. Semicolon

   c. Parenthesis

   d. Brackets

3. Excel applies conditional formatting rules in order of _____

   Fill in the blank space.

Topic 1: Manage conditional formatting rules

When you apply multiple conditional formatting rules to the same range of cells, conditional formatting will occur in order of precedence (from top to bottom). Some rules might cancel out other rules, even if that wasn't your intention. Copying and pasting cells that have conditional formatting applied might lead to unintended formatting consequences. In this topic, you'll learn how to find and manage conditional formatting rules.

Manage conditional formatting rules

To manage conditional formatting rules, perform the following steps:

1. Open a worksheet that has conditional formatting applied to cells and then select the cells that you want to manage rules for.

2. On the **Home** tab, in the **Styles** group, select the **Conditional Formatting** drop-down box, and then select **Manage Rules**.
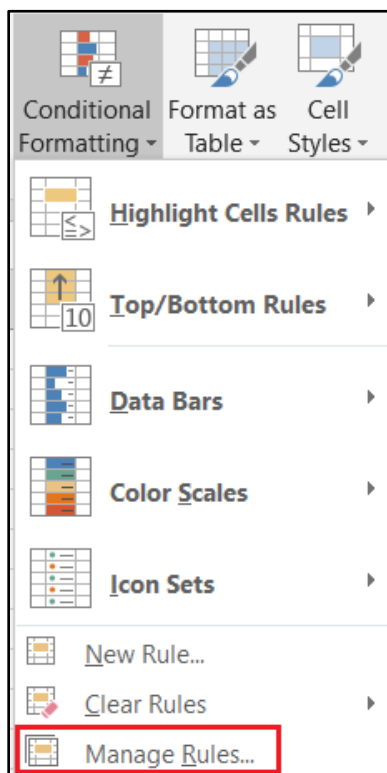
*Figure 4: **Conditional Formatting** drop down in the **Styles** group of the **Home** tab*

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3. In the **Conditional Formatting Rules Manager** dialog box, in the **Show formatting rules for** drop-down box, select **This Worksheet**, as the following screenshot depicts.
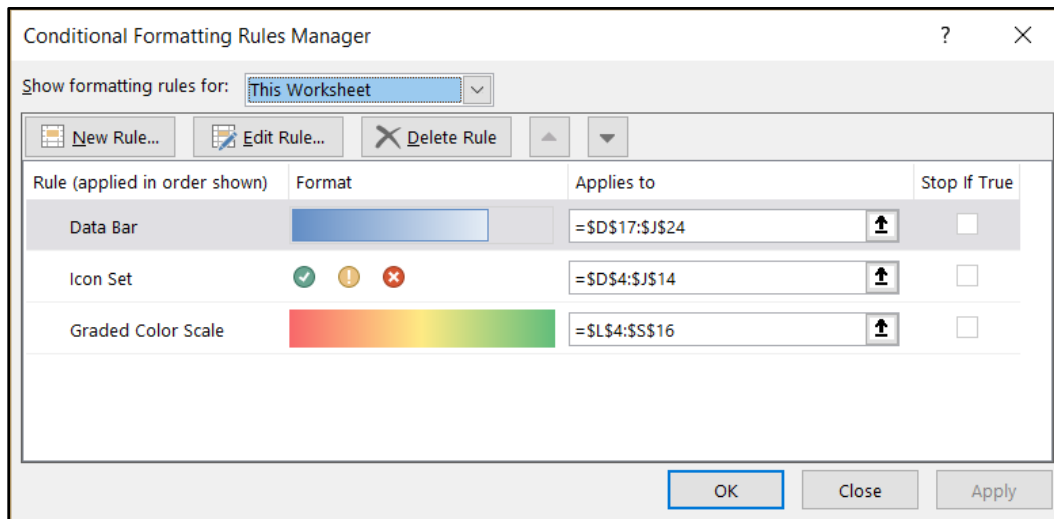
*Figure 5: **Show formatting rules for** drop-down box*

4. In the **Rule (applied in order shown)** column, select the desired rule and then select from the following options:

   o **Move up** (ᴧ) to move the rule higher in precedence
   o **Move down** (ᵛ) to move the rule lower in precedence
   o **Edit Rule** to make changes to the rule
   o **Delete Rule** to delete the rule
   o **New Rule** to create a new rule
   o **Stop if True** checkbox to stop applying rules that might conflict with the selected rule
   o **Applies to** box to change the range of cells the rule applies to

Additional information

To review the tutorial on managing conditional formatting rules, go to: Use conditional formatting to highlight information
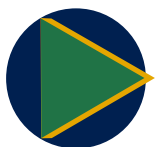
Video

To review the video on managing conditional formatting rules, go to: Manage conditional formatting

Activity: Discuss and learn

The teacher demonstrates how to manage conditional formatting rules.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to manage conditional formatting rules.

2. Ask the teacher clarifying questions. An example is: How can I stop rules from conflicting?

Try-it: Manage conditional formatting rules

In this leveled try-it activity, you'll manage the conditional formatting in the worksheet to depict the top 10 values in a bold font and the bottom 10 values in an italic font. You'll also use an icon set to depict the highest, middle, and lowest values.

Try-it 1

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try1_energy_costs_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Find the cells that have conditional formatting.

2. Delete the data bars, icon set, and color scale conditional formatting.

Try-it 2

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try2_energy_costs_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Delete the Top 10 and Bottom 10 conditional formatting rules.

2. Change the Top 10% and Bottom 10% conditional formatting rules to Top 10 and Bottom 10 conditional formatting rules

Topic 2: Customize number formats

You can use number formats to change the appearance of numbers, including dates and times, without changing the actual number. The number format does not affect the cell value. The actual cell value is displayed in the **Formula Bar**.

Excel provides several built-in number formats. You can use these built-in formats as is, or you can use them as a starting point to customize your own number formats.

A number format can have up to four sections, separated by semicolons. These sections define the format for positive numbers, negative numbers, zero, and text, in that order, as depicted in the following format:

<POSITIVE>;<NEGATIVE>;<ZERO>;<TEXT>

The following is an example of a number format:

#,##0.00_);[Red](#,##0.00);0.00;"costs "@

You do not have to include all sections in your custom number format. When you create custom number formats, keep in mind the following points:

- If you use only two sections for your custom number format, the first section is used for positive numbers and zeros; the second section is used for negative numbers.
- If you use only one code section, it is used for all numbers.
- If you want to skip a section and include a section that follows it, you must include the semicolon separator for the section that you skip.

Use prebuilt custom number features

To use prebuilt custom number features, perform the following steps:

1. Select the cell(s) to format.

2. On the **Home** tab, in the **Number** group, select the **Number Format** drop-down box, which the following screenshot depicts, and then select the desired format.
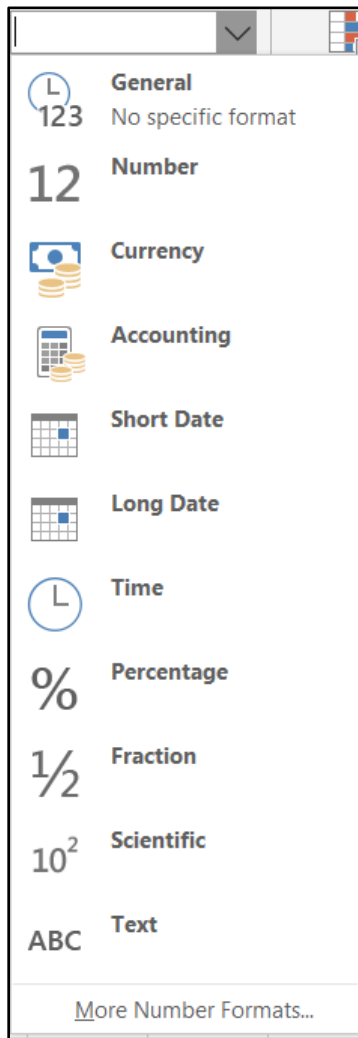
*Figure 6: **Number Format** drop-down box in the **Number** group of the **Home** tab*

3. To make additional quick changes to the formatting, use the following buttons in the **Number** group of the **Home** tab:

   o **Accounting Number Format** (**$**) drop-down box to format as dollars, euros, or other currency

   o **Percent Style** (**%**) to format as a percent

   o **Comma Style** (**,**) to format with thousands separator

o **Increase Decimal** to display more decimal places

o **Decrease Decimal** to display fewer decimal places

The following screenshot depicts the **Number** group on the **Home** tab.
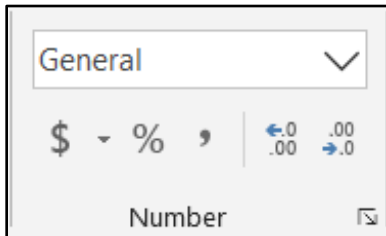
*Figure 7: **Number** group of the **Home** tab*

Customize a number format

To customize a number format, perform the following steps:

1. Select the cell(s) to format.

2. On the **Home** tab, in the **Number** group, select the **Number Format** drop-down box, and then select **More Number Formats**.
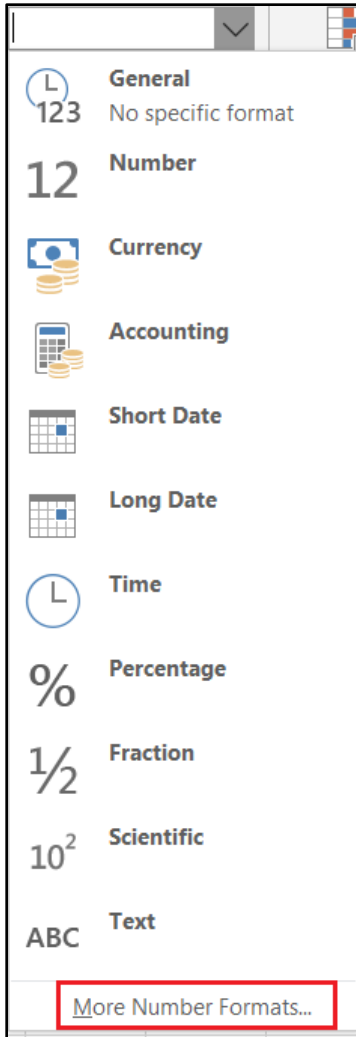
*Figure 8: **More Number Formats** option*

3. In the **Format Cells** dialog box, in the **Type** box, enter your custom number format.

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Managing and formatting data
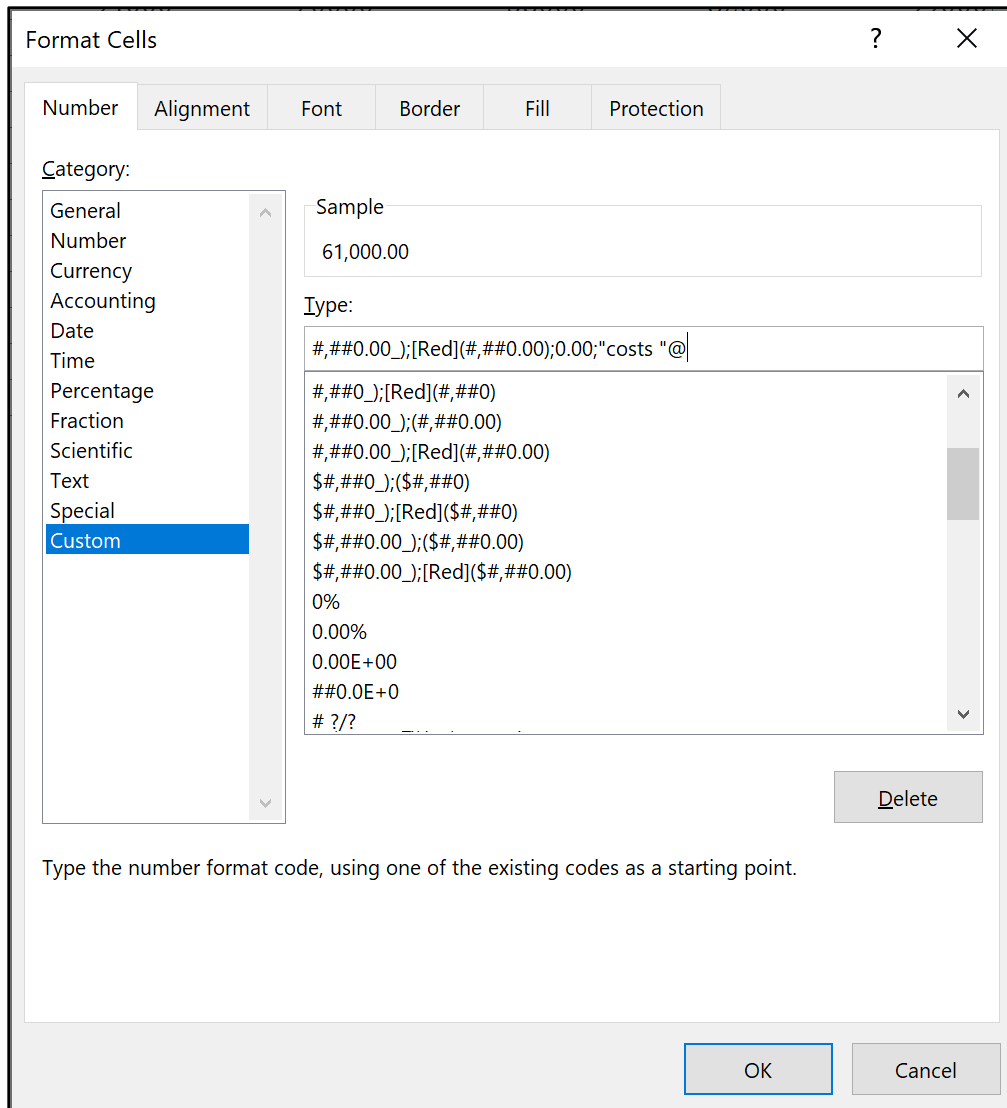
*Figure 9: **Format Cells** dialog box*

Hint: It's easier if you pick one of the prebuilt number formats first and then customize it. For example, you can select the following prebuilt number format for **Accounting** in the **Number Format** drop-down box in the **Number** group:

_($* #,##0.00_);_($* (#,##0.00);_($* "-"??_);_(@_)

and change it to the following format in the **Type** box in the **Format Cells** dialog window:

_($* #,##0.00_);[Red]_($* (#,##0.00);_($* "-"??_);_(@_)

When you make this change, negative numbers display in red with parentheses.

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Additional information

To review the guidelines on number formats, go to: [Review guidelines for customizing a number format](#)

To review the tutorial on combining numbers and text, go to: [Combine text and numbers](#)

Video

To review the video on custom number formats, go to: [Create a custom number format](#)

Activity: Discuss and learn

In this activity, your teacher will demonstrate multiple methods to customize number formats.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to customize number formatting.

2. Ask the teacher clarifying questions. An example is: How can I make negative numbers appear red?

Try-it: Customize number formats

In this standalone try-it activity, you'll create several custom number formats.

Try-it

Resources

You'll need the following resources for this try-it:

- Open **L2_T2_try_energy_costs_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Change date to show the short date and time.

2. Change number formatting for cells **B2:H13** on the **Production** worksheet to separate thousands with a comma, use no decimal points, and include **Jars** after the number.

3. Change number formatting for cells **B2:H13** on the **Balance** worksheet to currency with no decimal points and showing negative values in red with parenthesis.

Wrap-up

Use these questions to check what you learned in this lesson:

1. If you use only one section in a number format, Excel applies it to:

   Select the correct option.

   a. Positive numbers

   b. Positive numbers and zero

   c. All numbers

   d. Negative numbers

2. What are the main options available in the **Conditional Formatting Rules Manager** dialog box?

   Select all that apply.

   a. New Rule

   b. Delete Rule

   c. Edit Rule

   d. Reverse Rule

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3. The easiest method to find all conditional formatting rules on a worksheet is to use _____ option in the **Show formatting rules for** list in the **Conditional Formatting Rules Manager** dialog box.

Fill in the blank space.

4. Specify the correct order for the four sections available for number formatting.

Indicate the correct sequence by adding numbers 1–4 next to the following items.

a. Negative numbers – _____

b. Zero – _____

c. Text – _____

d. Positive numbers – _____

Lesson 3: Grouping data

Overview

When you get to the end of this lesson, you'll be able to group and ungroup data and use subtotals and totals to make data calculations. By grouping data, you can quickly expand and collapse data to display details and subtotals.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. How many levels can you have in an outline?

    Select the correct option.

    a. Five

    b. Two

    c. Eight

    d. Six

2. Which of the following are selections you can make in the **Subtotal** dialog box?

    Select all that apply.

    a. Group by

    b. At each change in

    c. Use function

    d. Add subtotal to

Topic 1: Group and ungroup data

By grouping data, you can create an outline of the data. You can then expand or collapse this outline to quickly display summary rows or columns, or to reveal the detail data for each group.

If you want to group data, you must first organize it into a format that is compatible with grouping. You must also make sure that:

- Each column of the data that you want to outline has a label in the first row; for example, **Season**.
- The data contains similar facts in each column.
- The range you want to outline has no blank rows or columns.

You can have up to eight levels of outline, but to have multiple groups in a level, you must have subtotal rows or columns.

Group data

To group data, perform the following steps:

1. Select the cells you want to group.
2. On the **Data** tab, in the **Outline** group, select the **Group** drop-down box.
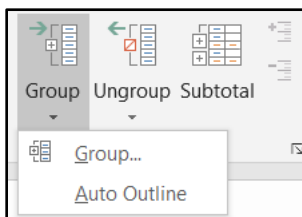
*Figure 10: **Group** options in the **Outline** group*

3. Select **Group** or **Auto Outline**.

   Note: Auto Outline only works if you've added summary rows or columns (subtotals) to your data.

4. If you select **Group**, in the **Group** dialog box, select **Rows** or **Columns**, and then select **OK**.
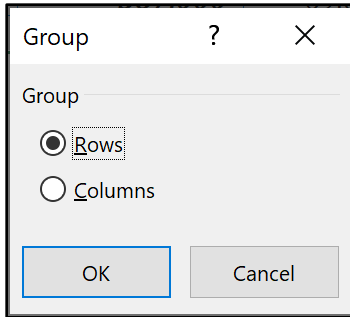
Figure 11: **Group** *dialog box*

Ungroup data

To ungroup data, perform the following steps:

1. Select the cells you want to ungroup.

2. On the **Data** tab, in the **Outline** group, select the **Ungroup** drop-down box.
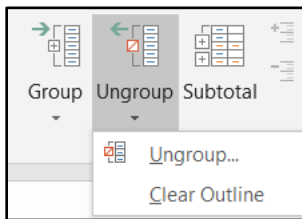
Figure 12: Ungroup options in the **Outline** *group*

3. Select **Ungroup** to clear the grouping of the selection or select **Clear Outline** to remove the entire outline.

4. If you select **Ungroup**, in the **Ungroup** dialog box, select **Rows** or **Columns**.
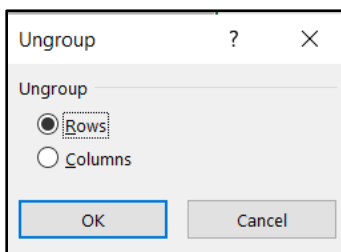
Figure 13: **Ungroup** *dialog box*

Additional information

To review the tutorial on grouping, go to: [Outline (group) data in a worksheet](#)

Activity: Discuss and learn

In this activity, your teacher will demonstrate how to group and ungroup rows and columns of data.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to group columns and rows of data.

2. Ask the teacher clarifying questions. An example is: How can I group data that is not subtotaled?

Try-it: Group and ungroup data

 In this standalone try-it activity, you'll group and ungroup data in a preformatted range of cells.

Try-it

Resources

You'll need the following resources for this try-it:

- Open **L3_T1_try_energy_costs_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Group columns of the **C1:G14** cells on the **KWh** worksheet.

2. **Auto Outline** the **A1:J18** cells on the **Cost** worksheet.

Topic 2: Subtotal data

 You can automatically calculate subtotals and grand totals in a list for a column by using the **Subtotal** command. This is very useful when you have long lists of numbers.

Insert subtotals in a list of data

1. Select the list of data you want to subtotal.

2. Select the **Data** tab.

3. Select **Subtotal** in the **Outline** group.

4. In the **Subtotal** dialog window, make the following selections:

    a. **At each change in:** —select the category you want to subtotal

    b. **Use function:** —select the calculation you want to use for the subtotal values

    c. **Add subtotal to:** —select the column(s) of values you want to subtotal

    d. Choose desired options in checkboxes
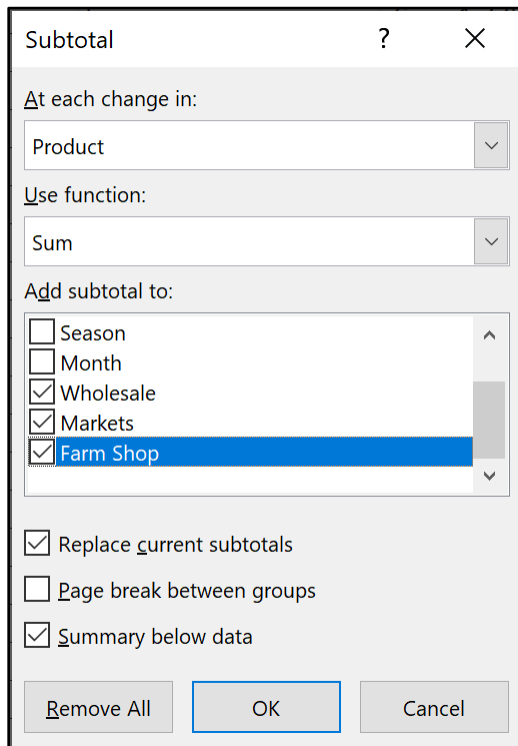
Figure 14: **Subtotal** *dialog box*

5. Repeat for each category you want to subtotal values for.

Note: Grand totals are added automatically.

Additional information

To review the tutorial on creating subtotals and totals, go to: Insert subtotals in a list of data in a worksheet

Activity: Discuss and learn

The teacher will demonstrate inserting subtotals and totals in a list of data.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to insert subtotals and totals in a list of data.

2. Ask the teacher clarifying questions. An example is: How can I insert subtotals for a specific group of data?

Try-it: Subtotal data

In this standalone try-it activity, you'll insert subtotals and totals in a list of data.

Try-it

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try_energy_costs_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

- Insert subtotals for an average of costs for the seasons and months in the list of data on the **Cost** worksheet.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Select the requirements for data grouping.

   Select all that apply.

   a. A label in the first row

   b. A total in the last row

   c. Similar facts in each column

   d. No blank rows or columns in the selected range

2. Select the functions you can apply as subtotals.

   Select all that apply.

   a. Average

   b. Sum

   c. Concatenate

   d. Count

3. If you want to use **Auto Outline**, your data must have _____ rows or columns.

   Fill in the blank space.

Lesson 4: Consolidating data and configuring language options

Overview

When you get to the end of this lesson, you'll be able to summarize data and pull together data from many sources. You'll also be able to use and configure language options when you need to share files with persons who speak a different language.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. What do you use to add new words to Office apps?

   Select the correct option.

   a. Custom Encyclopedia

   b. Custom Words

   c. Custom Dictionary

   d. Custom Spell check

2. What can you use to change text case?

   Select the correct option.

   a. Proofing

   b. Formulas

   c. Spell check

   d. The **Review** tab

3. What options are available for different languages?

   Select all that apply.

   a. Display

   b. Translation

   c. Editing

   d. Help

4. Use the **Consolidate** feature to consolidate data from multiple
   _____.

   Fill in the blank space.

Topic 1: Consolidate data

When you work with Excel, you might often have to work with data from multiple worksheets in multiple files. To make it easier to manage this data, you'll need to consolidate it into a single file. In this lesson, you'll learn how to consolidate data from multiple worksheets/workbooks.

Consolidate data from multiple workbooks

To consolidate data from multiple workbooks, perform the following steps:

1. Open the workbooks that contain the data you want to consolidate.

2. Make sure the data in each worksheet meets the following criteria:

   a. Each range of data is in list format.

   b. Each column has a label (header) in the first row and contains similar data.

   c. There are no blank rows or columns anywhere in the list.

   d. Each range has the same layout.

   e. Each range is on a separate worksheet.

3. Open a new file for the primary worksheet. Don't enter anything in the primary worksheet where you plan to consolidate the data. Excel will do this for you.

4. Place your cursor in the first cell where you want to consolidate your data.

5. On the **Data** tab, in the **Data Tools** group, select **Consolidate**, as the following screenshot depicts.
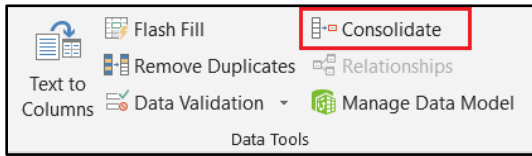
*Figure 15: **Consolidate** option in the **Data Tools** group of the **Data** tab*

6. In the **Consolidate** dialog box, select the type of **Function**.

7. Select the **Collapse** dialog on the **Reference:** box, which the following screenshot depicts.
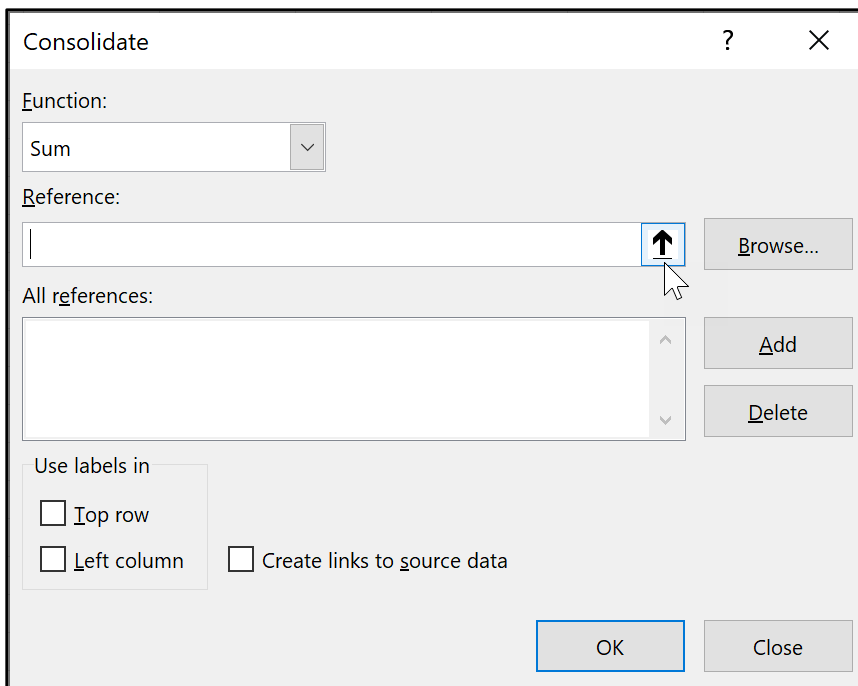
*Figure 16: **Consolidate** dialog box*

8. Go to the worksheet and select your first data range.

9. In the **Consolidate** dialog box, select the **Expand** dialog on the **Reference** box, and then select **Add**.

10. Repeat steps 8 and 9 for the remaining data ranges you want to consolidate.

Microsoft

11. Select from the following checkboxes:

    a. Select **Top row** to include all the top row labels. Leave clear if you want to summarize the data into one column.

    b. Select **Left column** to include all the left column labels.

    c. Select **Create links to source data** to link the data to the primary worksheet.

12. Select **OK**.

Additional information

To review the video on consolidate, go to: [Consolidate data in multiple worksheets](#)

Activity: Tell a story

The values for energy consumption at Munson's are recorded on different worksheets for each year, but you need to study trends for five years. To do this, you need to consolidate the data on one worksheet. The teacher will demonstrate how to consolidate the data from the different workbooks into one file by using the **Consolidate** option.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to consolidate data from multiple worksheets.

2. Ask the teacher clarifying questions. An example is: How can I consolidate data from multiple files?

Try-it: Consolidate data

In this standalone try-it activity, you'll consolidate the data from five files into one primary workbook.

Microsoft

Try-it

Resources

You'll need the following resources for this try-it:

- Open **L4_T1_try_energy_costs_2015_starter.xlsx**,
  L4_T1_try_energy_costs_2016_starter.xlsx,
  L4_T1_try_energy_costs_2017_starter.xlsx,
  L4_T1_try_energy_costs_2018_starter.xlsx, and
  L4_T1_try_energy_costs_2019_starter.xlsx in this lesson's Learning Activity
  Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open a new file, which will be the primary file.

2. Consolidate the data from the following sources into the new file:

   a. The **L4_T1_try_energy_costs_2015_starter.xlsx** file with cells **A1:B8** on the **KWh** worksheet as the data range.

   b. The **L4_T1_try_energy_costs_2016_starter.xlsx** file with cells **A1:B8** on the **KWh** worksheet as the data range.

   c. The **L4_T1_try_energy_costs_2017_starter.xlsx** file with cells **A1:B8** on the **KWh** worksheet as the data range.

   d. The **L4_T1_try_energy_costs_2018_starter.xlsx** file with cells **A1:B8** on the **KWh** worksheet as the data range.

   e. The **L4_T1_try_energy_costs_2019_starter.xlsx** file with cells **A1:B8** on the **KWh** worksheet as the data range.

3. Select the **Top row** check box in the **Consolidate** dialog box to include all the top row labels.

4. Select the **Left column** check box in the **Consolidate** dialog box to include all the left column labels.

5. Close the **L4_T1_try_energy_costs_2015_starter.xlsx**,
   L4_T1_try_energy_costs_2016_starter.xlsx,
   L4_T1_try_energy_costs_2017_starter.xlsx,
   L4_T1_try_energy_costs_2018_starter.xlsx, and
   L4_T1_try_energy_costs_2019_starter.xlsx files.

6. Save the primary file with a new name.

Topic 2: Use language-specific features

Throughout the world, all languages add new words every day. In this topic, you'll learn how to customize the dictionary in Excel so that you can add new words to it. You'll also use formulas to change the case of text.

Add new words to the custom dictionary by using Backstage

To add new words to the dictionary from the Backstage view, perform the following steps:

1. Select the **File** tab, and then in the **navigation** pane, select **Options**.

2. In the **Excel Options** dialog box, in the **navigation** pane, select the **Proofing** tab.
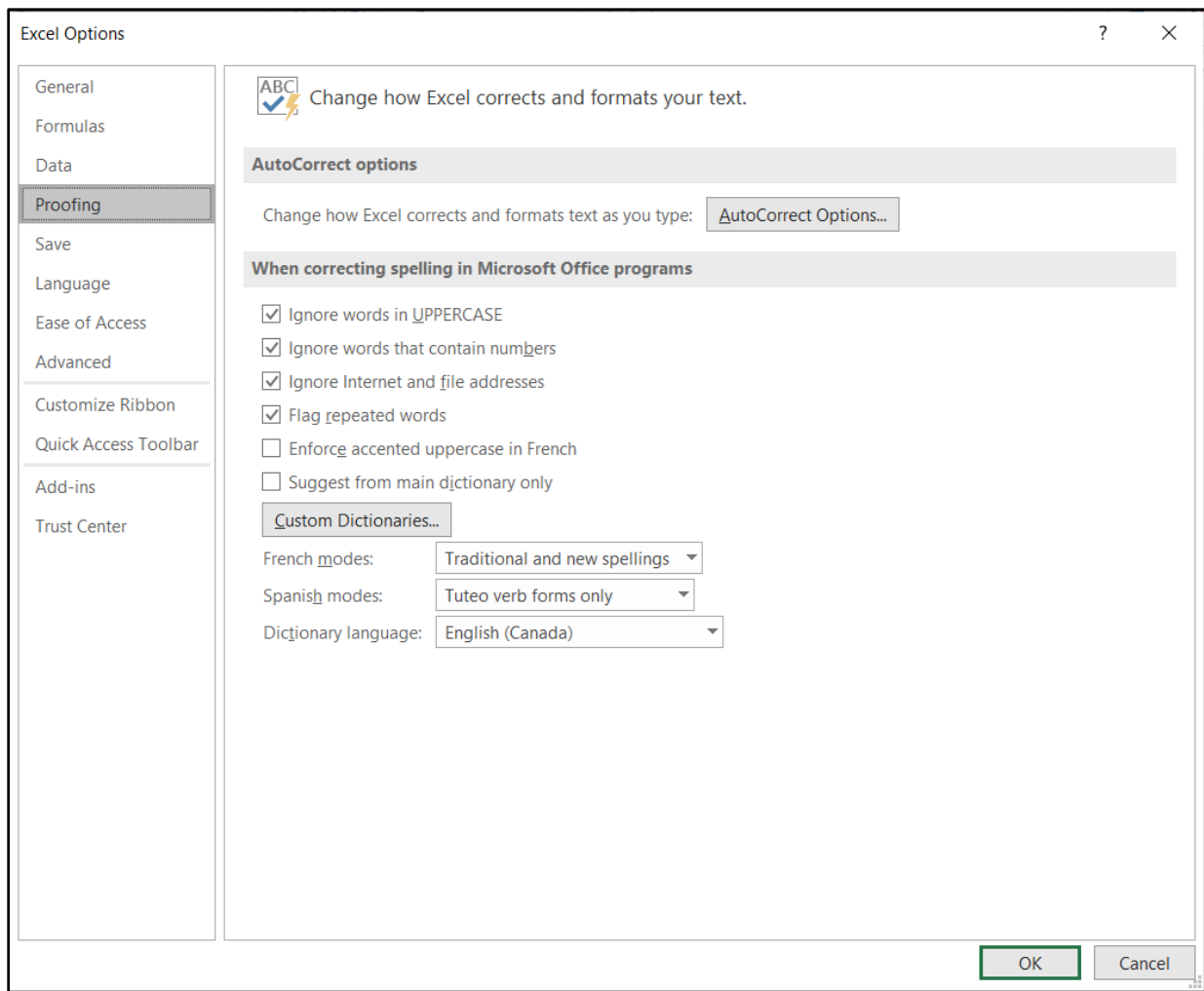
*Figure 17: **Excel Options** dialog box*

Microsoft

3. Select **Custom Dictionaries**.

4. In the **Custom Dictionaries** dialog box, select **RoamingCustom.dic**.
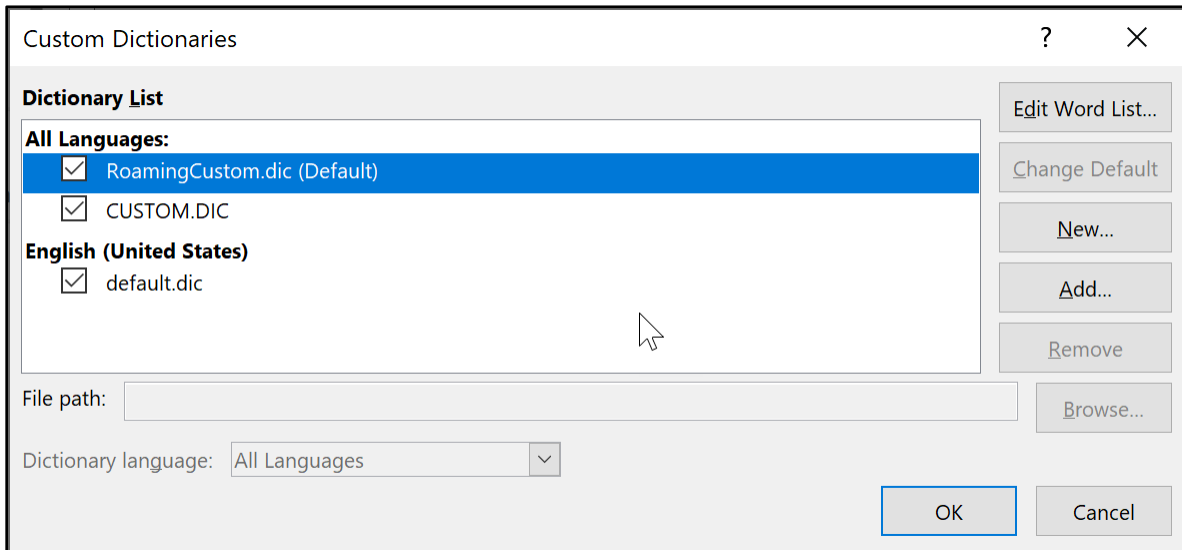
Figure 18: **Custom Dictionaries** *dialog box*

5. Select **Edit Word List**.

6. In the **RoamingCustom.dic** dialog box, in the **Word(s)** box, enter the new word.
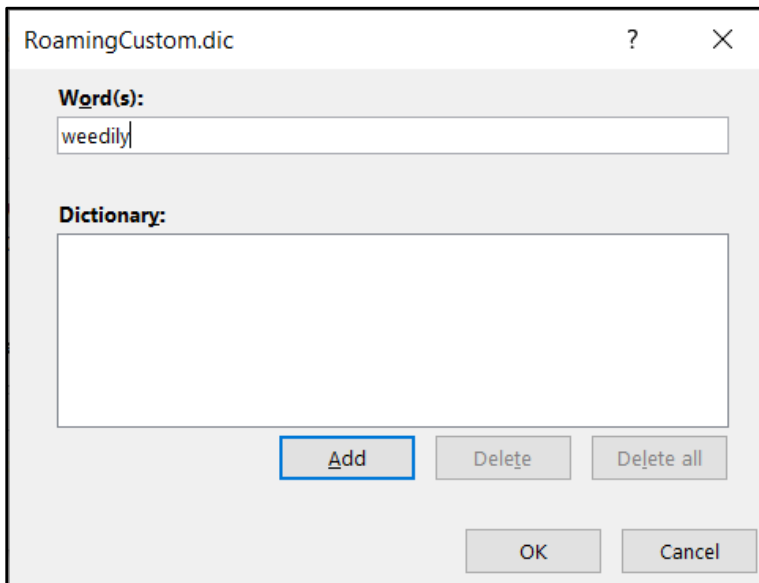
Figure 19: **RoamingCustom.dic** *dialog box*

7. Select **Add**.

8. Select **OK**.

Microsoft

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Add new words to the custom dictionary by using Spelling

To use the **Spelling** option to add new words to the dictionary, perform the following steps:

1. On the **Review** tab, in the **Proofing** group, select **Spelling**.
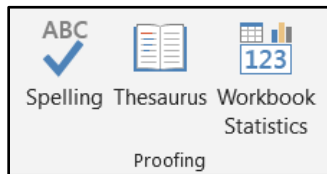
*Figure 20: **Proofing** group of the **Review** tab*

2. In the **Spelling** dialog box, ensure that the word you want to add is in the **Not in Dictionary** box, and then select **Add to Dictionary**.
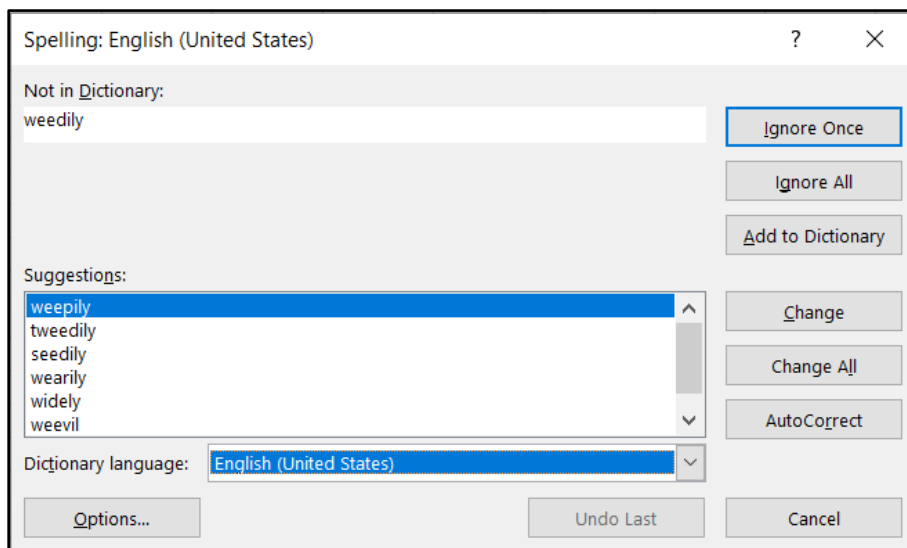
*Figure 21: **Spelling** dialog box*

Use a formula to change text case

To change text case by using formulas, perform the following steps:

1. Select the cell where you want the changed text to appear.

2. Enter the following formula in the cell, substituting XX for the cell row and column where the text to be changed is located:

    a. **=UPPER(XX)** to change the text in cell **XX** to upper case

    b. **=LOWER(XX)** to change the text in cell **XX** to lower case

    c. **=PROPER(XX)** to change the text in cell **XX** to proper case

For example, enter **=UPPER(A1)** to change the text from cell **A1** to upper case in the cell with the formula.

Additional information

To review the tutorial on changing words in the dictionary, go to: [Add or edit words in a spell check dictionary](#)

To review the tutorial on changing text case, go to: [Change the case of text](#)

Activity: Show me how

In this activity, your teacher will demonstrate how to add new words to the dictionary and change text case by using formulas.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to add new words to the dictionary and use formulas to change the text case.

2. Ask the teacher clarifying questions. An example is: How can I use Spell Check to add words to the dictionary?

Try-it: Use language-specific features

In this leveled try-it activity, you'll add words to the custom dictionary by using the **Spelling** option and Backstage. You'll also use formulas to change the text case.

Try-it 1

Resources

You'll need the following resources for this try-it:

- Open **L4_T2_try1_new_word_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Select the **Spelling** option.

2. When prompted, add the word **Weedily** to the dictionary.

Try-it 2

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open Excel.

2. Select **File** to go to **Backstage** view.

3. Open the **Excel Options** dialog box.

4. Add the new word **transload** to the **RoamingCustom.dic** dictionary.

Try-it 3

Resources

You'll need the following resources for this try-it:

- Open **L4_T2_try3_change_case_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Enter the formula to replicate the content in cells **A2:A7** as upper case in each corresponding cell in **B2:B7**.

2. Enter the formula to replicate the content in cells **A2:A7** as lower case in each corresponding cell in **C2:C7**.

3. Enter the formula to replicate the content in cells **A2:A7** in the same case in each corresponding cell in **D2:D7**.

Topic 3: Configure the editing and display languages

In an interconnected world, it's important to be able to share your files with others who might not speak the same language. In this topic, you'll learn how to configure the editing and display language options. Editing language features set up language-specific proofing tools such as spelling, grammar checking, and sorting. Bilingual speakers can customize settings for what works best for them. For example, they can set the **Help** display to the language most familiar to them while setting the editing language to the language in which they'll share the document. By setting display and editing languages, you do not translate documents from one language to another.

Add a language

To add a language to Excel, perform the following steps:

1. Open Excel.

2. Select the **File** tab, and then in the navigation pane, select **Options**.

3. In the **Excel Options** dialog box, in the navigation pane, select the **Language** tab.
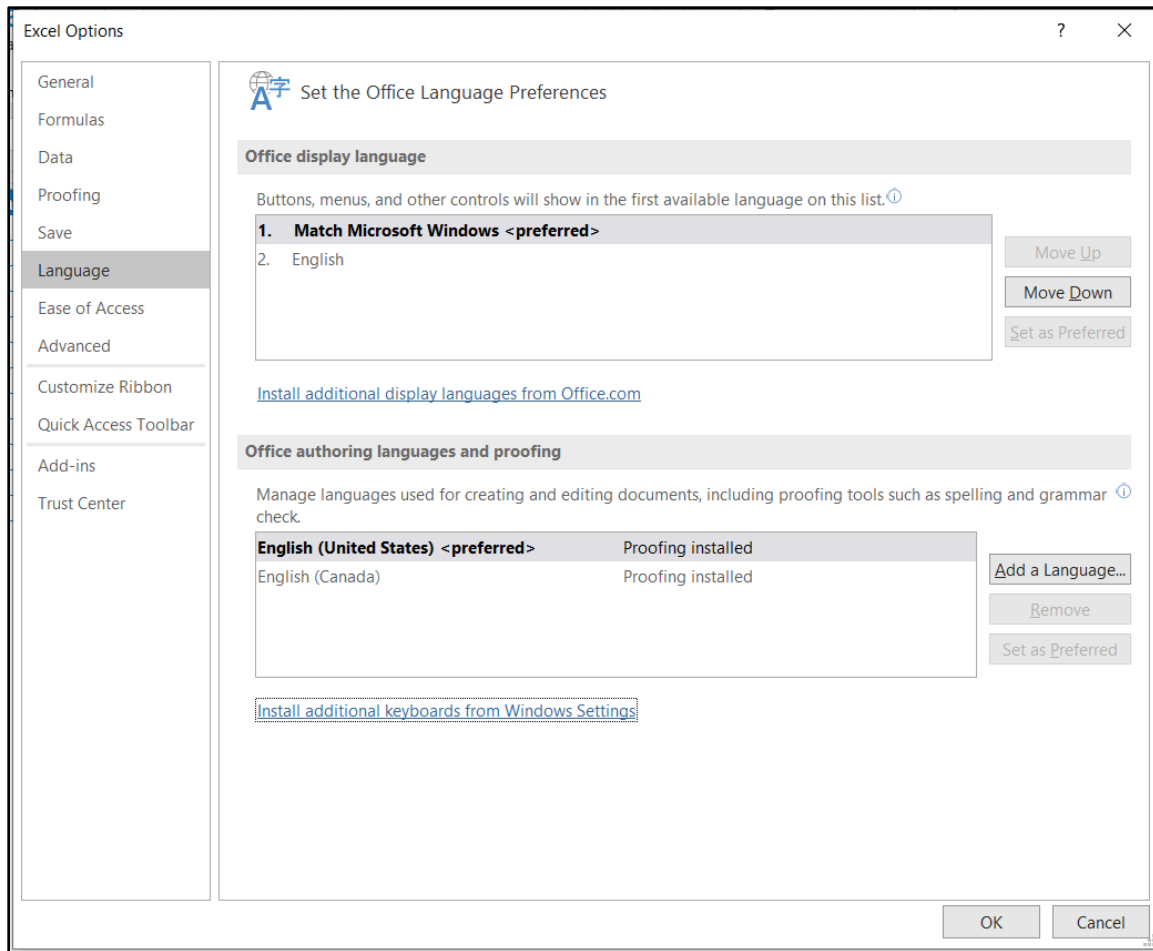
*Figure 22: **Excel Options** dialog box*

4. In the **Office authoring languages and proofing** section, select **Add a language**.

5. Choose the desired language, and then select **Add**.

6. In the **Excel Options** dialog box, select **OK**.

7. Restart Excel.

Change Display Language

To change your display language, perform the following steps:

1. After adding additional editing languages, open Excel.

2. Select the **File** tab, and then in the **navigation** pane, select **Options**.

3. In the **Excel Options** dialog box, in the **navigation** pane, select the **Language** tab.

4. In the **Office Display Language** section, select the language.

5. Select **OK**.

Additional information

To review the tutorial on adding an editing language, go to: [Add an editing language or set language preferences in Office](#)

Activity: Tell a story

Munson's has contacts worldwide, which makes it necessary for you to share your workbooks with persons in Canada and Mexico. It is therefore important that you use appropriate spelling and grammar when you're using phrases or words in those languages. In this activity, your teacher will demonstrate how to change the editing language of your workbook.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to add Canadian French as an editing language.

2. Ask the teacher clarifying questions. An example is: How can I change the display language?

Try-it: Configure the editing and display languages

In this standalone try-it activity, you'll add the Mexican Spanish editing language.

Try-it

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open Excel.

2. Add **Mexican Spanish** as an additional editing language.

Wrap-up

Use these questions to check what you learned in this lesson:

1. What formulas can you use to change text case?

    Select all that apply.

    a. UPPER

    b. MIDDLE

    c. LOWER

    d. PROPER

2. What two options can you use to add new words to the custom dictionary?

    Select the correct options.

    a. The spell checker

    b. References

    c. The **Backstage** view

    d. Dictation

3. By adding a language to your language settings, you can enable additional
   _____ tools for that language.

    Fill in the blank space.

4. To summarize data, which of the following functions can you use with the
   Consolidate feature?

    Select all that apply.

    a. Sum

    b. Average

    c. Product

    d. Dividend

5. Selecting the _____ check box when consolidating data will give you all the columns of data instead of summarizing the data.

Fill in the blank space.

Glossary

Conditional Formatting	Formatting the appearance of cells associated with specified criteria.
Data Consolidation	Pulling together data from multiple worksheets.
Formula	Excel functions and parameters that you use to perform calculations.
Grouped data	An outline of data that you can expand or collapse to quickly display summary rows or columns.

Table 2: Glossary terms and definitions

Cornerstone

Overview

In this Cornerstone, you'll work on the energy consumption data at Munson's. You'll format the data, highlight specific energy costs, group and consolidate data, and make language and editing customizations.

Objectives

The following table outlines the Cornerstone objectives and their corresponding Microsoft Office Specialist (MOS) exam objectives.

Create custom conditional formatting rules with and without formulas	• 2.3.1: Create custom conditional formatting rules • 2.3.2: Create conditional formatting rules that use formulas
Manage conditional formatting rules and create custom number formats	• 2.3.3: Manage conditional formatting rules • 2.2.1: Create custom number formats
Group, ungroup, subtotal, and total data	• 2.2.3: Group and ungroup data • 2.2.4: Calculate data by inserting subtotals and totals
Summarize data using the Consolidate feature, and configure language, editing, and display language options	• 3.4.1: Summarize data from multiple ranges by using the Consolidate feature • 1.3.2: Use language-specific features • 1.3.1: Configure editing and display languages

Microsoft

| **Create custom conditional formatting rules with and without formulas** | • 2.3.1: Create custom conditional formatting rules
• 2.3.2: Create conditional formatting rules that use formulas |

Table 3: Cornerstone objectives

Duration

60 minutes

Instructions

1. Complete the tasks below for each file.

2. When saving your file, add your name to the end of the filename, for example: <"Pick-Your-Own_Day_Dwayne_Espino">. Follow your teacher's directions for where to save your files.

3. When you're done with the Cornerstone, assess your completion and enter the points you think you earned within the task lists below. You can take the help of your teacher if required.

Tasks

You'll work with one file in this Cornerstone. The following are the tasks you need to do within this file.

File 1: Cornerstone_solar_energy_costs_starter.xlsx

Task: Use custom conditional formatting (30 points)

1. Use custom conditional formatting to show the five highest energy costs for **USA**, **Canada**, and **Mexico**. (15 points) (Exam objective 2.3.1)

2. Use custom conditional formatting with a formula to highlight energy costs that are below average for **USA**, **Canada**, and **Mexico**. (15 points) (Exam objectives 2.3.2 and 2.3.3)

Points scored: _____ / 30

Task: Customize number formats (15 points)

- Format values for **USA**, **Canada**, and **Mexico** costs to appropriate currency. (15 points) (Exam objective 2.2.1)

Points scored: _____ / 15

Task: Organize data (45 points)

1. Group **KWh** data by product. (15 points) (Exam objective 2.2.3)

2. Subtotal and Total **KWh** data by season. (15 points) (Exam objective 2.2.4)

3. Average **KWh** data from several worksheets. (15 points) (Exam objective 3.4.1)

Points scored: _____ / 45

Task: Use language options (10 points)

1. Change text case using a formula. (5 points) (Exam objective 1.3.2)

2. Add a new editing language. (5 points) (Exam objective 1.3.1)

Points scored: _____/ 10

FILE 1 TOTAL POINTS: _____ /100
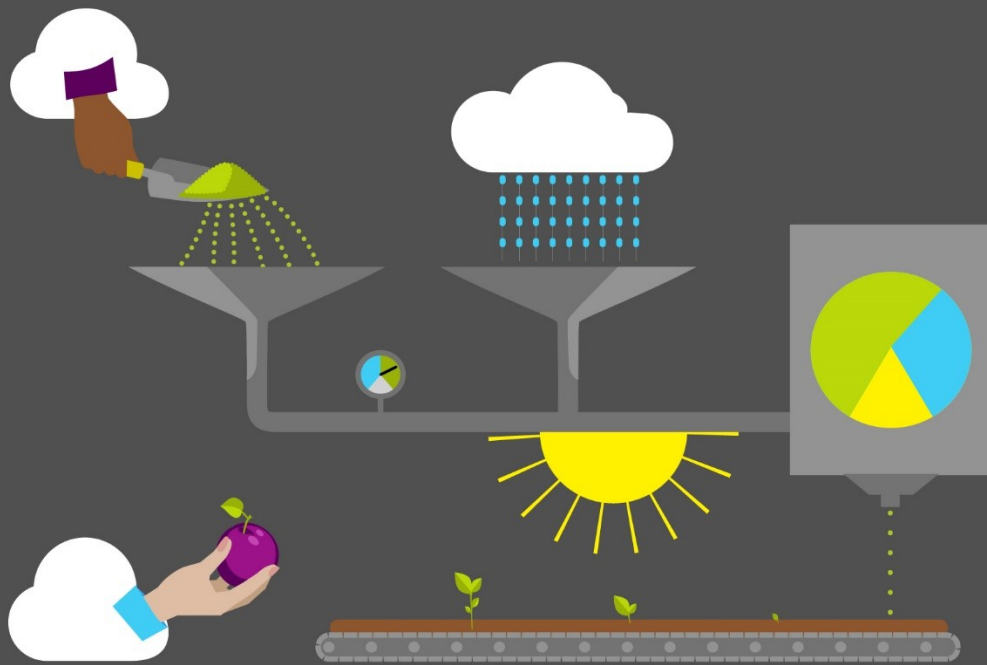
Student Guide

40571A
Microsoft Excel expert 2019

Module 2: Using advanced formulas

Contents

Microsoft

Microsoft

Module overview

Description

You can use Microsoft Excel 2019 to help answer questions that require some amount of data analysis. For example, you might want to find out:

- What's the average of sales of sneakers at your favorite store?
- How many dogs or cats live on your street?
- How many school days are there until summer vacation starts?
- What's the weekly food bill for families with more than two children in your area?

If you have all the data you need in a worksheet, you could work out the answers manually by using a calculator, studying the data, or using various built-in Excel functions or a combination of functions such as **Sort**, **Filter**, and **Subtotal**. In this module, you'll learn about other types of functions that you can use, such as logical, statistical, mathematical, lookup, and date and time functions to make the job easier. After learning about these functions, you'll be able to choose which ones(s) to use to get the answer you need. You'll be able to leave the calculator aside and use Excel to get the right results. You'll also learn how to configure Excel to perform calculations in your workbooks and how to edit **Excel Options** to suit your requirements better.

Lesson	Learning objective	Exam objective(s)
Using logical, statistical, and mathematical functions	Use functions with multiple criteria	- 3.1.1
Using lookup functions	Use lookup functions	- 3.2.1
Using lookup functions and external references	Use Match and Index functions to find data and create links to cells or ranges in other workbooks	- 3.2.1 - 1.1.2

Microsoft

Lesson	Learning objective	Exam objective(s)
Using date and time functions	Use date functions	• 3.3.1 • 3.3.2
Customizing Microsoft Excel	Configure formula calculation options	• 1.2.4
Cornerstone: Analyzing soil tests	Use various functions to analyze data, including Lookup and Date functions, and reference cells from another workbook	• 3.1.1 • 3.2.1 • 1.1.2 • 3.3.1 • 3.3.2

Table 1: Objectives by lesson

Scenario

You're analyzing the most recent soil testing report and comparing it to previous test results. There are specific questions that you need to answer to help the farm's agronomist evaluate whether the soil conditioning measures taken over the past year, which include aeration, drainage, and decreased use of pesticides and fertilizers, have improved the soil quality. You also need to find out how many working days passed from when the soil test was taken to the date the results were received and how many days until the next results should be received.

Cornerstone

This module concludes with a Cornerstone project in which you'll use logical, statistical, and mathematical functions to analyze soil test results. During the Cornerstone, you'll:

1. Use the **LOOKUP** function to retrieve specific values.
2. Create **COUNTIF** and **IFS** functions.
3. Use **MATCH** and **INDEX** functions.
4. Use date and time functions to calculate future dates.
5. Create a formula by combining the **IF** and **WORKDAY** functions.

Lesson 1: Using logical, statistical, and mathematical functions

Overview

You learned about the **IF** function in the Microsoft Excel associate 2019 course (if you took that course). In this lesson, you'll learn about logical and statistical functions such as **COUNTIF** and **AVERAGEIF** to add to your knowledge of functions. You'll then expand on this knowledge by learning how to create similar functions but for multiple criteria.

Warm-up

Ask your neighbor what they enjoyed the most about the previous module. Is there anything they are looking forward to learning in future modules of this course? Use the following questions to find out what you already know about this lesson's topics.

1. Which of the following categories does the **AVERAGEIF** function belong to?

   Select the correct option.

   a. Math & Trig

   b. Logical

   c. Lookup & Reference

   d. Statistical

2. Which of the following categories does the **SUMIFS** function belong to?

   Select the correct option.

   a. Math & Trig

   b. Logical

   c. Lookup & Reference

   d. Statistical

3. Which of the following categories does the **IFS** function belong to?

   Select the correct option.

   a. Math & Trig

   b. Logical

   c. Lookup & Reference

   d. Statistical

4. To work out how many entries in a list are equal to three specific conditions, you can use the _____ function.

   Fill in the blank space.

Topic 1: Use functions with single criteria

Excel 2019 includes several logical, mathematical, and statistical functions. Using some of these functions in this module will help you get a general idea of how they work.

If you took the earlier associate course, you would have explored the **IF**, **AVERAGE**, **MAX**, **MIN,** and **COUNT** functions for basic logical, statistical, or mathematical calculations. But what if you need to perform a more complex analysis of your data? For example, consider a worksheet that has three columns of data: the first column contains states, the second contains cities, and the third has population statistics. You can use the **AVERAGE** function to calculate the average population for all states, but if you only want the average for a specific state, you need to use **AVERAGEIF** instead.

AVERAGEIF

The **AVERAGEIF** function finds the arithmetic mean for the cells specified by a given criteria or condition. The syntax for this function is **=AVERAGEIF(range, criteria, [average_range])**. The part contained within square brackets is optional.

As with all functions in Excel, you can manually enter the function, you can start the function from the **Formulas** tab, or you can use the **Insert Function**. When you begin entering the formula, such as =AVE, Excel will display possible functions for you to choose from. You can continue entering the formula or you can select the formula from the displayed list by either double-clicking it or by selecting the Tab key. Your formula will be updated as follows and you can continue entering the formula:

```
=AVERAGEIF(
    AVERAGEIF(range, criteria, [average_range])
```

*Figure 1: **AVERAGEIF** function*

1. Enter the range of cells to evaluate. This can be a range, a whole column or row, or a named range if you have created one, followed by a comma (**,**).
2. Enter the criteria enclosed in quote marks. The criteria can be a number, cell reference, expression, or text, followed by a comma (**,**). For example, to find out the average of all cells that have a value greater than 100, enter "**>100**".
3. Enter the actual cells to average. If you do not provide any cell references, the cells in the first **range** will be averaged. If the range in step 1 is numerical, you might not need to perform step 3.
4. Enter a parenthesis **)** to complete the formula, and then select Enter.

Alternatively, use one of the following methods to enter the formula and the function arguments:

- Select the **Formulas** tab, and then select the **More Functions** category.
- Select **Statistical**, select **AVERAGEIF**, and then select **OK**.

Another way to do this:

1. On the **Formulas** tab, select **Insert Function** or select Shift +F3 on your keyboard. Alternatively, select the **Insert Function** button next to the **Formula Bar**.
   o Enter **AVERAGE** into the search box and then select **Go** (or select Enter). Alternatively, in the **Or select a category** drop-down menu, change the category from **Most Recently Used** to **Statistical**.
2. Select **AVERAGEIF** from the list of functions, and then select **OK** (or select Enter). The **Function Arguments** dialog box opens.
3. In the **Range** box, enter the range of cells you want Excel to evaluate. This can be a range, whole column or row, or a named range if you have created one.
4. In the **Criteria** box, enter what you want to find. This can be a number, cell reference, expression such as >100, or text).

5. In the **Average_range** box, enter the range to be averaged, if required. This box is optional.
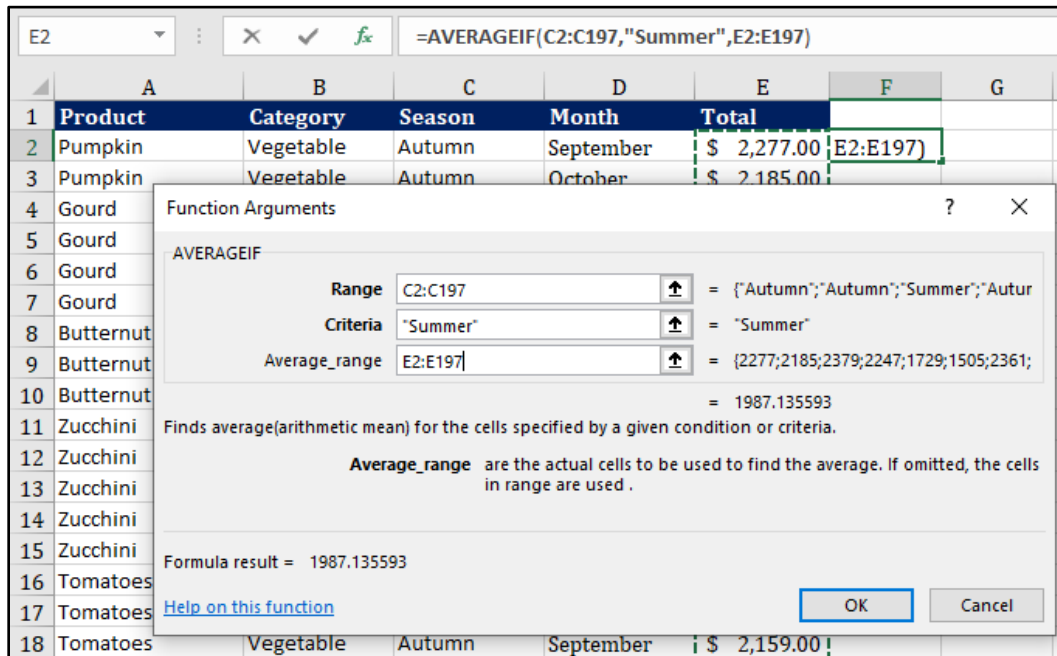
*Figure 2: **AVERAGEIF Function Arguments** dialog box*

6. Select **OK** or select Enter.

Note: The **Range** and **Average_range** (if you are using it) must be the same length. For example, if you select a whole column for the range, you must use a whole column for the average range; otherwise, you'll get an error. In Figure 2, the range C2:C197 matches E2:E197. This rule applies to all similar types of functions.

SUMIF

The **SUMIF** function is similar to the **AVERAGEIF** function, except that it adds the values in cells specified by a given criteria or condition. This function is included in the **Math & Trig** category and uses the following syntax:

=SUMIF(range, criteria, [sum_range])

The part contained within square brackets is optional.
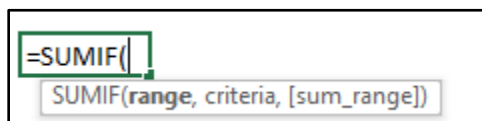
*Figure 3: **SUMIF** function*

1. Enter the range of cells to evaluate. This can be a range, a whole column or row, or a named range if you have created one, followed by a comma (**,**).
2. Enter the criteria enclosed in quote marks. The criteria can be a number, cell reference, expression, or text, followed by a comma (**,**). For example, to find out the sum of all cells that have a value greater than 100, enter **">100"**.
3. Enter the actual references of cells to sum. If left blank, the cells in **range** will be used.
4. Enter a parenthesis **)** to complete the formula, and then select enter.

Alternatively, on the **Formulas** tab, select the **Math & Trig** category, and then select **SUMIF**.

The following steps are another way to do this:

1. On the **Formulas** tab, select **Insert Function** or select the **Insert Function** button next to the **Formula Bar**.
2. Enter **SUMIF** into the search box, and then select either **Go** or Enter. Alternatively, in the **Or select a category** drop-down menu, change the category from **Most Recently Used** to **Math & Trig**.
3. Select **SUMIF** from the list of functions, and then select either **OK** or Enter. The **Function Arguments** dialog box opens.
4. In the **Range** box, enter the range of cells you want Excel to evaluate. This can be a range, a whole column or row, or a named range if you have created one.
5. In the **Criteria** box, enter the condition that you want Excel to validate the cells against. This can be a number, a cell reference, an expression such as >100, or text.
6. The **Sum_range** box is optional. If required, you can enter the range to be averaged in this box.
7. Select either **OK** or Enter to complete the formula.
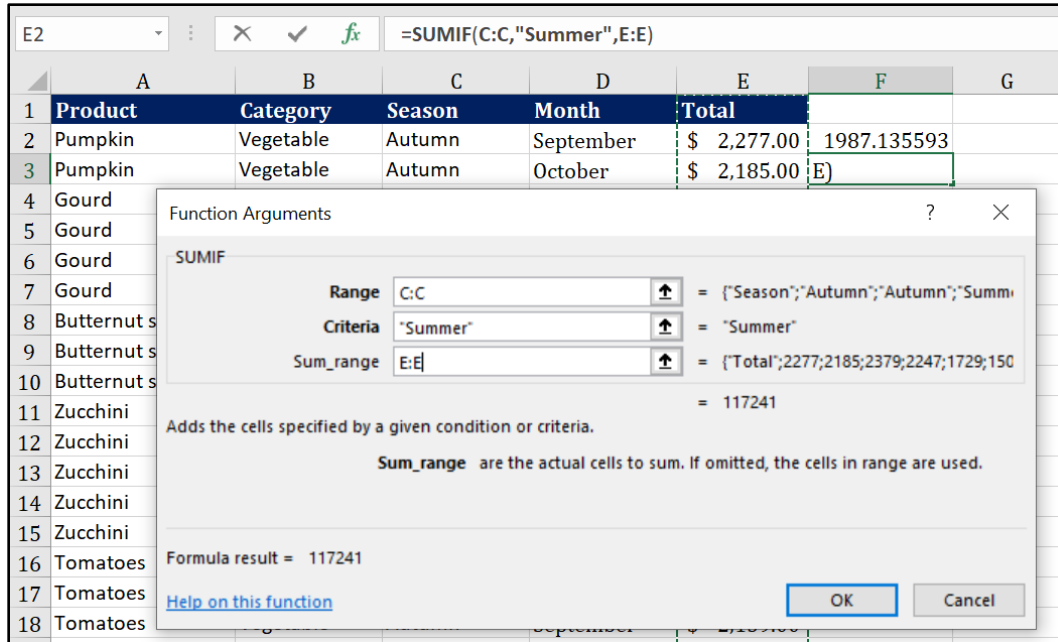
Figure 4: **SUMIF Function Arguments** *dialog box*

Video

To review the video on the **SUMIF** function, go to: [SUMIF function](#)

COUNTIF

The **COUNTIF** function counts the cells that meet a specified criteria or condition. It belongs to the **Statistical** category of functions and has the following syntax:

=COUNTIF(range, criteria)

1. Enter the range of cells to evaluate. This can be a range, a whole column or a row, or a named range if you have created one, followed by a comma (**,**).

2. Enter the criteria enclosed in quotes. The criteria can be a number, cell reference, expression such as >100, or text, followed by a parenthesis **)** to complete the formula.

Note that all criteria must be entered within quote marks, for example **">100"**.

Alternatively:

1. On the **Formulas** tab, select **Insert Function** or select the **Insert Function** button next to the **Formula Bar**.

2. Enter **COUNTIF** into the search box, and then select either **Go** or Enter. Alternatively, in the **Or select a category** drop-down menu, change the category from **Most Recently Used** to **Statistical**.

3. Select **COUNTIF** from the list of functions and then select **OK** or select Enter. Alternatively, on the **Formulas** tab, select **More Functions**, select **Statistical**, and then select **COUNTIF**. The **Function Arguments** dialog box opens.

4. In the **Range** box, enter the range of cells you want Excel to evaluate against a criterion. This can be a range, a whole column or a row, or a named range if you have created one.

5. In the **Criteria** box, enter the criteria that you want Excel to evaluate. The criteria can be numbers, cell references, expressions such as **>100**, or text.
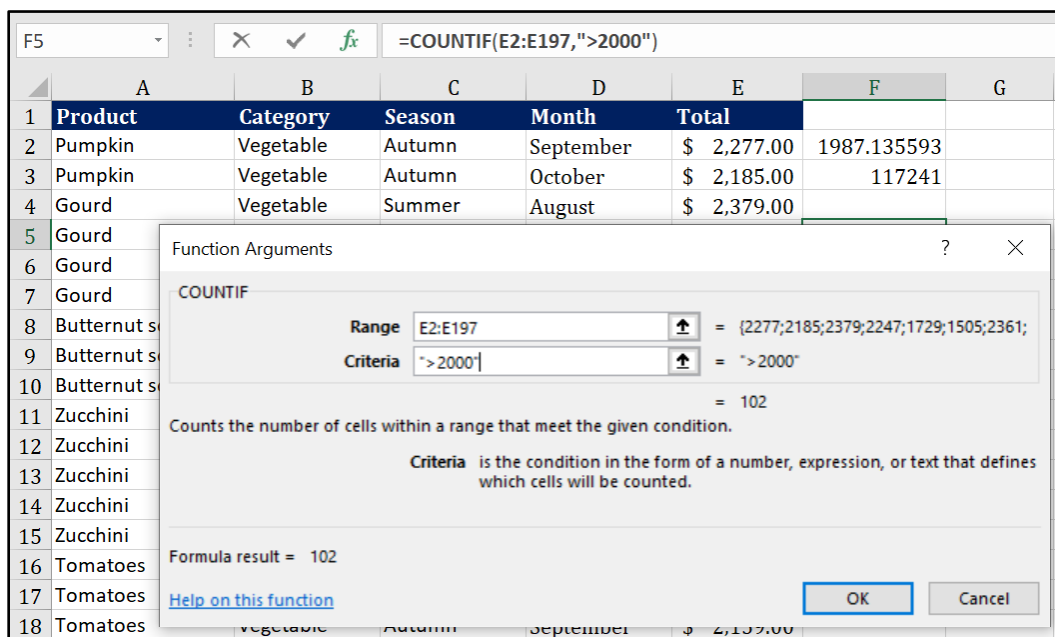
*Figure 5: **COUNTIF Function Arguments** dialog box*

3. Select either **OK** or Enter.

Other Functions

The following screenshot depicts some sample data.

	A	B	C
1	Jan	Feb	Mar
2	1000	1200	1300
3	1000	2000	2000

Figure 6: Example data

The following table provides a brief overview of additional functions included in Excel. The examples provided in this table use the sample data displayed in Figure 6.

Function	Description
IF	**Syntax:** **=IF(Logical_test, value_if_true, value_if_false)** Evaluates whether a condition is met. Returns one value if true and another if false. Example: **=IF(C2>A2,"Increasing","Investigate")** Result = Increasing
NOT	**Syntax:** **=NOT(Logical)** Evaluates whether any of the arguments are true. Returns FALSE if all arguments are false. Examples: **=NOT(A2>1000)** Result = TRUE **=IF(AND(NOT(A2<B2),NOT(B2<C2)),"Investigate","Increasing")** Result = Increasing

Function	Description
AND	**Syntax:** **=AND(Logical1, Logical2,....)** Evaluates whether all arguments are true. If all arguments are true, the result will be TRUE. If any of the arguments are not true, the result will be FALSE. Example: **=AND(A2>1000,B2>1000,C2>1000)** Result = FALSE **=IF(AND(A2>1000,B2>1000,C2>1000),"Good","Poor")** Result = Poor
OR	**Syntax: =OR(Logical1, Logical2,....)** Evaluates whether any arguments are true. If any arguments are true, the result will be TRUE. If all of the arguments are not true, the result will be FALSE. Examples: **=OR(A1>1000,B1>1000,C1>1000)** Result = FALSE **= IF(OR(A2>1000,B2>1000,C2>1000),"Good","Poor")** Result = Good

Table 2: Summary of other functions

Additional information

For more information on **Logical** functions, go to: Formulas and functions

For more information on **Math & Trig** functions, go to: Math and trigonometry functions (reference)

For more information on **Statistical** functions, go to: Statistical functions (reference)

Activity: Demonstrate and learn

In this activity, your teacher will demonstrate how to create a **SUMIF** function and change the criteria values. You'll then change the function to an **AVERAGEIF** to note the difference in the result.

Microsoft

Resources required

You'll need the following resources for this activity:

- Open **L1_T1_act_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to create a **SUMIF** function to total all the vegetable sales.

2. Change the contents of **G2** to **Fruit**, then **Nuts**, and then **Honey Based**.

3. Edit the function from **SUMIF** to **AVERAGEIF**.

Try-it: Use functions with single criteria

In this leveled try-it, you'll edit an existing function and you'll create another new function.

Try-it 1

Edit an existing formula to use the **SUMIF** function instead of **AVERAGEIF**.

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try1_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Examine the function in cell **H2**.

2. Edit the function to change it to a **SUMIF** function to find the total vegetable sales for winter.

3. Save the file as the same name *plus your initials*.

Try-it 2

Create a function to calculate the number of vegetable entries in a specified range.

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try2_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cell **H2**, create a function that will count the number of vegetables in the **Category** column.

2. Save the file as the same name *plus your initials*.

Try-it 3

Create a function that will average the total vegetable sale values for summer.

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try3_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cell **H2**, create a function that will average the values for total vegetable sales in summer.

2. Save the file as the same name *plus your initials*.

Topic 2: Use functions with multiple criteria

As you know, there are many logical and statistical functions available in Excel 2019. In the previous topic, you had the opportunity to practice some of these functions. Most work in a similar manner; using one of them will give you a general idea of how the others work. However, using nested functions, which means using multiple functions within the same formula, can be tricky.

Continuing from Topic 1, imagine a worksheet with three columns of data: the first column contains states, the second contains cities, and the third contains population statistics. You can count how many entries are listed, but what if you only want to count the entries above a specific figure? That's when you need to use **COUNTIF** instead of **COUNT**.
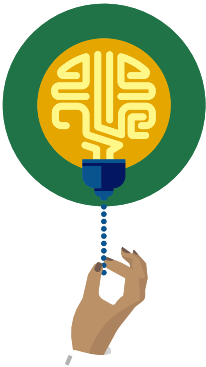
Did you know?

There are several new functions in Excel 2019 such as **SWITCH**, **IFS**, **MAXIFS**, **MINIFS**, and more. You'll get to try these out in this lesson. To learn more about the new functions included in Excel 2019, go to: What's new in Excel 2019 for Windows

IFS

IFS is a great new function available in Excel 2019. Evaluating your data against certain criteria often results in multiple possible outcomes, and not just a true or false value. The **IFS** function evaluates whether your data satisfies one or more conditions and returns a value corresponding to the first true condition. In previous versions of Excel, you would need to create a nested **IF** function, but in Excel 2019, you can use the **IFS** function. It belongs to the **Logical** category of functions and uses the following syntax:

=IFS(logical_test1, value_if_true1, logical_test2, value_if_true2,…)

To use the **IFS** function:

1. In the **Formula Bar**, enter **=IFS(** and then enter your question, followed by a comma.
2. Enter the result you want if the answer to your question is yes, followed by a comma.
3. Enter your next question, followed by a comma.
4. Enter the result you want if the answer to your second question is yes.
5. Continue entering your questions and the results you want until you have added all your questions.
6. Close the formula with a closed parenthesis **)** and then select Enter. Similar to how you used the other functions, you can use one of the following methods to enter a formula:
   - Select the **Formulas** tab, select the **Logical** category, and then select **IFS**.
   - On the **Formulas** tab, select **Insert Function**, or select the **Insert Function** button next to the **Formula Bar**.

Microsoft

- o Enter **IFS** into the search box and then select **Go** or select Enter. Alternatively, change the category from **Most Recently Used** to **Logical**.
- o Select **IFS** from the list of functions, and then select **OK**. The **Function Arguments** dialog box opens.
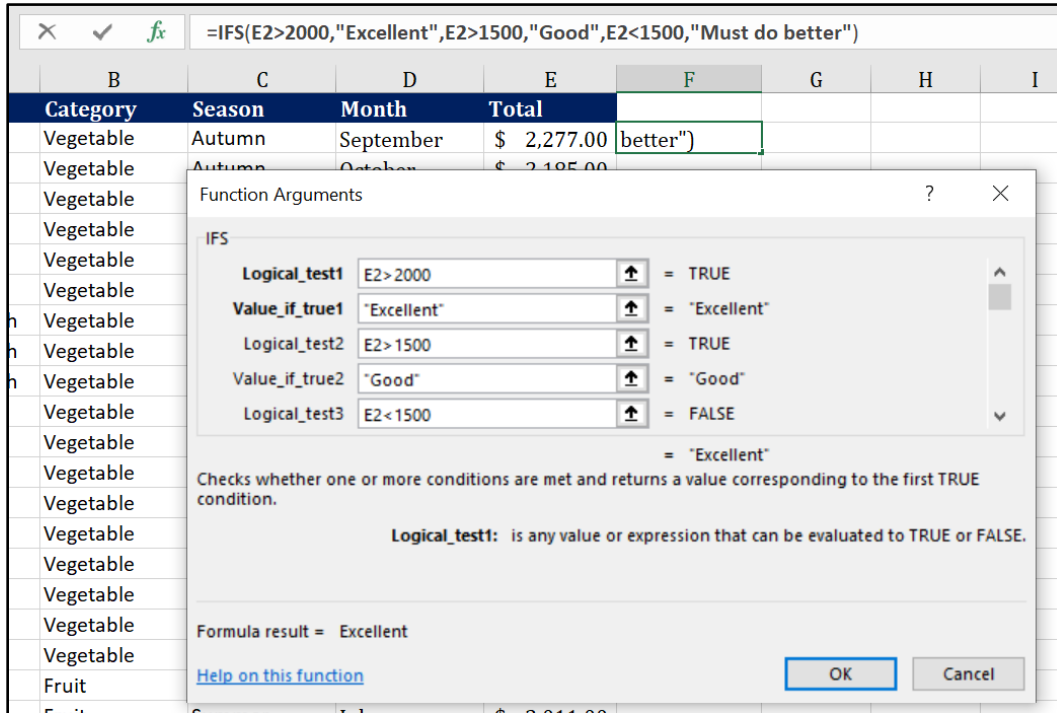
*Figure 7: **IFS Function Argument** dialog box*

7. As you enter your logical tests and the values you want if the result is true, Excel provides you more boxes to enter additional questions.
8. Select **OK** or select Enter to complete the function.

Did you know?

You can set up to 127 logical tests within an **IFS** function!

Additional information

For more information on the **IFS** function, go to: IFS Function

SWITCH

The **SWITCH** function compares one value against a list of values and returns the first matching value as the result. If no match is found, the function can return an optional default value. The syntax for **SWITCH** is **=SWITCH(expression, value1, result1, [default_or_value2, result2],…..)**. The part within square brackets is optional.

You can use this function to switch specific results to a different result. You could consider this to be similar to using the **Find** and **Replace** commands, except that you can replace more than one thing at the same time.

For example, imagine you have a worksheet that lists vegetables that are known by different names in different countries/regions, and you need to change the words to use the American names. You could find each word and replace it one by one or you could create a formula using the **SWITCH** function as shown in the following example:

=SWITCH(F4,"Aubergine","Eggplant","Chicory","Endive","Swede","Rutabaga","Co urgette","Zucchini",F4)

This formula evaluates the value in cell F4, and if it contains Aubergine, switches it to Eggplant; if it contains Chicory, switches it to Endive; and so on. If F4 doesn't contain any of those words, the function will return the original value of F4. Then, to tidy up the worksheet, you could copy the result and paste it on top of the original data as values to remove the formula. Excellent!

You can combine the **SWITCH** function with other functions; in lesson 4 of this module, you'll combine **SWITCH** and **WEEKDAY**.

AVERAGEIFS

The **AVERAGEIFS** function is a statistical function that finds the average (also known as the arithmetic mean) for the cells specified by a given set of criteria or conditions. The syntax for **AVERAGEIFS** is **=AVERAGEIFS(average_range, criteria_range1, criteria1, criteria_range2, criteria2,…)**.

To create an **AVERAGEIFS** function:

1. Enter **=AVERAGESIFS(** in the cell you want to create the formula.

2. Enter the range to be averaged if all the criteria are met. This can be a range, a whole column or a row, or a named range if you have created one, followed by a comma (**,**).

3. Enter the range where the first criteria will be evaluated, followed by a comma.

4. Enter the criteria, which can be a number, cell reference, expression such as **>100**, or text, followed by a comma (**,**).

5. Enter the next range where the next criteria will be evaluated, followed by a comma (**,**).

6. Enter the next criteria, followed by a comma (**,**) until you have completed adding all your criteria to evaluate, and then enter a closed parenthesis **)** to finish the formula.

7. Select Enter to complete the formula.

Alternatively, use the following steps:

1. Select the **Insert Function** button next to the **Formula Bar** or select **Insert Function** on the **Formulas** tab.

2. Enter **AVERAGE** into the search box, and then select either **Go** or Enter. Alternatively, in the **Or select a category** drop-down menu, change the category from **Most Recently Used** to **Statistical**.

3. Select **AVERAGEIFS** from the list of functions, and then select either **OK** or Enter. Alternatively, select the **Formulas** tab, select **More Functions**, select **Statistical**, and then select **AVERAGEIFS**. The **Function Arguments** dialog box opens as depicted in the following screenshot.
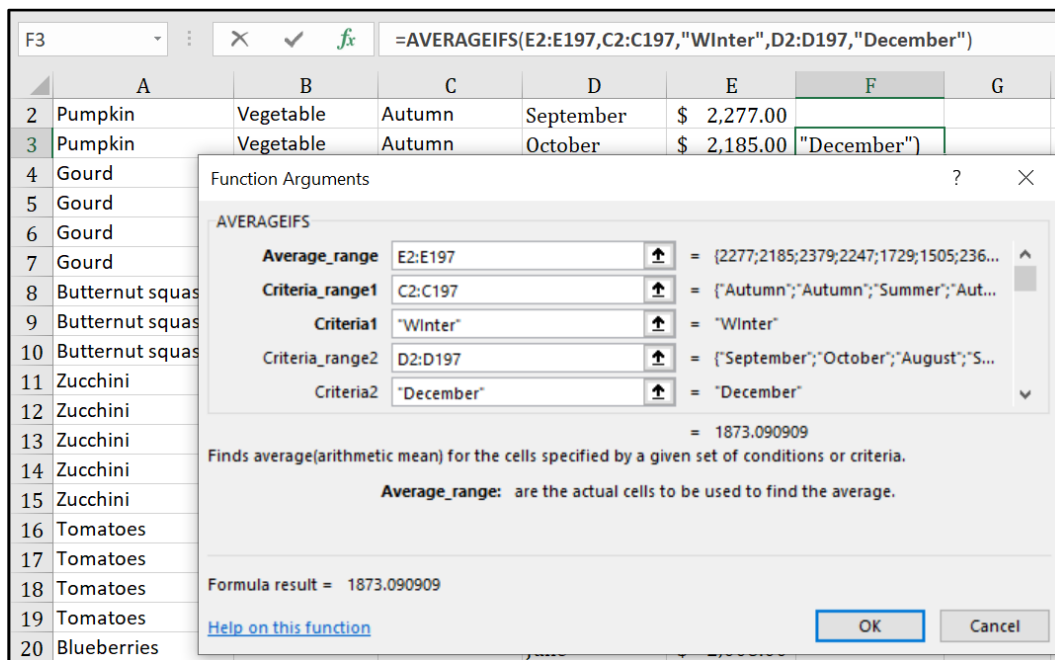
*Figure 8: **AVERAGEIFS Function Arguments** dialog box*

4. Enter values in the **Average_range**, **Criteria_range1**, and **Criteria1** boxes.

5. Excel will provide additional boxes in the **Function Arguments** dialog box to allow you to enter **Criteria_range2** value and **Criteria2** value.

Microsoft

6. Continue to add the additional criteria ranges and criteria values you need until you have completed adding all of your criteria.

7. Select either **OK** or Enter to complete the formula.

MAXIFS, MINIFS, COUNTIFS, and SUMIFS

- Excel includes several similar functions that you can use to perform specific evaluations of your data. The **MAXIFS** and **MINIFS** functions are included in the **Statistical** category, **COUNTIFS** in the **Logical** category, and **SUMIFS** in the **Math & Trig** category.

- These functions are very similar to the **AVERAGEIFS** function, and they perform the following calculations:

  o **MAXIFS** finds the highest value among cells specified by a given set of criteria or conditions.

  o **MINIFS** finds the lowest value among cells specified by a given set of criteria or conditions.

  o **COUNTIFS** counts the number of cells specified by a given set of criteria or conditions.

  o **SUMIFS** totals the values in the cells specified by a given set of criteria or conditions.

The syntax for these functions is the same as **AVERAGEIFS**. Simply replace **AVERAGEIFS** with **MAXIFS**, **MINIFS**, **COUNTIFS**, or **SUMIFS** as appropriate.

Editing functions

There are many methods you can use to edit a function. First, select the cell containing the function to edit, and then use one of the following options:

- Select the **Formula Bar**, make your alteration, and then select Enter to complete the edit.

- Select the **Insert Function** and then make your alteration in the **Function Arguments** dialog box. If there are nested functions within the same formula, select any of the function names within the **Formula Bar**; the **Function Arguments** dialog box will then switch to that part of the formula. Select either **OK** or Enter to complete the edit.

- Select the formula and then select F2, make your alteration, and then select Enter to complete the edit.

Additional information

For more information on the **SWITCH** function, go to: [SWITCH function](#)

Activity: Discuss and learn

In this activity you'll work in pairs, teams, or individually to match a function with its correct description.

Resources required

You'll need the following resources for this activity:

- Open **L1_T2_act_functions_starter.docx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Study the description in the first column of the table in the Word document.

2. Work in pairs, teams, or individually (as instructed by your teacher) to indicate the correct function against each description.

3. There are 12 functions to identify.

Try-it: Use functions with multiple criteria

In this leveled try-it, you'll create a **MAXIFS** function and describe what an **IFS** function is evaluating.

Try-it 1

Create a new formula that uses the **MAXIFS** function.

Resources

You'll need the following resources for this try-it:

- Open **L1_T2_try1_sample_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cell **F2**, create a function that will find the maximum sample value if the rate is greater than or equal to 3 and if it belongs to the periodic table group 2.

2. Save the file as the same name *plus your initials*.

Try-it 2

Describe what the **IFS** function is calculating in column D.

Resources

You'll need the following resources for this try-it:

- Open **L1_T2_try2_sample_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Examine the comment in cell **D2**.

2. Edit the comment to complete the description of what the function in cell **D2** is calculating.

3. Save the file as the same name *plus your initials*.

Wrap-up

Do you or your classmates have any concerns about today's topics? Maybe you can help. Make a note for the "mud puddle" or "parking lot" or send a short email to your teacher if your concerns are not answered. Then, use these questions to check what you learned in this lesson.

1. Which of the following functions does not exist in Excel 2019?

   Select the correct option.

   a. **AVERAGEIF**

   b. **MAXIF**

   c. **SUMIF**

   d. **MINIFS**

2. If the content of **A2** is 100 and the contents of **B2** is 200, what result would you get using the formula **=IF(AND(A2>50,B2>200),"Excellent","Needs improvement")**

   Select all that apply.

   a. Excellent

   b. You would get an error

   c. Needs improvement

   d. A2>50

3. You can use an **IFS** function instead of which of the following functions?

   Select all that apply.

   a. **Nested IF**

   b. **IF**

   c. **COUNTIF**

   d. **AND**

4. Identify the category to which the following functions belong.

   o **SUMIFS**
   o **COUNTIF**
   o **AVERAGEIFS**
   o **SWITCH**

   Categorize the following items by adding the function name next to each item.

   o **Math & Trig -** _____
   o **Statistical -** _____
   o **Statistical -** _____
   o **Logical -** _____

Lesson 2: Using lookup functions

Overview

Several **Lookup & Reference** functions are available in Excel 2019. **LOOKUP** is used when the key row or column is not adjacent to the data row or column. **VLOOKUP** and **HLOOKUP** are probably the most frequently used lookup functions. These functions are the same except for the direction of the lookup table. In this lesson, you'll learn how to use the **VLOOKUP** function and the **HLOOKUP** function. Imagine a worksheet containing the details of every student attending your school this year. The worksheet contains details such as name, date of birth, contact details, and grade results. You need to find some information about a specific group of students in another workbook. You could search for each student's details manually and enter the details you need yourself, or you could use a lookup function to find the information automatically.

Warm-up

Use these questions to find out what you already know about this lesson's topics.

1. What does the V in **VLOOKUP** mean?

   Select the correct option.

   a. Value

   b. Value_if_true

   c. Vertical

   d. View

2. The **HLOOKUP** function belongs to which category of functions?

   Select the correct option.

   a. Math & Trig

   b. Lookup & Reference

   c. Logical

   d. Statistical

3. There are many **Lookup & Reference** functions in Excel 2019, not all of which are mentioned in this lesson. Which of the following functions do not belong to the **Lookup & Reference** function category?

   Select all that apply.

   a. **REPLACE**

   b. **HLOOKUP**

   c. **LOOKUP**

   d. **SWITCH**

4. **VLOOKUP** will return a value from a column index number, and **HLOOKUP** will return a _____ index number.

   Fill in the blank space.

Topic 1: Use VLOOKUP

Have you ever found yourself manually searching for values within one table of data and then entering the values you need into another table? If you need to add more values, you have to repeat the process again and again. It's a task that can be time-consuming and boring. Luckily, you can use **VLOOKUP** or **HLOOKUP** for such repetitive tasks.

The **VLOOKUP** function belongs to the **Lookup & Reference** category; you can use it to find data in a table where the data is laid out vertically. There are four parts in a **VLOOKUP** function, and it has the following syntax: **=VLOOKUP(lookup_value, table_array, col_index_num, [range_lookup])**

Create a VLOOKUP function

To create a **VLOOKUP** by manually entering it:

1. Enter **=VLOOKUP(**.

2. In **Lookup_value**, enter the value you wish to find, followed by a comma. This can be a cell reference, text, or number.

3. In **Table_array**, enter the range of cells or table that contains the value you want to find, followed by a comma. The table array can be a defined range or table or a range of cells that may need to be absolute.

4. In **Col_index_num**, enter the column number within the table array that you want to return when the value you want to find has been found, followed by a comma.

5. Enter **False** or **0** for an exact match, or enter **True** or **1** for an approximate match.

6. Complete the formula with a closed parenthesis **)** and then select enter.

Alternatively, to create a **VLOOKUP** using the **Function Arguments** dialog box:

1. Select the **Insert Function** button next to the **Formula Bar** or on the **Formulas** tab.

2. Enter **VLOOKUP** into the search box and then select either **Go**, or change the category from **Most Recently Used** to **Lookup & Reference**.

3. Select **VLOOKUP** from the list of functions and then select **OK**. Alternatively, select the **Formulas** tab, select **Lookup & Reference**, and then select **VLOOKUP**. The **Function Arguments** dialog box opens as the following screenshot depicts.
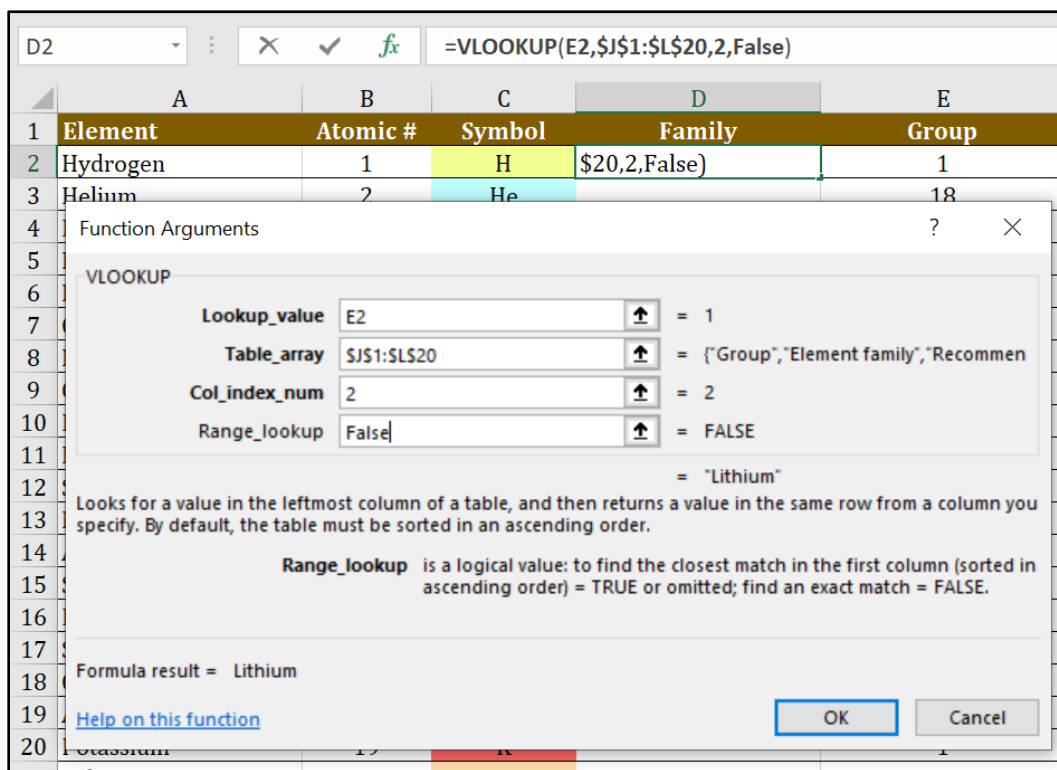
*Figure 9: **VLOOKUP Function Arguments** dialog box*

4. In **Lookup_value**, enter the value you want to find. This can be a cell reference, text, or a number.

5. In **Table_array**, enter the range or table of cells in which you want to find the value. The table array can be a defined range, a table, or a range of cells that may need to be absolute.

6. In **Col_index_num**, enter the column number you want to return the value from.

Microsoft

7. In **Range_lookup**, enter **False** or **0** for an exact match. For an approximate match, enter **True** or **1** or leave it blank.

8. Select either **OK** or Enter to complete the formula.

Note:

*   Use the following guidelines when creating a **VLOOKUP** function:
    o   When you use **TRUE** or **1** in **Range_lookup** or do not enter anything, Excel will return the closest match that is less than the number you are looking up. If there is no lower value to return, **#N/A** will be returned.
    o   A **VLOOKUP** function will check in the first column of the table array and will return the first match it can find.
    o   When looking up numerical values, you should sort the table array by the first column, smallest to largest first.
    o   If the **Range_lookup** is **FALSE** or **0** and the **Lookup_value** is text, you can use a wildcard character within the **Lookup_value**. Use a question mark (**?**) to match any single character or an asterisk (*****) to match any sequence of characters in the **Lookup_value**. To find an actual question mark or asterisk, type a tilde (**~**) before the character.

Video

To review the video on the **VLOOKUP** function, go to: [VLOOKUP function](#)

Activity: Discuss and learn

In this activity, you'll discuss the four parts of the **VLOOKUP** function that has been created in a worksheet. Your teacher will then create the formula again by entering the formula manually.

Resources required

You'll need the following resources for this activity:

*   Open **L2_T1_act_elements_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions.

1. Follow your teacher and participate in the discussion.

2. Create another formula with the **VLOOKUP** function along with your teacher for practice before filling out the rest of the elements.

Try-it: Use VLOOKUP

In this leveled try-it, you'll edit an existing **VLOOKUP** function and then create a new formula using this function.

Try-it 1

Edit the function on the **Samples** worksheet so that the levels in column **D** are correct.

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try1_elements_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Examine the values in column **D**. You'll notice that some of the values are correct and others are incorrect.

2. Edit the formula in **D2** to fix the errors.

3. Fix the rest of the formulas in column **D**.

4. Save the file as the same name *plus your initials*.

Try-it 2

Find the correct periodic table group for each element listed.

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try2_elements_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cell **B2**, on the **Samples** worksheet, create a formula that will find the element's periodic table group number from the **Elements_Info** defined range on the **Elements** worksheet.

2. Add the formula for the rest of the elements on the **Samples** worksheet.

3. Save the file as the same name *plus your initials*.

Additional information

For more information on using range names in functions, go to: Define and use names in formulas

Topic 2: Use HLOOKUP

You can use the **HLOOKUP** function to find data in a table where the data you need to retrieve is laid out horizontally. There are four components in the **HLOOKUP** function, which belongs to the **Lookup & Reference** category. The **HLOOKUP** function is the same as **VLOOKUP** except that it checks for a row value rather than a column value. The syntax for **HLOOKUP** is **=HLOOKUP(lookup_value, table_array, row_index_num, [range_lookup])**.

Create a HLOOKUP function

To create a **HLOOKUP** by manually entering it:

1. In the cell you want to use the formula, enter **=HLOOKUP(** and then complete the four parts of the function in the same way that you did for **VLOOKUP**.

2. Make sure that you are referring to the row number rather than the column number.

Alternatively, to create a **HLOOKUP** by using the **Function Arguments** dialog box:

1. Select the **Insert Function** button next to the **Formula Bar** or select **Insert Function** on the **Formulas** tab.

2. In the search box, enter **HLOOKUP** and then select either **Go**. Alternatively, in the **Or change the category** drop-down menu, change the category from **Most Recently Used** to **Lookup & Reference**.

3. Select **HLOOKUP** from the list of functions, and then select **OK**. Alternatively, select the **Formulas** tab, select **Logical**, and then select **HLOOKUP**.

Microsoft

4. In the **Lookup_value** box, enter the value you want to find. This can be a cell reference, text, or a number.

5. In **Table_array**, enter the range or table of cells you want to find the value in. The table array can be a defined range or table or a range of cells that may need to be absolute.

6. In **Row_index_num**, enter the row number you want to check.

7. In **Range_lookup**, enter **False** or **0** for an exact match. For an approximate match, enter **True** or **1**, or leave it blank.

8. Select **OK** or select Enter to complete the formula.

Note:

Use the following guidelines when creating a **HLOOKUP** function:

- When you use **TRUE** in **Range_lookup** or do not enter anything, Excel will return the closest match lower than the number you are looking up. If there is no lower value to return, #N/A will be returned.
- The **HLOOKUP** function checks the first row of the table array and returns the first match it can find.
- When looking up numerical values, you should sort the table array by the first row, smallest to largest first. To do that:
  - o Select the **Data** tab and then select **Sort**.
  - o Select the **Options** button and then select **Sort left to right** under **Orientation**.
  - o Continue to set the sort option you want.
- If the **Range_lookup** is **FALSE** or **0** and the **Lookup_value** is text, you can use a wildcard character within the Lookup_value. Use a question mark (**?**) to match any single character or an asterisk (*****) to match any sequence of characters in the Lookup_value. To find an actual question mark or asterisk, type a tilde (**~**) before the character.
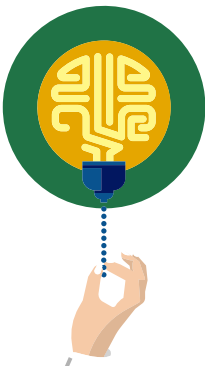
Did you know?

There's a new lookup function currently available in Office 365 that will be soon included in Excel 2019: the **XLOOKUP** function! Here's a link to the XLOOKUP function for you to review when you have a moment.

Additional information

For more information on the **HLOOKUP** function, go to: [HLOOKUP function](#)

Activity: Pose a question

Your teacher will ask you a question about the difference between the **VLOOKUP** and **HLOOKUP** function. You'll then create an **HLOOKUP** formula based on a **VLOOKUP** formula that has already been created.

Resources required

You'll need the following resources for this activity:

- Open **L2_T2_act_trace_elements_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Consider the difference between an **HLOOKUP** and **VLOOKUP**. Ask yourself:
   - What does the V stand for?
   - What does the H stand for?
   - What difference does it make to the formula?
2. Be prepared to share with the class.
3. Examine the **VLOOKUP** function in column **C** of the **Soil Sample 2019** worksheet.
4. Work with your neighbor to create a similar formula on the **Soil Sample 2020** worksheet, but use **HLOOKUP** instead. A range named **Level** has been created for your use as the table array on the **Soil Sample 2020** worksheet.

Try-it: Use HLOOKUP

In this standalone try-it, you'll work in pairs to write a description of the **HLOOKUP** and **VLOOKUP** functions.

Microsoft

Try-it

Imagine one of your peers has asked you to explain how to use lookup functions and the various elements in these functions. In this try-it, you'll try to describe the **HLOOKUP** and **VLOOKUP** functions to make it as easy as possible for your peers to understand how these functions work.

Resources

You'll need the following resources for this try-it:

- Open **L2_T2_try_trace_elements.xlsx** in this lesson's Learning Activity Resources as reference or create your own data in a blank workbook.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Use any method and/or help available to you and your partner to write a brief user guide that will help your friends understand these two functions.

2. Consider:

    o   Are all the four parts of the function required?
    o   What's the correct sequence for the functions?
    o   How would you make the formula easier to understand?
    o   What's the difference between an **HLOOKUP** and **VLOOKUP**?

3. Be prepared to share your work with the class.

4. Your teacher may ask you to hand in your work at the end of the lesson.

Wrap-up

For what kind of data would it be useful to apply the **VLOOKUP** or **HLOOKUP** functions? Discuss with your neighbor. Use the following questions to review what you learned in this lesson.

1. In a **VLOOKUP** or a **HLOOKUP** function, what should you enter in the fourth segment of the formula to specify that you want an approximate match return?

    Select all that apply.

    a. True

    b. Leave it blank

    c. False

    d. 1

2. A **VLOOKUP** function checks the _____ column in a table array to match it with the lookup value.

   Fill in the blank space.

3. When using a **VLOOKUP** function for a numerical value, it's best practice to sort the first column from _____ to _____

   Fill in the blank spaces.

4. What is the correct order of entering the four parts of an **HLOOKUP** function?

   Indicate the correct sequence by adding numbers 1-4 next to the following items.

   a. Row_index_num - _____

   b. Range_lookup - _____

   c. Table_array - _____

   d. Lookup_Value - _____

Lesson 3: Using lookup functions and external references

Overview

In this lesson, you'll learn how to use the **MATCH** and **INDEX** functions to find data. In the previous lesson, you learned that the **VLOOKUP** function checks the first column in the table array and the **HLOOKUP** function checks the first row in the table array for the value you want to find. But what if the value you want to find is not in the first column or row of the table array? That's when the **MATCH** and **INDEX** functions can help.

The second topic in this lesson will cover referencing data on other workbooks, which basically means linking cells from one worksheet to another so that they are automatically updated.

Warm-up

Use the following questions to find out what you already know about this lesson's topics.

1. To which category of functions does **MATCH** belong?

   Select the correct option.

   a. Logical

   b. Financial

   c. Lookup & Reference

   d. Statistical

2. When you reference another workbook in a formula, what type of brackets enclose the source workbook within the formula?

   Select the correct option.

   a. ( )

   b. < >

   c. [ ]

   d. { }

3. When you reference another workbook in a formula, what symbol is after the source worksheet name within the formula?

   Select the correct option.

   a. !

   b. ?

   c. $

   d. \

4. When the value you are searching for is not in the first column of a table array, you can use the _____ and/or _____ functions.

   Fill in the blank spaces.

Topic 1: Use MATCH and INDEX

The **MATCH** function on its own returns the relative position of a value in a specified list or range. The **INDEX** function returns a specific value or reference at the intersection of a column and row. You can use the **INDEX** function with a reference or an array. The **MATCH** and **INDEX** functions work well in combination with other functions, such as **VLOOKUP**.

MATCH function

The **MATCH** function belongs to the **Lookup & Reference** function category and uses the following syntax:

=**MATCH(lookup_value, lookup_array, [match_type])**

The **Lookup_value** and **Lookup_array** components are similar to the **VLOOKUP** and **HLOOKUP** function. The part in square brackets is optional but has three possible values that you can enter:

- Enter **0** to find an exact match you need to retrieve.
- Enter **1** to find the largest number, greater than or equal to the lookup value. However, the lookup array must be sorted smallest to largest.
- Enter **-1** for the smallest number, less than or equal to the lookup value. However, the lookup array must be sorted in largest to smallest order.

Here are some examples of the **MATCH** function:

- **=MATCH("Iron",A1:A24,0)** will return the position of Iron within the range A1:24. Based on the data in Figure 10, the result is 12.
- **=MATCH(200,B1:B24,-1)** will return the position of the smallest number, less than or equal to the lookup value. Based on the data in Figure 10, the result is 5, meaning anything below the fifth position (B5) is below 200.
- If the data in column B in Figure 11 is reversed, that is, sorted smallest to largest, **=MATCH(200,B1:B24,1)** will return the position of the highest number, greater than or equal to the lookup value. The result is 20.

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	A	B	C
1	**Element**	**Sample**	**Rate**
2	Calcium	315.00	3
3	Sodium	299.00	4
4	Sulphur	233.00	2
5	Potassium	220.00	5
6	Magnesium	180.00	2
7	Sulfate	147.00	Unrated
8	Chloride	143.00	Unrated
9	Nitrate	33.00	Unrated
10	Phosphoros	7.70	2
11	pH value	6.60	3
12	Iron	4.60	2
13	Manganese	2.70	4
14	Copper	2.65	4
15	Zinc	1.88	4
16	ECe (soil salinity)	0.99	2
17	Vanadium	0.98	2
18	Lead	0.82	1
19	Nickel	0.77	1
20	Strontium	0.48	1
21	Cobalt	0.10	1
22	Molybdenum	0.08	3
23	Cadmium	0.05	1
24	Lime (calcium carbonate)	0.05	Unrated

*Figure 10: Sample data for **MATCH** function*

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	A	B	C
1	**Element**	**Sample**	**Rate**
2	Cadmium	0.05	1
3	Lime (calcium carbonate)	0.05	Unrated
4	Molybdenum	0.08	3
5	Cobalt	0.10	1
6	Strontium	0.48	1
7	Nickel	0.77	1
8	Lead	0.82	1
9	Vanadium	0.98	2
10	ECe (soil salinity)	0.99	2
11	Zinc	1.88	4
12	Copper	2.65	4
13	Manganese	2.70	4
14	Iron	4.60	2
15	pH value	6.60	3
16	Phosphoros	7.70	2
17	Nitrate	33.00	Unrated
18	Chloride	143.00	Unrated
19	Sulfate	147.00	Unrated
20	Magnesium	180.00	2
21	Potassium	220.00	5
22	Sulphur	233.00	2
23	Sodium	299.00	4
24	Calcium	315.00	3

*Figure 11: Sample data for **MATCH** function*

INDEX function

The **INDEX** function also belongs to the **Lookup & Reference** function category. However, the **INDEX** function has two forms: the array form and the reference form. The array form returns an entire row or column. The reference form returns the value in the intersecting cell where the row and column meet:

- =INDEX(array, row_num, column_num)
- =INDEX(reference, row_num, [column_num], [area_num])

Did you know?

Curly brackets (braces) around a formula {....} means that the formula is a superpower formula because it performs multiple calculations in the same formula. It's also known as an array formula; to make it work correctly, you must complete the formula by selecting Ctrl + Shift + Enter.

Here are some examples of the **INDEX** function based on the data in Figure 12.

	A	B	C	D	E	F	G	H	I	J	K
1	**Sample comparisons**										
2											
3	2016 Sample				2018 Sample				2020 Sample		
4	**Elements**	**Sample**	**Rate**		**Elements**	**Sample**	**Rate**		**Elements**	**Sample**	**Rate**
5	Copper	3.55	5		Copper	2.65	4		Copper	2.5	4
6	Iron	6	3		Iron	4.6	2		Iron	4.5	2
7	Manganese	4.23	4		Manganese	2.7	4		Manganese	1.5	3
8	Phosphorous	10.5	3		Phosphorous	7.7	2		Phosphorous	7.6	2
9	Potassium	250	5		Potassium	220	5		Potassium	215	5
10	Zinc	2.2	5		Zinc	1.88	4		Zinc	1.48	3
11											

*Figure 12: Sample data for **INDEX** function*

- To find the rate for Zinc that was recorded in 2016, the formula is:
  =INDEX(A5:C10,6,3).

- This will return the contents of the cell in the sixth row and third column within the range **A5** to **C10**. The result will be 5.

- To find the rate for Zinc in 2016, 2018, or 2020, the formula is:
  =INDEX((A5:C10,E5:G10,I5:K10),6,3,2). The reference part of the function has been edited to include three ranges to which the function should refer. The 2 at the end of the formula refers to which of the three tables to search. In this case, it is the second table (**E5** to **G10**). The result will be 4.

  =INDEX((A5:C10,E5:G10,I5:K10),6,3,3). The 3 at the end of the formula indicates that the function should refer to the third table (**I5** to **K10**). The result will be 3.

- When using the array form of the **INDEX** function, you must indicate the cells in which you want the results to be displayed. For example, if there are three values to return from a row, you need to select three cells while creating the formula. When you have created the formula, you must select Ctrl+Shift+Enter to complete it; otherwise, you won't get the correct answer. This creates an array formula with curly brackets (braces) at either end of the formula:

  {=INDEX((A5:C10,E5:G10,I5:K10),6,0,3)}

  This formula will return the entire sixth row in the third table; the result will be Zinc, 1.48, and 3.

Combine MATCH and INDEX

Instead of using a **VLOOKUP** or **HLOOKUP** function to find a value, you can combine **MATCH** and **INDEX** in the same formula. This could be helpful when you need to find a value that is not in the first column or row of the table array.

In the following example, **=INDEX(A1:E119,MATCH("Fe",B1:B119,0),4)**, the formula returns a value that's in the fourth column of a data table **A1** to **E119**. The value to find is in the second column (**B1** to **B119**), and the value to return is in the fourth column; therefore, using **VLOOKUP** will not help. You could rearrange the table so that the column containing Fe is in the first column, but sometimes you won't want to change the data at all.

The outer component of the formula **=INDEX(A1:E119,...,4)** specifies where to find the value and which column to return when the value is found.

The inner component **MATCH("Fe",B1:B119,0)** specifies what needs to be found, where to find it within the table, and to return an exact match.

Video

To review the video on the **MATCH** function, go to: MATCH function

To review the video on the **INDEX** function, go to: INDEX function

Activity: Pose a challenge

In this activity, your teacher will ask questions about the **MATCH** and **INDEX** functions. Consider the possibility of using **VLOOKUP** or **HLOOKUP** to find specific data.

Microsoft

Resources required

You'll need the following resources for this activity:

- Open **L3_T1_act_elements_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Examine the data on the **Elements** worksheet. Consider the following:

    o If you wanted to find the symbol for any of the elements, could you use **VLOOKUP** or **HLOOKUP**? If not, why not?

    o Is it possible to extract a full row using **MATCH** or **INDEX**?

2. Switch to the **Searching Elements** worksheet and examine the function in cell **J2** and in the cells **I7** to **L7**.

3. Check your understanding of how the function works.

4. Change the contents of cell **I2** to any other symbol listed in column **B**. Does the result in **J2** update?

5. Change the row number in any of the formulas in the range **I7** to **L7**. Does the result update? If not, why not?

6. Follow along as your teacher recreates one of the functions.

Try-it: Use MATCH and INDEX

In this leveled try-it, you'll edit an existing **MATCH** or **INDEX** function, or you'll create a new formula using the **MATCH** and **INDEX** functions.

Try-it 1

A **MATCH** function has been created, but it needs to be combined with **INDEX** to retrieve the name of the element and not just the position in the column.

Resources

You'll need the following resources for this try-it:

- Open **L3_T1_try1_elements_starter.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Examine the function in cell **J2**. Notice it's not retrieving the correct value. It contains the formula **=MATCH(I2,B1:B119,0)** and is therefore only returning the position of the contents of cell **I2** within the **Elements** column.

2. Edit the formula to include the **INDEX** function so that it picks up the Element name for the symbol in **I2** (you can use the formula in **K6** as reference).

3. Change the contents of cell **I2** to **Cr** to check that your formula works.

4. Save the file as the same name *plus your initials*.

Try-it 2

An **INDEX** function has already been created, but it needs to be combined with **MATCH** to return the required results.

Resources

You'll need the following resources for this try-it:

*   Open **L3_T1_try2_elements_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Examine the function in cell **J2**. It contains an error because it's unclear which row and column need to be matched.

2. Edit the formula to include the **MATCH** function so that it retrieves the Element for the symbol in **I2** (you can use the formula in K6 as reference).

3. Change the contents of cell **I2** to **Rb** to check that your formula works.

4. Save the file as the same name *plus your initials*.

Try-it 3

Create a new formula using both the **INDEX** and **MATCH** functions.

Resources

You'll need the following resources for this try-it:

*   Open **L3_T1_try3_elements_starter.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cell **J2**, create an **INDEX** function with a nested **MATCH** function so that you can find the Element that matches the contents of **I2** in the range **A1** to **E119**.

2. Copy the formula from **J2** to **K2**, and then edit it to find the Group number.

3. Save the file as the same name *plus your initials*.

Topic 2: Reference data from other workbooks

What if you have to regularly refer to cells in various workbooks? For example, you could have a workbook that summarizes data from several workbooks. The other workbooks are updated on a regular basis, which means that you need to constantly update the summary workbook. How time consuming would that be? If the data from the other workbooks were linked to the summary workbook, the values would always be updated automatically.

Reference another workbook

When you reference an external workbook in your workbook, you are creating a link. The following procedure is one of the simplest methods to link to another workbook:

1. Open both workbooks (the destination and source workbooks).

2. In the destination workbook, select the cell in which you want to add the reference.

3. Enter an equal sign (**=**).

4. Select the source workbook, and then select the cell(s) you want to refer to.

5. Select Enter.

6. You'll be automatically returned to the destination workbook. If the data in the source workbook is updated, it will be automatically updated in the destination workbook, too. We recommend that you keep both the source and destination workbooks open when you are updating data in the source workbook. Sometimes, the destination workbook might not get updated correctly if it's closed.

Reference a defined range in another workbook

If the source workbook contains a defined range name, you can link to the whole range.

1. Open both the destination and source workbooks.

2. In the destination workbook, select the cell in which you want to add the reference.

3. Enter an equal sign (**=**).

4. Select the source workbook, but don't select a specific cell. To select the source workbook, on the **View** tab, in the **Window** group, select **Switch Windows**, or select Alt+Tab on your keyboard. (You many need to select Tab more than once to select the correct workbook.)

5. Select F3, and the **Paste Name** dialog box will open as depicted in Figure 13.
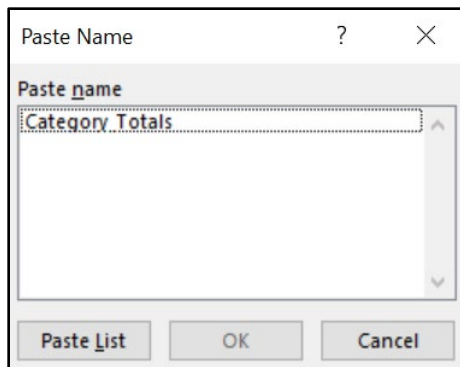
*Figure 13: **Paste Name** dialog box*

6. In the **Paste_name** list, select the range to link to, and then select **OK**. You'll be automatically returned to the destination workbook, and the whole range will be linked.

Security warnings

When you open a workbook that contains links to other workbooks, Excel might display a security warning message under the ribbon as depicted in Figure 14.
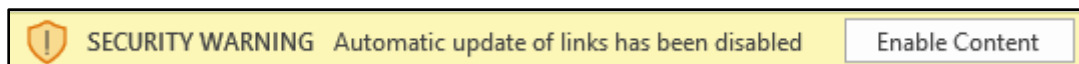
Figure 14: Security Warning message

Select **Enable Content** to continue working in the workbook.

If a source workbook has been updated at any time without the destination workbook being open, you'll receive a message as depicted in Figure 15.
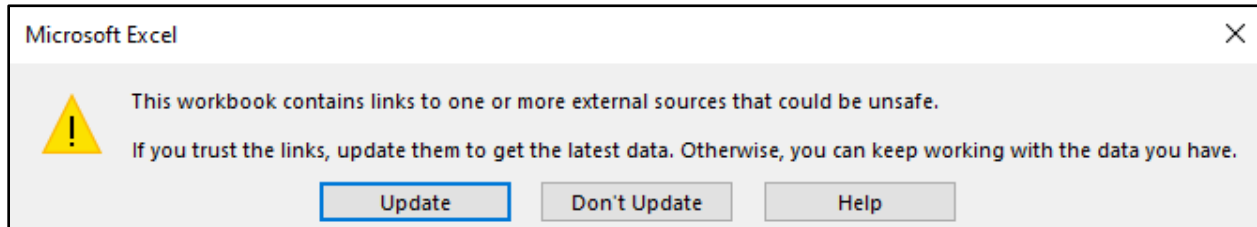
*Figure 15: **Security Warning** dialog box*

If you do receive a warning like this, don't panic. Select **Update** if you are happy to go ahead and update the current workbook, or select **Don't Update** if you would prefer not to. However, be extra careful when making the decision to update or not. If columns or rows have been inserted into the source workbook since you first created the link, the cells in the destination workbook might be referring to the wrong cells! If this happens, close the workbook without saving, and then open again and select **Don't Update** instead. Alternatively, you may need to create the link again.

Break a link

At any time, you can remove the link to an external workbook. To do this:

1. On the **Data** tab, in the **Queries & Connections** group, select **Edit Links**.

2. In the **Edit Links** dialog box, select the link you want to remove, and then select **Break Link**. You could also copy and paste the cell containing the link on top of the same cell as a value. To do so, copy the cell, and then either access the context menu (right-click) or select the drop-down menu on the **Paste** button on the **Home** tab, and then select **Values**.
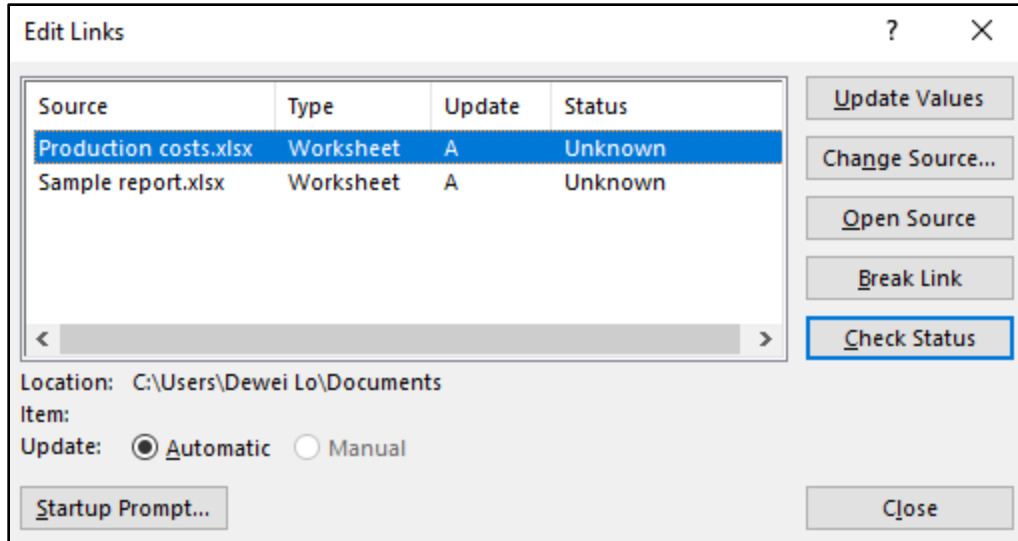
*Figure 16: **Edit Links** dialog box*

From this dialog box, you can also:

- Update the linked values.
- Change the source to a different workbook.
- Open the source workbook and check the status of the links.

Additional information

For more information on referencing data from other workbooks, go to: Create an external reference (link) to a cell range in another workbook

Activity: Show and tell

In this activity, you'll learn how to reference data from other workbooks and find out the challenges that this might cause.

Resources required

You'll need the following resources for this activity:

- Open **L3_T2_act_summary_starter.xlsx**, **L3_T2_act_finances.xlsx**, and **L3_T2_act_sales.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as your teacher links data from the finance workbook into the summary workbook.

2. Discuss what challenges this may create.

Try-it: Reference data from other workbooks

In this leveled try-it, you'll create links to other workbooks.

Try-it 1

Create three links from one workbook to another.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try1_summary_starter.xlsx** and **L3_T2_sales.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In **L3_T2_try1_summary_starter.xlsx**, on the **Summary** worksheet, in cell **B18**, create a link to the cell **E174** on the **Forecast Sales** worksheet in **L3_T2_sales.xlsx**.

2. Repeat to link **B19** to **F174** and **B20** to **G174**.

3. Save the file as the same name *plus your initials*.

Try-it 2

Create a link to another workbook by using the **SUM** function.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try2_summary_starter.xlsx** and **L3_T2_sales.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Instructions

The following are the general tasks that you need to perform during this try-it.

1. In cell **B18** on the **Summary** worksheet in **L3_T2_try2_summary_starter.xlsx**, create a formula that totals the cells **E174** to **G174** in the **L3_T2_sales.xlsx** workbook.

2. Save the file as the same name *plus your initials*.

Try-it 3

Create a link to another workbook that averages a defined named range.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try3_summary_starter.xlsx** and **L3_T2_finances.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it.

1. In cell **B4** on the **Summary** sheet in **L3_T2_try2_summary_starter.xlsx**, create a formula that averages the named range **Category_Totals** in the **L3_T2_finances.xlsx** workbook.

2. Save the file as the same name *plus your initials*.

Wrap-up

Use these questions to check what you learned in this lesson.

1. To return an exact match by using the **MATCH** function, what value would you use for the **match_type**?

   Select the correct option.

   a. -1

   b. 1

   c. 0

   d. Leave it blank

2. When referencing a named range in another workbook, what keyboard shortcut can you use to open the **Paste Name** dialog box?

   Select all that apply.

   a. F1

   b. F2

   c. F3

   d. F4

3. To break a link from one workbook to another, select the **Data** tab and then select **Edit Links**. Select the link to break and then select _____.

   Fill in the blank space.

4. Order the following components for the **INDEX** function syntax in the reference form in the correct sequence.

   Indicate the correct sequence by adding numbers 1-4 next to the following items.

   a. Column_num - _____

   b. Reference - _____

   c. Area_num - _____

   d. Row_num - _____

Lesson 4: Using date and time functions

Overview

Wouldn't it be great to be sure that when you are working with dates in a workbook that your data is always up to date? Well, Excel 2019 has a selection of date and time functions that can help you. In this lesson, you'll learn how to use the **NOW**, **TODAY**, **WEEKDAY**, and **WORKDAY** functions. One of the key things to remember when working with date and time functions is that you should check the formatting that has been applied to all cells involved in the formula, including the cell where the result is displayed.

Warm-up

Use these questions to find out what you already know about this lesson's topics.

1. What is the keyboard shortcut to enter the current time into a cell?

   Select the correct option.

   a. Ctrl + semicolon

   b. Ctrl + Shift + semicolon

   c. Ctrl + tilde

   d. Ctrl + D

2. If you want to calculate the next three working days from a specific date, which of the following functions would you use?

   Select the correct option.

   a. **WEEKDAY**

   b. **NETWORKDAYS**

   c. **WORKDAY**

   d. **DAY**

3. Which of the following functions will help keep current a formula that refers to dates?

    Select all that apply.

    a. **HOUR**

    b. **NOW**

    c. **MINUTE**

    d. **TODAY**

4. To identify a day of the week as a number rather than a text value, you can use the _____ function.

    Fill in the blank space.

Topic 1: Use NOW and TODAY

Using the **NOW** or **TODAY** function is an excellent way of ensuring that formulas or cells referring to dates are always current. You can use these functions on their own, and they both work in the same way. The **NOW** function returns the date and current time, and the **TODAY** function returns the date only. However, when you combine either function with other functions, you can perform highly complex calculations.
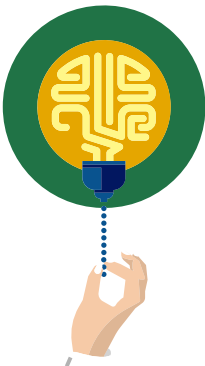
Did you know?

Excel stores dates as sequential serial numbers, which means they can be used in calculations. Number 1 is January 1, 1900. Number 2 is January 2, 1900 and so forth. That's why, if a cell containing a date has been formatted as a number, you get a value such as 43831.

NOW function

The **NOW** function syntax is **=NOW()**. It's particularly helpful when you need to display the current date and time in a worksheet, and you need it to update automatically every time you open the workbook. Similarly, when you use **NOW** within a formula, the formula result will also be up to date to the very minute and second according to the clock in your device. This is great for recording the time you started a task against the time you finished it because you can subtract one from the other to calculate the exact amount of it took to complete the task. What a great tool for time management!

TODAY function

The **TODAY** function syntax is **=TODAY()**. The **TODAY** function is similar to the **NOW** function. It's useful when you want to display the current date on a worksheet whenever you open the workbook. It's also useful for calculating intervals between dates, in days. For example, you could have a cell with the start date and another with the finish date, and then subtract one from the other to work out how many days are between them. You may need to change the formatting to **General** if the result is returned in a date format.

Date and Time keyboard shortcuts

There are a couple of keyboard shortcuts that you can use to enter the date and/or time into a cell. The important thing to remember is that the shortcuts keep the date or time static from the moment you use them according to the date and time settings on your device. This means they are perfect for recording the actual date or time without having to enter it yourself.

The keyboard shortcuts for inserting the date and time into a cell are:

- Time: Ctrl+ : or Ctrl + Shift + ; (depending upon the type of keyboard you are using)
- Date: Ctrl + ;

The following table provides a few examples of formulas using **NOW** or **TODAY**. For all of the **TODAY** examples listed, you would get the same result using **NOW**.

Formula	Result
=NOW()-2.5	The date and time 2.5 days ago
=TODAY()-30	The date 30 days ago
=TODAY()+14	The date two weeks from now
=MONTH(TODAY())	The current month
=INT((TODAY()-A1)/365)	The number of years between the dates in cell A1. The **INT** function at the start removes any decimal points and leaves the integer only.
=IF(A1>TODAY(),"Future","Past")	If the date in A1 is greater than the current date, the result will be Future; otherwise, the result will be Past.

Table 3: Examples of formulas

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Note: When using date and time functions, take care to check the formatting that has been applied to the cells. You may think you have the wrong result, when it's really just a matter of fixing the formatting. For example, you might need to change from a **Date** format to **General** or **General** to **Short Date** or **Long Date**.

Additional information

For more information on the **TODAY** function, go to: <u>TODAY function</u>.

For more information on the **NOW** function, go to: <u>NOW function</u>

Activity: Each one, teach one

In this activity, you'll take a few minutes to research the **TODAY** and **NOW** functions. You'll then teach your partner what you learned.

Resources required

You'll need the following resources for this activity:

- Create a blank workbook to practice your formulas.

Activity instructions

Participate in the activity by following these instructions:

1. Use any option available to you to research the **NOW** and **TODAY** functions.

2. Enter some random dates in any cell in the workbook to practice with.

3. Teach your partner something about each formula.

Try-it: Use NOW and TODAY

In this standalone try-it, you'll answer a series of date-related questions by using either **NOW** or **TODAY**.

Resources

You'll need the following resources for this try-it:

- Open **L4_T1_try_question_time.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Answer the questions in column **A** using either the **NOW** function or the **TODAY** function, or refer to a cell within the worksheet that contains the **NOW** or **TODAY** function.

2. Add a couple of your own questions to the list.

3. Compare your results with your classmates.

4. Did anyone add the same questions as you?

5. Save the workbook as the same name *plus your initials.*

Topic 2: Use WEEKDAY and WORKDAY

The **WEEKDAY** and **WORKDAY** functions belong to the **Date & Time** function category. If you ever find yourself counting days between dates using a calendar, you'll find both of these functions useful.

WEEKDAY function

The **WEEKDAY** function evaluates a date and returns the day of the week as an integer. The syntax is =**WEEKDAY(serial_number, [return_type])**.

Serial_number refers to the date, and **return_type** is optional. If you omit it, Sunday will be returned as a 1, Monday will be returned as a 2, and so on. *Figure 17* lists the return types that are available in Excel 2019. The value that will be returned in the example depicted in the following screenshot will be 5 for Friday.
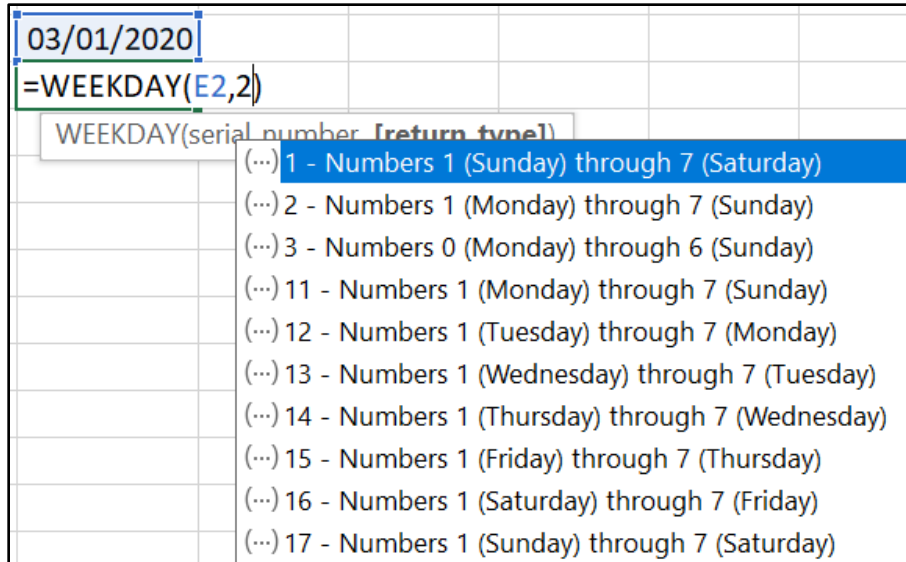
*Figure 17: **WEEKDAY** function return types*

WORKDAY function

The **WORKDAY** function is great for adding days onto a date, excluding weekends. It can even exclude bank holidays if you include them in the function! The syntax is **=WORKDAY(start_date, days, [holidays])**. Holidays is optional but enables you to achieve a more accurate result if included. When including holidays, you can refer to another workbook that contains a list of bank holidays or you can add the list into your current worksheet if you want to. Don't forget to check the formatting that has been applied to the result!

Imagine you had a task to complete within seven working days (in your case, that might be school days), and you were given the task on a Monday. The due date is not next Monday, it's next Wednesday. If that week included one bank holiday, then the due date would be Thursday. If you wanted to calculate how many days it actually took you to complete the task, you could use the **NETWORKDAYS** function.

Did you know?

Not every nation or region has Monday as the first day of the working week. For some, Friday and Saturday constitute the weekend. Luckily, there is a function available that can deal with that: WORKDAY.INTL function. How cool is that?

WEEKDAY combined with SWITCH

When working with the **WEEKDAY** function, you might find that having the day returned as an integer is a little hard to understand or not very useful. If you combine the **WEEKDAY** with the **SWITCH** function, you can display the integer as a text value.

The following examples are based on the cell **C2** containing **2/29/2020**, which is a Saturday. The formula in the first example uses **WEEKDAY** only, and the second example uses the same function in combination with **SWITCH**.

=WEEKDAY(C2,2) returns a result of 6

=SWITCH(WEEKDAY(C2,1),6,"Saturday",7,"Sunday","Weekday") returns a result of Saturday

The formula in the second example translates as: if the day equals 6, switch it to Saturday; if it equals 7, switch it to Sunday; otherwise, switch it to Weekday.

Additional information

For more information on the **WEEKDAY** function, go to: WEEKDAY function

For more information on the **WEEKDAY** function, go to: WORKDAY function

For more information on date and time functions, go to: Date and time functions (reference)

Activity: Discuss and learn

In this activity, your teacher will ask a volunteer to guess what the **WEEKDAY** and **WORKDAY** functions can do. The volunteer will then demonstrate each function using random dates or dates suggested by you or your classmates.

Resources required

You'll need the following resources for this activity:

* Open **L4_T2_holidays.xlsx** in this lesson's Learning Activity Resources for reference and create a blank workbook or use any other open workbook to practice on.

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Using advanced formulas

Activity instructions

Participate in the activity by following these instructions.

1. In a blank worksheet, enter a few random dates into a few cells.

2. You can use a keyboard shortcut or use a function to enter the current date if you want.

3. Consider the kind of questions you could answer using the **WORKDAY** or **WEEKDAY** functions.

4. Use **L4_T2_holidays.xlsx** as reference with the **WORKDAY** function.

5. Prepare to share your thoughts with the class.

Try-it: Use WEEKDAY and WORKDAY

In this leveled try-it, you'll create a formula that uses the **WEEKDAY** function or a formula that uses the **WORKDAY** function.

Try-it 1

Create a function that helps you discover what day of the week you were born on.

Resources

You'll need the following resources for this try-it:

- Create a new blank workbook or use the same one from the previous activity.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Enter a random date at least 16 years ago in cell **A1**.

2. Create a function in the adjacent cell that returns the day of week of the date you entered using the return type that would display a Monday as 1.

3. Save the workbook as **Weekday_***plus your initials.*

Try-it 2

Create a function that will calculate the date in 30 working days, including bank holidays for the current year.

Microsoft

59

Resources

You'll need the following resources for this try-it:

- Open **L4_T2_holidays.xlsx** and **L4_T2_try2_sample_dates_starter.xlsx** in this lesson's Learning Activity Resources for reference and create a new blank workbook or use the same one from the previous activity.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cell **B2**, use a keyboard shortcut to enter today's date so that it doesn't update in **L4_T2_try2_sample_dates_starter.xlsx**.

2. In cell **B3**, create a function that will calculate 30 working days in the future using **B2** as the start and will take into account the bank holidays listed in **L4_T2_holidays.xlsx**.

3. In cell **B4**, calculate how many days there are between the cells **B2** and **B3**.

4. Save the workbook as the same name_*plus your initials*.

Wrap-up

If time permits, you can try creating an **IF** function that includes **TODAY**. For example, if a cell is greater than today, it's in the future; if it's less than today, it's in the past. Then use the following questions to check what you learned in this lesson:

1. The result of a formula should be 12/31/2020 and it displays as 44196. Which of the following formats will fix it?

   Select all that apply.

   a. Number

   b. General

   c. Short Date

   d. Long Date

2. The **WEEKDAY** function has several return types that you can use to represent the day of the week as a number. If you enter 2 as the return type, the result you get is 1. What day of the week does 1 refer to?

    Select the correct option.

    a. Friday

    b. Saturday

    c. Sunday

    d. Monday

3. To represent Sunday as 1 in the **WEEKDAY** function, which return type can you use from the following?

    Select all that apply.

    a. Omit it

    b. 1

    c. 11

    d. 17

4. Which of the following is the correct syntax for the **WORKDAY** function?

    Select the correct option.

    a. =WORKDAY(start_date, days)

    b. =WORKDAY(start_date, days, [holidays])

    c. =WORKDAY(serial_number, [return_type])

    d. =WORKDAY(serial_number, days, [holidays]).

Microsoft

Lesson 5: Excel customization options

Overview

In this lesson, you'll learn how to configure when Excel updates formulas on your workbook and how to change **Excel Options** to suit your needs, potentially improving your productivity.

Warm-up

Use these questions to find out what you already know about this lesson's topics.

1. By default, how are formulas set to update?

    Select the correct option.

    a. By selecting F9

    b. Automatically

    c. Automatically except for data tables

    d. Manually

2. Which of the following options can you use to set calculation options?

    Select all that apply.

    a. Select the **Format** tab, and then select the **Formula Auditing** group.

    b. Select the **Format** tab, and then select the **Calculation** group.

    c. Select **File**, select **Options**, and then select **General**.

    d. Select **File**, select **Options**, and then select **Formulas**.

3. Which of the following tabs are available in **Excel Options**?

    Select all that apply.

    a. Advanced

    b. Data

    c. Ease of Access

    d. Review

4. Which of the following **Excel Options** tabs can you use to change the default font type and font size?

    Select the correct option.

    a. Add-ins

    b. Formulas

    c. General

    d. Proofing

Topic 1: Set formula calculation options

Imagine a workbook that links to several other workbooks, thus linking thousands of cells. Every time you open the linked workbook, it accesses all the linked data in the other workbooks, whether they are open or not. It can take several minutes to completely open the workbook and to save it. That's okay if you are super patient, but that can be very time-consuming. In Excel 2019, you can choose to update calculations when you want to, rather than every time you make a change to a cell.

Set calculation options by using the ribbon

There are two main methods you can use to set calculation options to suit your needs. The simplest method is by using the ribbon.

1. Select the **Formulas** tab, and in the **Calculation** group, select **Calculation Options**.
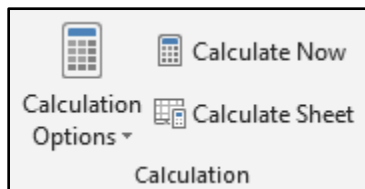
*Figure 18: **Calculation** group*

2. Select one of the three available options: **Automatic**, **Automatic Except for Data Tables**, or **Manual**.

3. If you select **Automatic Except for Data Tables** or **Manual**, when you are ready to update the formulas, you can select **Calculate Now** from the **Calculation** group (or select F9) or select **Calculate Sheet** to update the current sheet only (or select Shift+F9).

4. Select **Calculation Options** and then select **Automatic** to return to the default settings.

Set calculation options by using Excel Options

You can also set the calculation options by using **Excel Options**. To do this:

1. Select **File** and then select **Options**.

2. In the **Excel Options** dialog box, select the **Formulas** tab, and then select the option you want under **Calculation Options**.

3. Select **OK** to save your modifications.
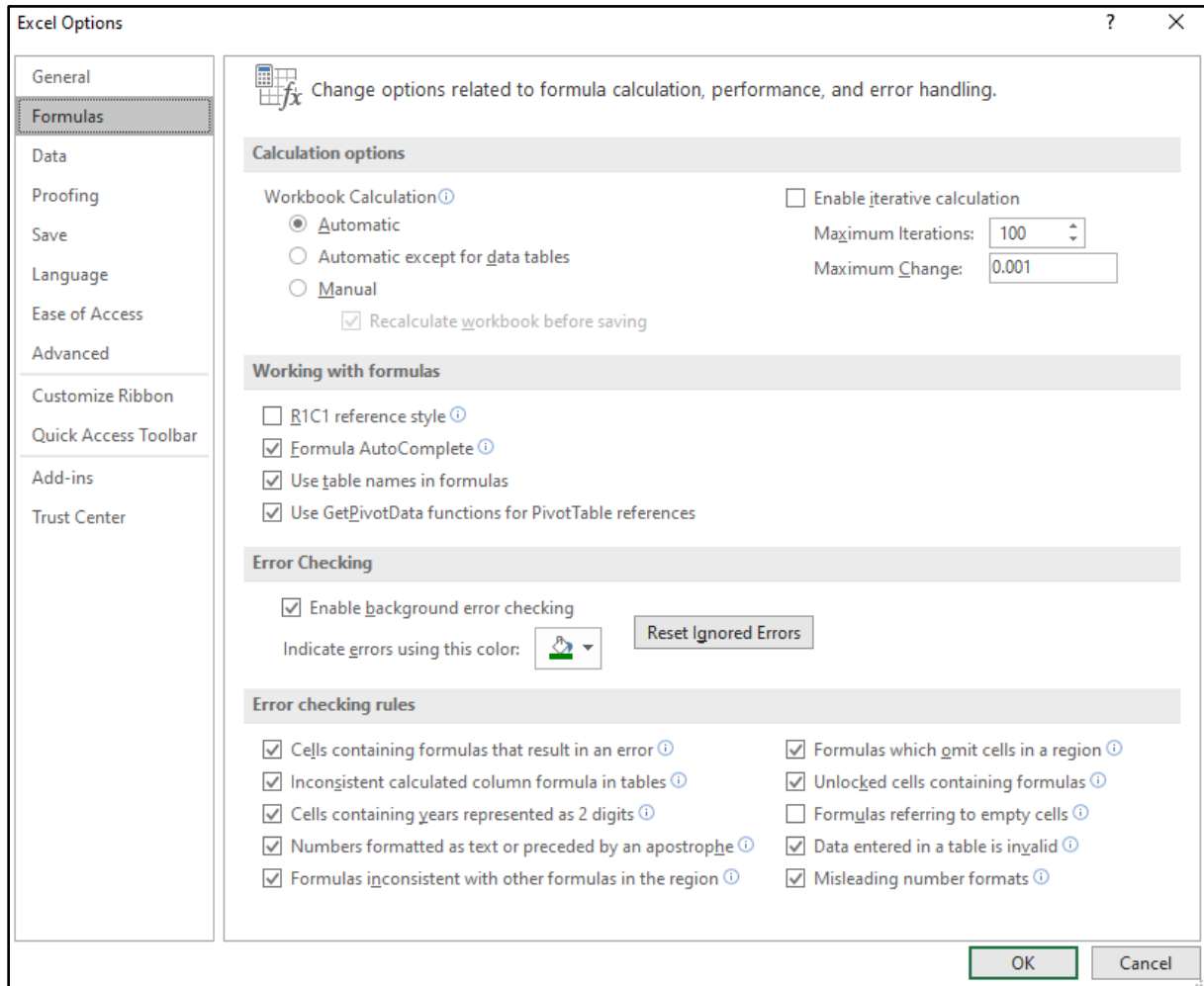
*Figure 19: **Formulas Options** tab*

Note:

- When you change the calculation settings in a workbook, you are setting them at the application level, which means that these settings will apply for every workbook that you use in the future and not just the current workbook or worksheet.

- From the **Formula** tab in **Excel Options**, you can choose to set an additional option to **Recalculate workbook before saving**. Disabling this option may help reduce the time it takes to close a huge workbook.
- You can also edit the iteration calculation settings.

Additional information

For more information on setting calculation options, go to: [Change formula recalculation, iteration, or precision in Excel](#)

Activity: Discuss and learn

In this activity, you'll open a workbook and change the calculation options. You'll then use the methods available to update the functions.

Resources required

You'll need the following resources for this activity:

- Open **L5_T1_act_samples.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Follow the teacher's instructions to change the default calculation options.

2. Consider why you might want to do this in the future.

3. Be prepared to share your thoughts with the class.

Try-it: Set formula calculation options

In this standalone try-it, you'll set the calculation options in a workbook.

Try-it

Set the calculation options back to default settings.

Resources

You'll need the following resources for this try-it:

- Open **L5_T1_try_samples_starter.xlsx** in this lesson's Learning Activity Resources.

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Instructions

The following are the general tasks that you need to perform during this try-it:

1. Examine the formula in cell **A18** on the **Trace Elements** worksheet. Is it current?

2. Select the keyboard shortcut to update the entire workbook.

3. Alter the sample value for Nickel on the **2010**, **2014**, and **2018** worksheets to any other value. Has the data on the **Trace Elements** worksheet updated? What about the chart?

4. Set the calculations back to default settings.

5. Save the workbook as the same name_*plus your initials*.

Topic 2: Set Excel options

When you become more experienced with using Excel, you'll likely want to change some of the options to help make Excel work better for you. It's very likely that you'll want to customize the ribbon or the **Quick Access Toolbar**. But you might know all about that already if you took the Excel associate course!

To access **Excel Options**, select **File**, and then select **Options**. The **Excel Options** dialog box displays several tabs for each category of options as depicted in the following screenshot.
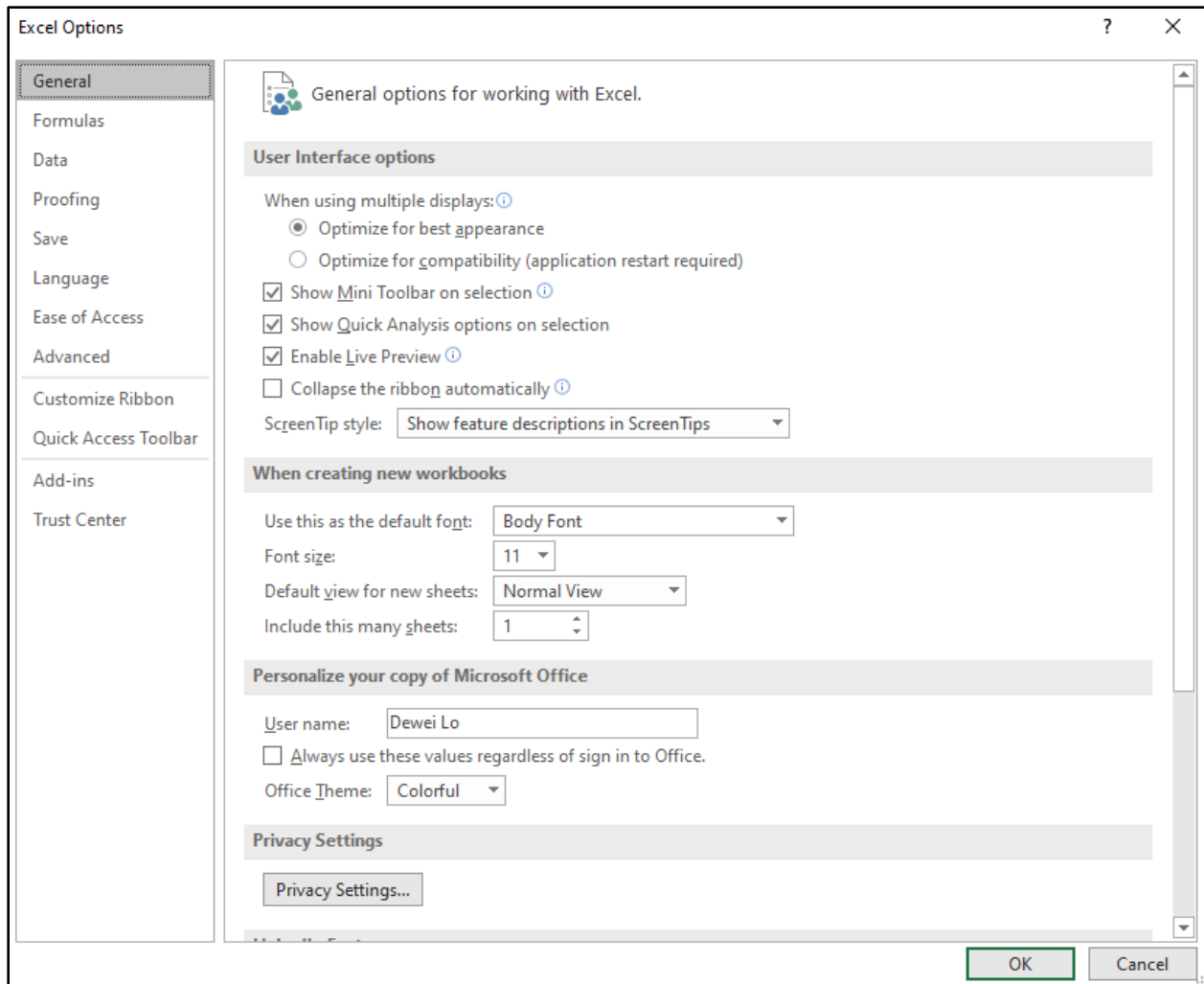
*Figure 20: **Excel Options** dialog box, **General** tab*

Make a note of whatever changes you make within **Excel Options** as you might change an option that does not produce the results you desire, and you might want to revert the change. You would then need to remember how to set the option back to its original setting.

Select **OK** to apply any changes you make, but note that some changes won't take effect until you restart the application.

There are several options you can set using Excel Options; however, covering them all in this guide would be impossible. Instead, the following sections illustrate some of the most common changes users make.

General Options

On the **General** tab, you can change:

- The default font size
- The number of worksheets to include in every new workbook
- The user name
- The **Office Theme** setting to Colorful, Dark Gray, Black or White
- Displaying or hiding the mini toolbar when selecting text
- Enabling or disabling live preview

Formulas Options

On the **Formulas** tab, you can set:

- How Excel calculates formulas
- Whether to enable or disable the use of table names in formulas
- What color to use to indicate errors if you don't want the default green
- Error checking rules

Proofing Options

Use the **Proofing** tab to set what is checked when you run Spell Check. You can choose to:

- Ignore words in UPPERCASE
- Ignore words that contain numbers
- Ignore internet and file addresses
- You can also set the **AutoCorrect Options** and set the dictionary language.

Save Options

On the **Save** tab**,** you can:

- Set the **AutoRecover** options
- Set the default file location to save for local files, templates, and drafts

Language Options

On the **Language** tab, you can add languages and the order in which languages are used.

Ease of Access Options

Use this tab to make Excel more accessible. You can choose to display **ScreenTips**, modify the display font size, and keep the accessibility checker on while you work.

Advanced Options

The **Advanced** tab has the most options that you can use for customizing Excel. On this tab, you can:

- Set editing options such as enabling or disabling the fill handle, drag and drop, **AutoComplete**, and **Flash Fill**.
- Enable or disable cut, copy, and paste options.
- Set the quality of images and printing.
- Set chart options.
- Set display options, such as the number of recent workbooks listed in Backstage or whether to display the **Formula Bar**.
- For a specific workbook, you can display the scroll bars, worksheet tabs, worksheet row and column headers, and gridlines.
- And many more options.
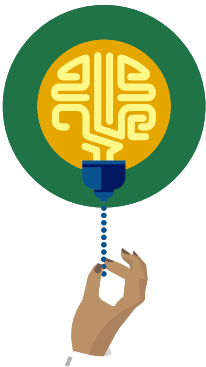
Did you know?

Not every nation or region writes numbers the same way you do. For example, in the USA, ten thousand dollars is usually formatted as $10,000.00. In Germany, it's typically formatted as $10.000,00; and in Switzerland, it would be $10'000.00. Changing the system separators in **Advanced Options** might be very useful if you have to keep changing the formatting.

Add-Ins

Use the **Add-Ins** tab to manage the add-ins that are available on your device. Select **Go** to activate built-in add-ins such as the **Analysis ToolPak** or **Solver** for further analysis of your data.

Trust Center Options

On the **Trust Center** tab, you can access the **Trust Center Settings**, which opens another dialog box as depicted in the following screenshot. You'll learn more about the Trust Center options in Module 5, when creating macros.
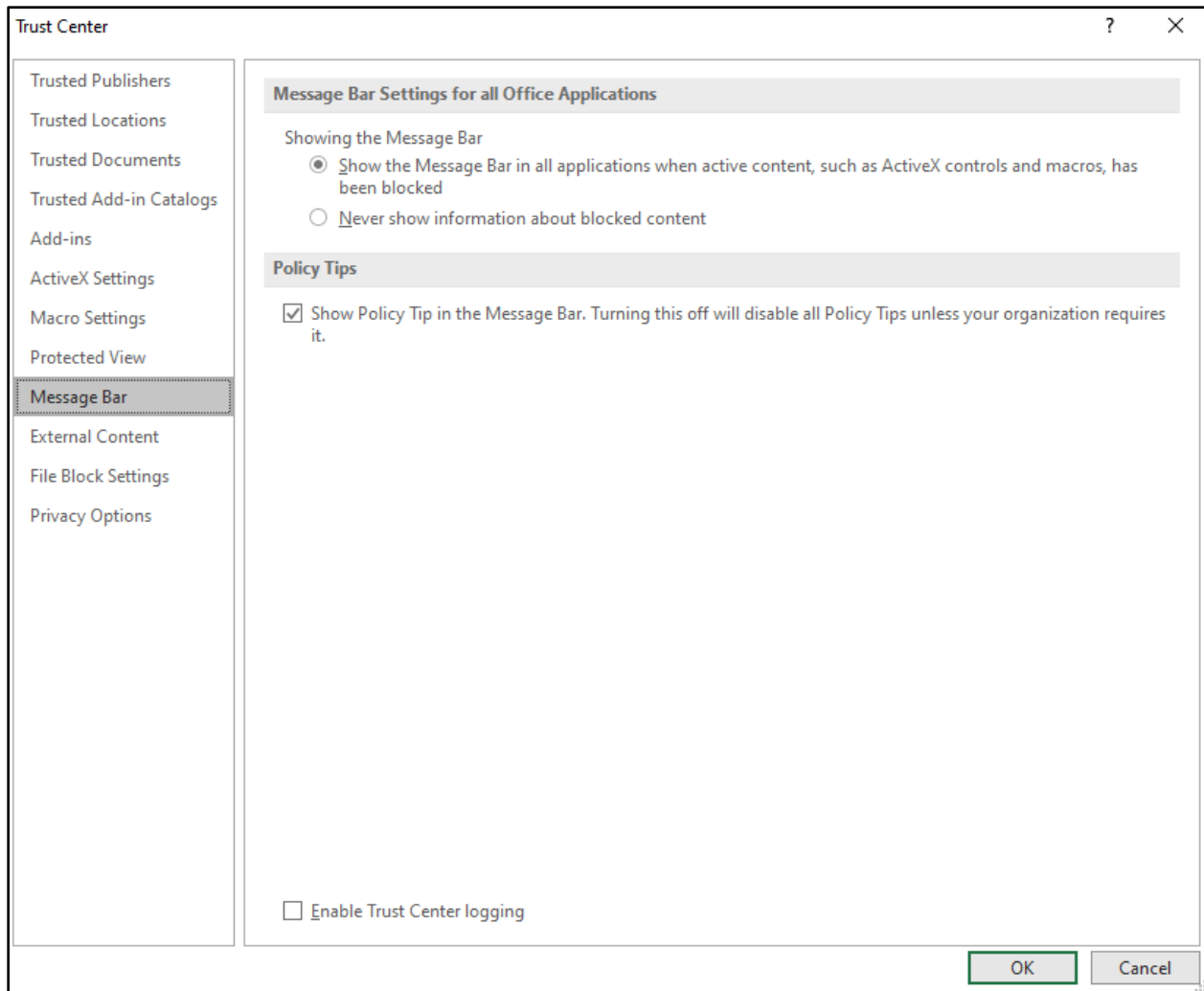
*Figure 21: **Trust Center** options*

Additional information

For more information on Excel Options, go to: Advanced Options

Activity: Discuss and learn

In this activity, your teacher will lead a discussion on some of the key Excel options that you may want to change in the future.

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Resources required

You'll need the following resources for this activity:

- Open any workbook that you have available or create a blank workbook for reference.

Activity instructions

Participate in the activity by following these instructions:

1. Follow the discussion and ask/answer questions when prompted.

2. You'll perform a scavenger hunt to locate specific options in the try-it that follows.

Try-it: Set Excel options

In this standalone try-it, you will locate various options within **Excel Options**.

Try-it

Work in pairs or teams to locate where the options listed can be edited in **Excel Options**.

Resources

You'll need the following resources for this try-it:

- Open **L5_T2_Excel_options_starter.docx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Access the **Excel Options**.

2. Locate the option listed in the first column in the Word document.

3. Enter the tab where the options can be found in the second column (there may be more than one answer).

4. Enter the section under which the option can be found in the third column.

5. Compare your answers with another pair or team before checking against the solution file.

Accessible alternative:

The teacher will split the class into two teams and call out an option on the list. The team that finds the option first wins a point. If one team keeps winning, take turns from team to team.

Wrap-up

For the final wrap up before the Cornerstone, there will be a function challenge if time permits. Open **L5_T2_wrap_up.xlsx** in the lesson's Learning Activity Resources. This workbook contains an assortment of worksheets that should inspire you to think up some excellent questions. Take a moment to examine the data on any of the worksheets. (You can also create your own data if you prefer.) Create at least two questions for your neighbor to answer using any function. Swap places and answer the questions your neighbor has set for you. (If swapping places is not possible, just ask your neighbor the question.) Save the workbook as the same name plus your name.

Use the following questions to check what you learned in this lesson:

1. To update formulas on a workbook that is set to manual update, you can use the keyboard shortcut _____ to update all formulas at any time.

    Fill in the blank.

2. To update formulas on a workbook that is set to manual update, you can use the keyboard shortcut _____ + _____ to update all formulas in the current worksheet only.

    Fill in the blanks.

3. To set the dictionary language to Spanish (Mexico), which tab would you use within **Excel Options**?

    Select the correct option.

    a. Advanced

    b. General

    c. Proofing

    d. Save

4. Which of the following statements is true?

    Select all that apply.

    a. You can hide the **Formula Bar** in the current workbook only.

    b. You can hide the **Formula Bar** for all workbooks only.

    c. You can hide **ScreenTips** from everywhere in Excel, except when entering functions manually.

    d. You can hide ScreenTips from everywhere in Excel.

Glossary

Array function	A formula that calculates more than one variable at the same time. You must use Ctrl+Shift+Enter to complete an array function; the completed formula will be contained with braces {...}.
Column index number	The position of the column within the table array. The row index number refers to the position of the row within the table array.
Expression	A mathematical term; for example, >=200 (greater than or equal to 200) or <100 (less than 100).
Function Arguments	The dialog box that helps you build a formula.
Iteration	The repeated recalculation of a worksheet until a specific value is reached. This is used in functions such as the **Solver** add-in tool. When a formula refers to one of its own cells, it's known as a circular reference, and these can iterate indefinitely. In the **Excel Options** > **Formula Options**, you can control the maximum number of iterations and the amount of acceptable change.
Lookup value	Refers to the value you want to find.
Table array	The table, range, or list of cells that contains the value you want to find.

Table 4: Glossary terms and definitions

Cornerstone

Overview

In this Cornerstone, you'll use various functions to analyze data, including **Lookup** and **Date & Time** functions. You'll also reference cells from another workbook.

Objectives

The following table outlines the Cornerstone objectives and their corresponding MOS exam objectives.

Use functions with multiple criteria	• 3.1.1: Perform logical operations by using nested functions, including IF(), IFS(), SWITCH(), SUMIF(), AVERAGEIF(), COUNTIF(), SUMIFS(), AVERAGEIFS(), COUNTIFS(), MAXIFS(), MINIFS(), AND(), OR(), and NOT()
Use **VLOOKUP**	• 3.2.1: Look up data by using the VLOOKUP(), HLOOKUP(), MATCH(), and INDEX() functions
Reference data from other workbooks	• 1.1.2: Reference data in other workbooks
Use **NOW** and **TODAY** functions	• 3.3.1: Reference date and time by using the NOW() and TODAY() functions
Use **WEEKDAY** and **WORKDAY**	• 3.3.2: Calculate dates by using the WEEKDAY() and WORKDAY() functions

Table 5: Cornerstone objectives

Duration

50 minutes

Instructions

1. Complete the tasks below for each file.

2. When saving your file, add your name to the end of the filename; for example, Sample_Dwayne_Espino.xlsx. Follow your teacher's directions for where to save your files.

3. When you're done with the Cornerstone, assess your completion and enter the points you think you earned within the task lists below. You can use the help of your teacher if you need it.

Tasks

You'll work with three files in this Cornerstone. The following are the tasks you need to do within each file.

File 1: Cornerstone_samples_starter.xlsx

Task: Lookup values (4 points)

1. Open **Cornerstone_samples_starter.xlsx**.

2. In cell **B2** in the **Sample Summary** worksheet, create a function that will find the element symbol for the element in cell **A2** using the table (**A1:E119**) on the **Elements** worksheet. (3 points) (Exam objective 3.2.1)

3. Fill the formula for all cells up to **B27** for all the elements. (1 point)

Points scored: _____ / 4

Task: Use COUNTIF(S) (4 points)

1. In cell **M10** on the **Sample Summary** worksheet in **Cornerstone_samples_starter.xlsx**, create a function that will count how many rates in column **H** are **4** or more. (2 points)

2. In cell **M11**, create a function that will count how many samples for the rates are at least **3** and the sample result is greater than **200**. (2 points) (Exam objective 3.1.1)

Points scored: _____ / 4

Task: Use IFS (4 points)

1. In cell **I2** on the **Sample Summary** worksheet in **Cornerstone_samples_starter.xlsx**, create an **IFS** function that will return the level for the rate in **H2**. (3 points) (Exam objective 3.1.1)

2. Fill the formula in the cells for all elements. (1 point)

Points scored: _____ / 4

Task: Use MATCH and INDEX (6 points)

1. Examine the contents of cell **B31** on the **Sample Summary** worksheet in **Cornerstone_samples_starter.xlsx**.

2. In cell **C31**, create an **INDEX** and **MATCH** function to return the symbol for the contents of cell **A31** (use the formula in **B31** as guidance). (3 points) (Exam objective 3.1.1)

3. Repeat steps 1 and 2 for **Group** and **Periodic table row**. (You can use copy and paste and edit the formula if you want to.) (3 points).

Points scored: _____ / 6

FILE 1 TOTAL POINTS: _____ / 18

File 2: Cornerstone_test_date_starter.xlsx

Task: Calculate future dates (5 points)

1. Open **Cornerstone_test_date_starter.xlsx** and **Cornerstone_holidays.xlsx**.

2. In cell **B2** on the **Cornerstone_test_date_starter.xlsx** workbook, create a function that calculates the date in 10 days. (1 point) (Exam objective 3.3.1)

3. In cell **B3**, check what day of the week it is by using a function that returns Monday as 1. (2 points) (Exam objective 3.3.2)

4. In cell **B4**, create a function that will calculate 21 working days from the date in cell **B2**, ensuring that you take into account any possible holidays in **Cornerstone_holidays.xlsx**. (2 points) (Exam objective 3.3.2 and 1.1.2)

Points scored: _____ / 5

Microsoft

Task: Combine IF with WORKDAY (3 points)

1. In column **H**, there is an existing formula **=(WORKDAY(F8,7)** that adds 7 working days to the date when the last results were received. Edit the existing formula so that it is nested within an **IF** function where the result is "On Time" if the received date is less than 7 working days; otherwise, it's "Late". (2 points) (Exam objective 3.3.2)

2. Fill the formula for all test results. (1 point)

Points scored: _____ / 3

FILE 2 TOTAL POINTS: _____ / 8
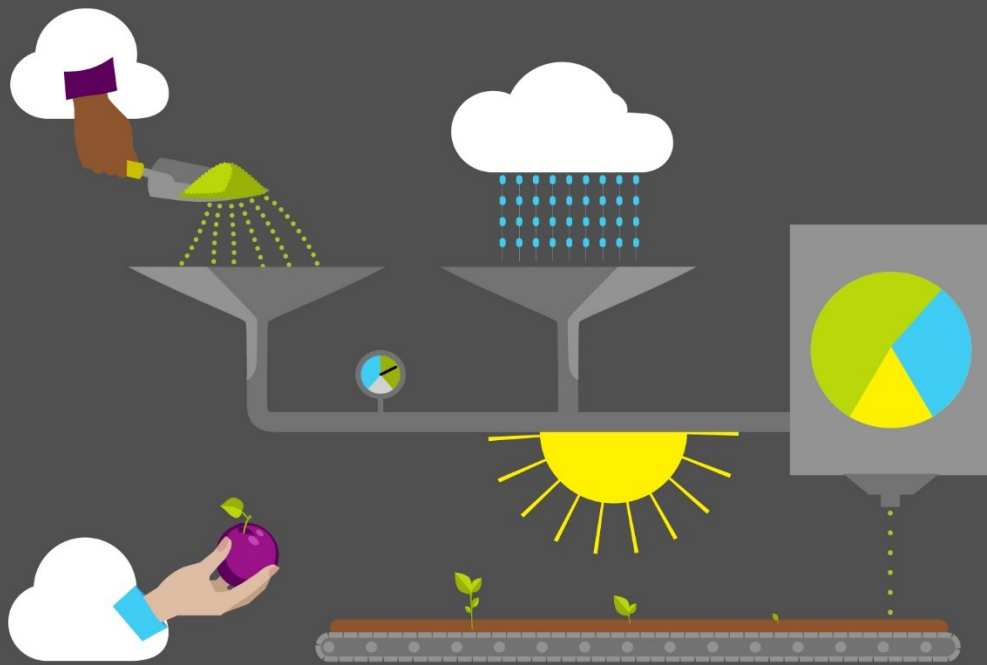
Student Guide

40571A
Microsoft Excel expert 2019

Module 3: Validating and auditing data

Contents

Microsoft

Module overview

Description

Entering and maintaining complex data in Microsoft Excel 2019 workbooks can be a challenge under the best of circumstances. When you add in factors such as varying skill levels, distractions, fatigue, or stress, the opportunity for error multiplies. Verifying data and checking formula results manually can be a tedious and time-consuming process, even if you have someone to help you.

This module includes learning activities that will help you use Excel to confirm and expedite data entry and formula checks. You'll also learn to quickly check for and resolve errors.

At the end of this module, you'll work on the Cornerstone project to facilitate worksheet entries, evaluate data and formulas, and resolve errors to provide reliable data.

Lesson	Learning objective	Exam objective(s)
Validating data	Apply data validation settings and remove duplicates from a list.	• 2.2.2 • 2.2.5
Filling cells	Use the **Flash Fill** feature and set advanced options for fill series.	• 2.1.1 • 2.1.2
Auditing formulas	Trace precedents and dependents and monitor cells and formulas with the **Watch Window**.	• 3.5.1 • 3.5.2
Checking and evaluating data	Create error checking rules and evaluate formulas.	• 3.5.3 • 3.5.4
Cornerstone: Auditing CSA data	• Use the **Flash Fill** feature. • Configure data validation. • Remove duplicate records. • Monitor cells and formulas by using the **Watch Window**. • Evaluate formulas.	• 2.1.1 • 2.2.2 • 2.2.5 • 3.5.2 • 3.5.4

Table 1: Objectives by lesson

Microsoft

Scenario

Munson's Pickles and Preserves Farm supports a local community supported agriculture (CSA) project for community members to become "farm members" and purchase shares of the produce to feed their families.

Each week they receive a box of fresh produce. They can take part in farm events such as workdays, potlucks, and you-pick gardens to experience the joy of harvesting their own food. You've received a workbook that details produce distribution to members by member ID, states or provinces, and location. The data has several errors; you need to fix those errors and validate the data.

Cornerstone

After you've completed the lessons and try-its and navigated through several scenarios, the Cornerstone project will test your ability to apply what you've learned. In the Cornerstone, you'll:

- Use the **Flash Fill** feature.
- Configure data validation.
- Remove duplicate records.
- Monitor cells and formulas by using the **Watch Window**.
- Evaluate formulas.

Lesson 1: Validating data

Overview

At the end of this lesson, you'll be able to apply data validation settings and remove duplicates from a list.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. By using the **Data Validation** command, you can provide worksheet users with _____.

   Select all that apply.

   a. A warning message about their cell entry.

   b. A list of values to choose from for the cell.

   c. A message about the input they need to enter in the cell.

   d. A choice of formulas.

2. To help ensure that a list does not have any repeated rows, you can use the _____ tool.

   Fill in the blank space.

3. What are the styles of error messages available for data validation?

   Select all that apply.

   a. Stop

   b. Warning

   c. Caution

   d. Information

Topic 1: Perform basic data validation

When multiple people are entering data in a worksheet, you'll often get different results for what should be the same data. It's also likely that people make typing errors when performing data entry. For example, if you have multiple people entering employee data into a list in the Marketing Department, there might be a few different entries in the **Department** column, such as:

- Marketing
- Mktg.
- Marketing Dept.
- Mtkg.
- Mkt. Dept.

Inconsistent and incorrect entries will make it impossible to accurately sort, filter, and summarize your data. In this example, if you needed to calculate the total count of employees in each department, you would have five different totals.

The **Data Validation** command in Excel provides a variety of ways for you to not only restrict the entries in a cell but also to guide and inform the users on requirements. This command also helps you find data that violates the restrictions you set.

Set up data validation for cell(s)

On the **Data** tab of the ribbon, in the **Data Tools** group, when you select the **Data Validation** command (not the drop-down list), a dialog box with three tabs displays. The following screenshot highlights the **Data Validation** command on the **Data** tab:
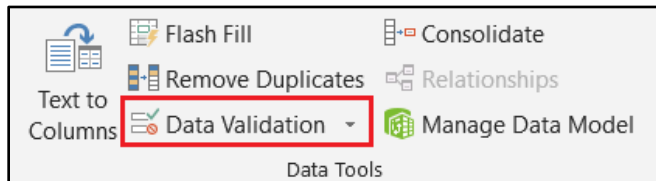
*Figure 1: **Data Validation** command on the **Data** ribbon tab*

The following screenshot depicts the **Data Validation** dialog box with three tabs—
Settings, **Input Message**, and **Error Alert**:
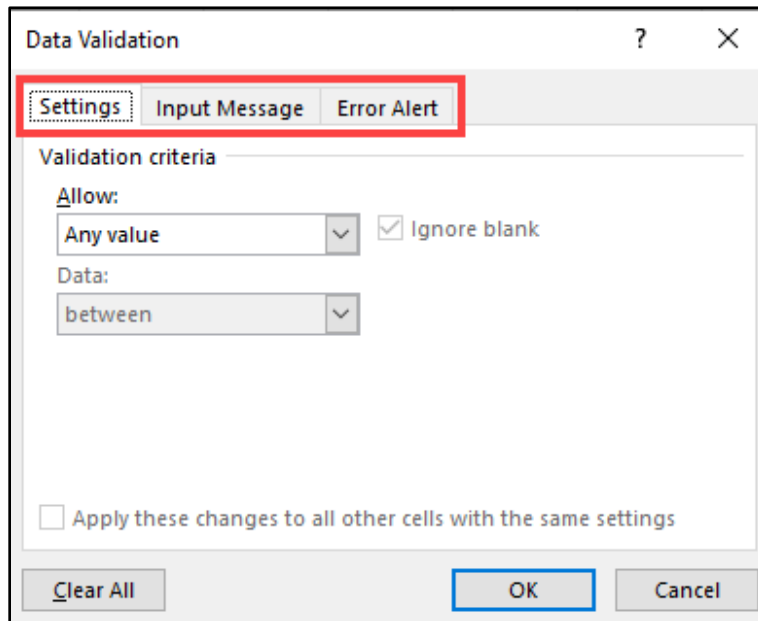
*Figure 2: **Data Validation** dialog box with tabs for **Settings**, **Input Message**, and **Error Alert***

Settings tab

On the **Settings** tab, you set the *criteria*, or conditions and restrictions rules, for the data
that you want to allow in the selected cell or cells. Notice that the default settings allow
Any value in cells. In the **Allow** drop-down list, you can select from:

- **Whole Number**, to restrict the cell to accept only whole numbers.
- **Decimal**, to restrict the cell to accept only decimal numbers.
- **List**, to pick data from a drop-down list.
- **Date**, to restrict the cell to accept only date entries.
- **Time**, to restrict the cell to accept only time entries.
- **Text Length**, to restrict the length of the text entered.
- **Custom**, for a custom formula.

The remaining options on the **Settings** tab change according to your choice in the
Allow drop-down list. Most options in the **Allow** drop-down list supply options for
Data, which is a list of comparison operators. For each of the data options, Excel has
appropriate cell-picker windows for **Value**, **Minimum**, **Maximum**, **Start date**, **End date**,
Start time, **End time**, and so on.

If you select **List** in the **Allow** drop-down list, Excel provides a cell-picker window for the reference to the range of cells containing the list values. If you select **Custom** in the **Allow** drop-down list, Excel has a cell-picker window for the formula. The following screenshot depicts examples of cell-picker windows.
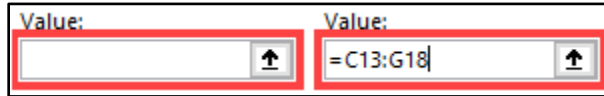
Figure 3: Examples of cell-picker windows

Input Message tab

The next tab in the **Data Validation** dialog box is the **Input Message** tab. This is where you configure the input message that displays when the user selects a cell. Note that this is an optional setting. If you don't want an input message, clear the **Show input message when cell is selected** check box. The following screenshot depicts the **Input Message** tab in the **Data Validation** dialog box:
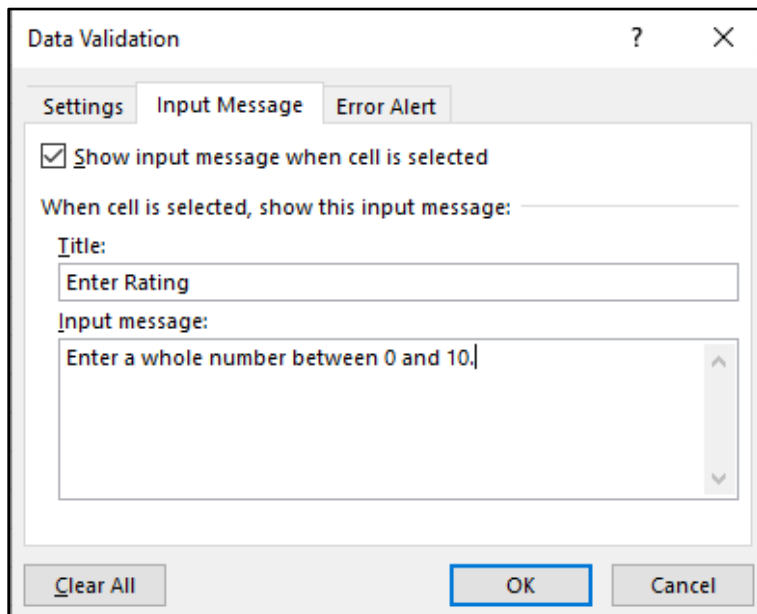
*Figure 4: **Input Message** tab*

Error Alert tab

The next tab in the **Data Validation** dialog box is the **Error Alert** tab. On this tab, you can configure the options for the response from Excel when a user enters data that does not meet the **Settings** criteria for valid data. This is also an optional setting. If you do not want an error alert, clear the **Show error alert after invalid data is entered** check box.

On the **Error Alert** tab, you can select from the following error styles:

- **Stop** prevents users from entering invalid data.
- **Warning** warns users that they are entering invalid data, without preventing it.
- **Information** informs users that they are entering invalid data, without preventing it.

Validation circles

You might not want to completely prevent users from entering data in the cells with data validation, because that could interrupt the workflow around the data entry and impact productivity. By allowing users to enter data in a cell, you have information for which you must follow up. Going back to the example of multiple people entering employee data into a list in the Marketing Department, it's still helpful if the entry is "Mtkg" and not blank. You can identify cells in which users have entered invalid data by using validation circles. To use validation circles:

1. On the **Data** tab, in the **Data Tools** group, select the **Data Validation** drop-down list, and then select **Circle Invalid Data** to apply circles over the cells that contain data that is against the validation rules you've set for those cells.

2. In the **Data Validation** drop-down list, select **Clear Validation Circles** to remove the validation circles from any cells on the worksheet.

You'll find that you can't anticipate all the possible errors that users make during data entry. When you review the data, you might discover multiple errors and then need to find and correct them all. For example, in a column that lists employee hiring dates, some entries might be for the future! You can apply data validation settings to all the cells in this column, including those that already have data. In this example, the data validation settings you need would be:

- Allow: Date
- Data: less than or equal to
- End date: =TODAY()

After you apply the data validation settings, use the **Circle Invalid Data** command to find any cells that don't meet those criteria. As you fix the invalid entries, Excel removes the validation circles when the entries meet the validation criteria.

Additional information

For more information on using the Data Validation tool, go to: Apply data validation to cells

For more information on data validation, go to: More on data validation

Video

To review the video on creating and managing drop-down lists, go to: Create and manage drop-down lists
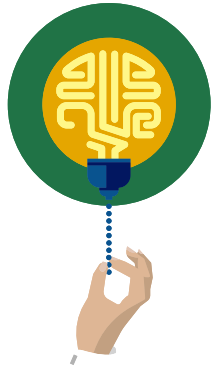
Did you know?

If you're creating a worksheet for others to use, you can provide helpful guidance for the users on any cell or cells by using only the **Input Message** of the **Data Validation** dialog box. Simply leave **Settings** at **Allow: Any value**, and for the **Error Alert**, deselect the checkbox for **Show error alert after invalid data is entered**.

Activity: Show me how

In this activity, your teacher will demonstrate and guide you through configuring data validation for specific cells on a worksheet.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher demonstrate how to set up data validation options.

2. Ask the teacher clarifying questions. An example is: How can I provide input messages?

Try-it: Perform basic data validation

In this leveled try-it activity, you'll use the methods and commands you learned in this topic to configure data validation.

Try-it 1

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try1_members_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Set the following data validation on the column of zip codes, **I5:I30**:

   - Validation Criteria: **Text length equal to five characters**
   - Input Message Title: **Zip Code**
   - Input Message: **Enter 5-digit postal zip code.**
   - Error Alert Style: **Warning**
   - Error Title: **Zip Code Error**
   - Error message: **Postal zip codes require 5 digits.**

   Note: You can customize the title and the input message to match postal codes in your country/region.

2. Enter **3430** in cell **I5**, and then select Enter.

3. Observe the warning error message.

Try-it 2

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try2_members_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Set the following data validation on the column of state abbreviations, **H5:H30**:

   - Validation Criteria: **List** with a source of **=Input!$B$2:$B$9**
   - Input Message Title: **State**
   - Input Message: **Select a state from the drop-down list.**

- o   Error Alert Style: **Stop**
- o   Error Title: **State Error**
- o   Error message: **That state is not on the list.**

2. Enter **WA** in cell **H5**, and then select Enter.

3. Observe the stop error message.

Try-it 3

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try3_members_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Set the following data validation on the column of cities, **G5:G30**:

    - o   Validation Criteria: **List** with a source of **=Input!$A$2:$A$14**
    - o   Input Message Title: **City**
    - o   Input Message: **Select a city from the drop-down list.**
    - o   Error Alert Style: **Information**
    - o   Error Title: **City Error**
    - o   Error message: **That city is not on the list.**

2. Enter **Hotlanta** in cell **G8**, and then select Enter.

3. Observe the information error message.

4. Set the following data validation on the column of **Num**: **A5:A30**:

    - o   Validation Criteria: **Whole numbers between 1 and 26**
    - o   Input Message Title: **Number**
    - o   Input Message: **Enter a number between 1 and 26.**
    - o   Error Alert Style: **Warning**
    - o   Error Title: **Number Error**
    - o   Error message: **The number must be between 1 and 26.**

5. Enter **30** in cell **A5** and then select Enter.

6. Observe the warning error message.

■■ Microsoft

Topic 2: Remove duplicates

Sometimes users are in a hurry or simply don't realize that data already exists in a cell. At other times, while trying to quickly enter similar entries, they might copy and paste existing data that they then plan to replace with different values. During the process, they might forget or miss entries. Excel supplies tools to identify and remove duplicate values or records.

You should first identify and review duplicate values or records before you remove them from your data. You can do this with filtering or conditional formatting. These are skills you might have already learned in the Microsoft Excel associate 2019 course.

Remove duplicates from a range of cells

When you're ready to remove duplicates, select the cells that contain those duplicates. On the **Data** tab, in the **Data Tools** group, select the **Remove Duplicates** command, which the following screenshot depicts:
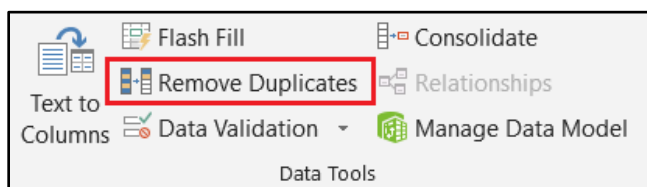
*Figure 5: **Remove Duplicates** command on the **Data** tab*

In the **Remove Duplicates** dialog box, verify the correct selection status by selecting or clearing the **My data has headers** check box. The list of column names from your data is in a list box; by default, all are selected. To change the selection status more quickly, you can choose from the **Select All** or **Unselect All** options. When you select column names in the **Columns** list, you're telling Excel what to evaluate as a duplicate record. Typically, Excel considers records duplicates only if every column has the same value.

For example, you may have a list of members in which some people have the same first and last names, but if any of the other columns are different, they are not duplicates. In the following table, none of the records are complete duplicates. However, if you wanted Excel to ignore the **Join Date** column when considering if a record is a duplicate, you would not select the **Join Date** column. Then, the first and second records would be considered duplicates; **Remove Duplicates** would keep the first record with the **Join Date** in **2010** and delete the second record with the **Join Date** in **2001**.

First Name	Last Name	City	State	Phone	Join Date
Linda	Schmid	Abilene	KS	555-1123	1/1/2010
Linda	Schmid	Abilene	KS	555-1123	1/1/2001
Linda	Schmid	Topeka	KS	555-1134	1/1/2010

Table 2: Examples of non-duplicate complete records

The **Remove Duplicates** command always considers each row in a data set as a record. If it finds duplicates, it'll keep the first record and remove any following records. Even if you don't select all columns as you're searching for duplicates, Excel will remove the entire record of a duplicate.

Additional information

For more information on identifying and removing duplicates, go to: Find and remove duplicates

For more information on filtering for unique values or removing duplicate values, go to: Filter for unique values or remove duplicate values
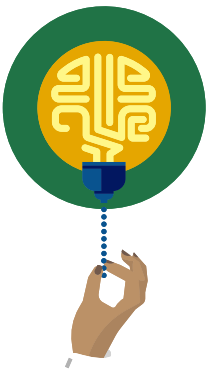
Did you know?

You can use **Remove Duplicates** to quickly reduce a copy of a column of repetitive data values to a list that you can then use as the source for your **Data Validation** drop-down list!

Activity: Tell a story

Multiple users have been copying and pasting records into a main list from other lists, and over time, this has resulted in duplication. A team member has found multiple instances of the same records in the list and has reviewed those duplicate records to verify that they are not needed. They've asked you to remove the duplicate records. In this activity, your teacher will demonstrate and guide you through the steps for removing duplicates.

Microsoft

Resources required

You'll need the following resources for this activity:

- Open **L1_T2_act_produce_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Activity instructions

Participate in the activity by following these instructions:

1. Open the **L1_T1_act_produce_starter.xlsx** workbook and go to the **Summer** worksheet.

2. Observe the teacher's demonstrations and your own Excel window, and follow any instructions given.

3. Be sure to save any changes to the file before moving on to the try-it.

Try-it: Remove duplicates

In this standalone try-it activity, you'll practice using the **Remove Duplicates** command with one or more columns not selected and with all columns selected.

Try-it

Resources

You'll need the following resources for this try-it:

- **L1_T2_try_members_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open **L1_T2_try_members_starter.xlsx** and go to the **Members** worksheet.

2. Use the **Remove Duplicates** command to remove any duplicated records in the list, instructing it to disregard the columns **Num** and **State**. Note the information in the message box from **Remove Duplicates**. Enter the number of removed records in cell **N3**.

3. Undo the **Remove Duplicates** operation to restore the removed records.

4. Use the **Remove Duplicates** command to remove any duplicate records in the list, instructing it to disregard the column **Num** in evaluating duplicates. Note the information in the message box from **Remove Duplicates**. Enter the number of removed records in cell **N4**.

5. Undo the **Remove Duplicates** operation to restore the removed records.

6. Use the **Remove Duplicates** command to remove any duplicate records in the list. Note the information in the message box from **Remove Duplicates**. Enter the number of removed records in cell **N5**.

Wrap-up

Use these questions to check what you learned in this lesson:

1. The available tabs for **Data Validation** settings are:

   Select all that apply.

   a. Error Alert

   b. Settings

   c. Format

   d. Input Message

2. The **Remove Duplicates** tool considers each row in a data set as a _____.

   Fill in the blank space.

Lesson 2: Filling cells

Overview

Why enter data yourself when you can fill cells automatically instead? In this lesson you'll learn how to use the **Flash Fill** feature, including setting advanced options for a linear or growth fill series.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. You can use the **Fill** command in the **Editing** group on the **Home** tab to:

   Select the correct option.

   a. Fill cells with underline formatting.

   b. Fill a workbook with worksheets.

   c. Fill cells with a series of values.

   d. Fill a worksheet with a picture.

2. Which of the following features is **Flash Fill** a part of?

   Select the correct option.

   a. AutoFill

   b. AutoFit

   c. Filter

   d. Advanced Filter

3. On which group on the **Home** tab can you find **Flash Fill**?

   Select the correct option.

   a. Number

   b. Styles

   c. Cells

   d. Editing

4. To fill data using a series from the ribbon commands, start by selecting the _____ button.

Fill in the blank space.

Topic 1: Use the Flash Fill feature

Using **Flash Fill** is a great way to save time and effort. If you completed the Microsoft Excel associate 2019 course, you might remember using **AutoFill**. You might already be using **AutoFill** regularly, because it's such a useful tool. **Flash Fill** is a feature of **AutoFill**.

You can use **Flash Fill** to extract data from existing data and combine additional data with the extracted data. Be careful, as the results might not always be what you were expecting! You could consider using **Flash Fill** instead of features such as **Text to Columns** or functions such as **CONCAT**, **UPPER**, **LOWER**, **PROPER**, **LEFT**, and **RIGHT**.

Use the Fill command

To use **Flash Fill** by starting with the **Fill** command:

1. Enter an example of the data you'd like to extract into a cell in the same row as the data to be extracted. Make sure to include any added data you want to combine with the extracted data.

2. Select the cells that you want to fill, including the cell(s) to use as a basis for the rest of the cells.

3. On the **Home** tab, select the **Fill** drop-down list from the **Editing** group, and then select **Flash Fill**, as the following screenshot depicts:
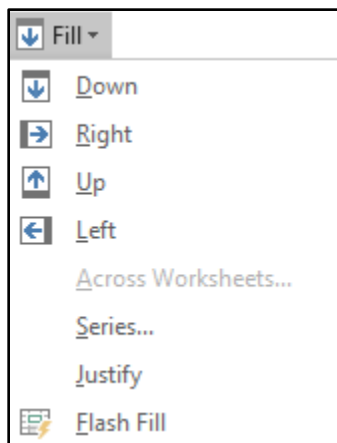
*Figure 6: **Fill** drop-down list on the **Home** tab*

Microsoft

Use the cursor

You also can use **Flash Fill** with a cursor. To do this:

1. Enter an example of the data you'd like to extract into a cell in the same row as the data to be extracted. Make sure to include any added data you want to combine with the extracted data.

2. Select the cell(s) to use as a basis for the rest of the cells.

3. Position the cursor at the cell on the last row and column of the cells you selected. The cursor will change to a small black cross.

4. Use your cursor to select the cells required.

5. Release the cursor to complete the action.

6. An **AutoFill Options** button displays in the corner of the filled data.

7. Select the button and then select **Flash Fill**.

Note: If the **Flash Fill** feature does not work, you might need to enable it.

Additional information

For more information on enabling **Flash Fill**, go to: Enable Flash Fill in Excel

Use automatic Flash Fill

Depending upon what you are entering into a workbook, if Excel detects a pattern, it will automatically offer suggestions to complete the rest of the column, which you can use or ignore. Imagine a column that contains a list of your classmates' full names from cell **A2** through to **A30**. Cell **A2** contains **Pablo Tirado** and **A3** contains **Victor Ivanov**. If you were to enter **Tirado** into cell **B2** and then enter **Ivanov** into cell **B3**, Excel will recognize the pattern and prepopulate the rest of the cells through to **B30**. Select Enter to fill the data automatically. A **Flash Fill** options button will display next to the filled data, as the following screenshot displays, which you can select for further options if you want.
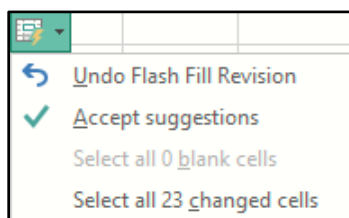
*Figure 7: **Flash Fill** options button*

Microsoft

Note: If you were to enter **Tirado** and **Ivanov** in uppercase, the Flash Fill feature would fill the remaining cells in uppercase, too This means that you don't need to use the **UPPER** function to change the case of the text. The same applies for the **PROPER** and **LOWER** commands.

Activity: Show and tell

In this activity, your teacher will demonstrate how to use **Flash Fill** by using a list of names.

Resources required

You'll need the following resources for this activity:

- **L2_T1_act_students.xlsx** in this lesson's **Learning Activity Resources** folder.

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher's demonstrations and your own Excel window, and follow any instructions given.

2. Be sure to save any changes to the file before moving on to the try-it.

Try-it: Use the Flash Fill feature

In this leveled try-it activity, you'll extract values from existing data. Alternatively, you'll extract data from existing data with added text and characters specifications.

Try-it 1

Use **Flash Fill** to extract part of the values in a column of cells.

Resources

You'll need the following resources for this try-it:

- **L2_T1_try1_students_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cells **B2** to **B26**, use **Flash Fill** to extract the first initial of each student's first name and then their full surname.

2. Save the workbook as the same name *plus your initials*.

Try-it 2

Use **Flash Fill** to extract data and add text.

Resources

You'll need the following resources for this try-it:

- **L2_T1_try2_students_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cells **D2** to **D26**, use **Flash Fill** to extract each student's last name, followed by a comma and a space. Then add the initial of their first name; for example, **Pepin, A**.

2. Sort the list into alphabetical order A to Z using the new data in column **D**.

3. Save the workbook as the same name *plus your initials*.

Try-it 3

Resources

You'll need the following resources for this try-it:

- **L2_T1_try3_students_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In cell **D2** to **D26**, use **Flash Fill** to create a user name for each student that is made up of their # number, first name, and first letter of the last name, followed by an exclamation mark; for example, 1AlainP!, 2AzeemB!

2. Sort the list into alphabetical order Z to A by using the new data in column **D**.

3. Save the workbook as the same name *plus your initials*.

Microsoft

Topic 2: Set advanced options for fill series

You now know how useful the **AutoFill** feature is. Advanced fill options enable you to have even more control over how Excel automatically fills data in your worksheet.

Create a linear series using AutoFill

A linear series is data with a continual increase or decrease. For example, 1, 3, 5, 7, 9, 11 has a continuous increase of 2 between each number. The series 20, 15, 5, 0, -5 has a continuous decrease of 5 between each number. To create a linear series using **AutoFill**:

1. Enter at least the first two numbers in the sequence in adjacent cells, so that Excel can detect the linear pattern to fill. For example, enter **5** in **A1** and **9** in **B1**.

2. Select the cells to be sequentially increased or decreased; for example, **A1** and **B1**.

3. Position the cursor at the cell that is on the last row and column of the selected cells. The cursor will change to a small black cross.

4. Use your cursor to select the cells required.

5. Release the cursor to complete the action.

You could also:

1. Position the cursor at the cell that is on the last row and column of the selected cells. The cursor will change to a small black cross.

2. Right-click or access the context menu and then select the cells required.

3. Release the cursor and select **Linear trend**.

Create a linear series using the Fill command

Use the **Fill** command on the **Home** tab if you want more control over how Excel fills data in your worksheet. To do this:

1. Enter at least the first two numbers in the sequence in adjacent cells so that Excel can detect the pattern to fill. You could also just enter the starting number in one cell, if there is a steady increase or decrease.

2. Select the cell(s) to be sequentially increased or decreased, including the cells you want Excel to fill.

3. On the **Home** tab, select **Fill** from the **Editing** group.

Microsoft

4. Select **Series**. The **Series** dialog box will open.

5. Select **Linear** as the **Type**, if not already set.

6. Enter the **Step value** number that you wish to increase or decrease by, as the following screenshot depicts. If you already entered the pattern in the first couple of cells, select **Trend** instead.
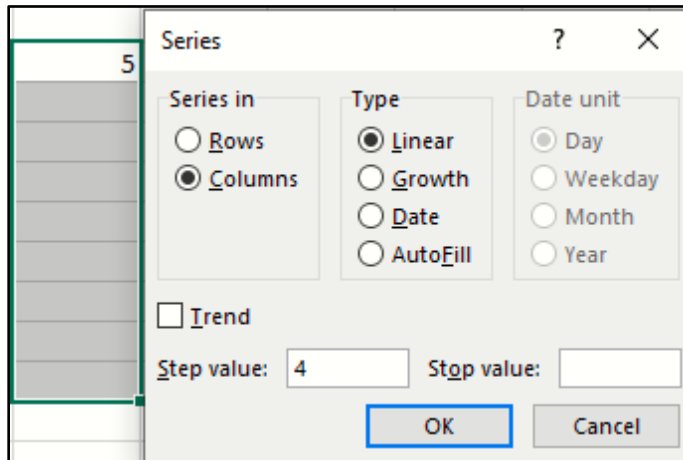
*Figure 8: **Fill Series** dialog box*

7. Select either **OK** or Enter to complete the action, and then Excel will fill the selected cells by using the step value you entered.

Create a growth series using AutoFill

A growth series is data that the AutoFill feature multiplies by a consistent value that you configure. For example, the series 3, 9, 27, 81, 243, 729 has been multiplied by 3 (the step value) based on the result of each multiplication (the product). That is, 3 x 3 = 9, 9 x 3 = 27, and 27 x 3 = 81. A growth series is also known as an exponential value. To create a growth series using AutoFill:

1. Enter at least the first two numbers in the sequence in adjacent cells so that Excel can detect the growth pattern to fill. For example, enter **2** in **A1** and **4** in **B1**.

2. Select the cells to be sequentially increased; for example, **A1** and **B1**.

3. Position the cursor at the cell that is on the last row and column of the selected cells. The cursor will change to a small black cross.

4. Select the cells required.

5. Release the cursor to complete the action.

Microsoft

You could also:

1. Position the cursor at the cell that is on the last row and column of the selected cells. The cursor will change to a small black cross.

2. Right-click or access the context menu and select the cells required.

3. Release the cursor and select **Growth trend**.

Create a growth series using the Fill command

You can use the **Fill** command to control what data Excel fills in your worksheet. To do this:

1. Enter the starting value in the first cell. (You can enter the first two cells if you want to.)

2. Select the cells to be sequentially filled, including the starting cell(s).

3. From the **Home** tab, select **Fill** from the **Editing** group.

4. Select **Series**. The **Series** dialog box will open.

5. Select **Growth** as the **Type**.

6. Enter the **Step value** number that you wish to multiply by. If you have already entered the pattern in the first couple of cells, you can select **Trend** instead.

7. Select either **OK** or Enter to complete the action. The selected cells will be filled using the step value you entered.

Create a date series

Instead of having to manually enter dates in a sequence in a worksheet, you can use the **Fill** command to do it for you. You can also use **AutoFill**, but using the **Fill** command enables you to control the dates that are entered. For example, you can create a list for an entire year for every 14 days from the start to the end of the year. To create a date series by using the **Fill** command:

1. Enter the starting date in the first cell.

2. From the **Home** tab, select **Fill** from the **Editing** group.

3. Select **Series**. The **Series** dialog box displays, as the following screenshot depicts:
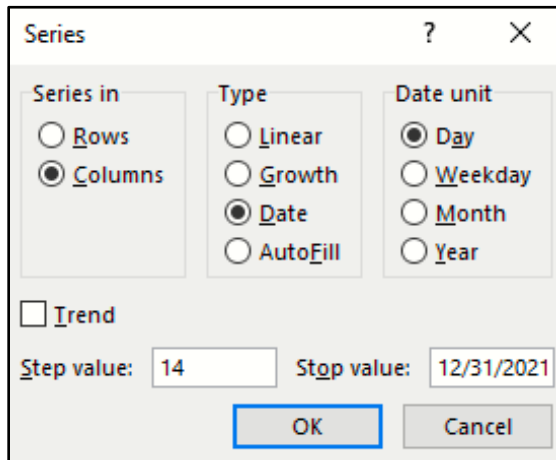
*Figure 9: **Series** dialog box*

4. Select **Rows** or **Columns** from the **Series in** selections.

5. Select **Date** as the **Type**.

6. Enter the **Step value** number that you want to increase the date by; for example, **14**.

7. Enter the last date in the series in **Stop value**.

8. Select either **OK** or Enter to complete the action. The selected cells will be filled using the step value you entered.

Additional information

For more information on advanced options for fill series, go to: [Project values in a series](#)

Activity: Tell a story

In this activity, your teacher will tell a story to help explain growth trends and linear trends. They will then demonstrate how to create a linear series and growth series.

Resources required

You'll need the following resources for this activity:

- Open a blank workbook or use any open workbook with a new worksheet.

Microsoft

Activity instructions

Participate in the activity by following these instructions:

1. Follow the story and ask questions if you need further clarification.

2. Follow any instructions your teacher gives you.

3. Imagine a scenario in which you shared details of your favorite TV series with two people. Those two people shared this information with two people each, and all those people shared it with two people each. How many people will know about your favorite TV series after five levels in the chain? Create a **Growth Fill** series to find out.

4. What if you told five people at the start? How many would know after 10 levels in the chain?

Try-it: Set advanced options for fill series

In this standalone try-it activity, you'll create a date series for a full year.

Resources

You'll need the following resources for this try-it:

- **L2_T2_try_shipments_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

The following are the general tasks that you need to perform during this try-it:

1. In cell **A4**, enter the first **Thursday** of the current year using the **mm/dd/yyyy** format. **Note**: You may instead enter the standard short date format that is used in your country/region.

2. Use the **Fill** command to fill column **A** with every **Thursday** until the end of the current year.

3. Save the workbook as the same name *plus your initials*.

Microsoft

Wrap-up

Use these questions to check what you learned in this lesson:

1. On a worksheet in cells **A2:A50**, you have the full names of people in "Last Name, First Name" format. To put each person's first name into the next column, you need to do the following:

   Indicate the correct sequence by adding numbers 1-4 next to the following items.

   a. In cell **B4**, begin entering the first name of the name that is in cell **A4**. - _____

   b. Select the Enter key. - _____

   c. In cell **B3**, enter the first name of the name that is in cell **A3**. - _____

   d. When Excel displays a preview of the list of first names, select Enter. - _____

2. In a **Linear** fill series, what does the **Step value** refer to?

   Select the correct option.

   a. The value by which to multiply each value in the series.

   b. The value by which to divide each value in the series.

   c. The difference between each number in the series.

   d. The difference between the first number and the last number in the series.

3. In a **Growth** fill series, what does the **Step value** refer to?

   Select the correct option.

   a. The value by which to multiply each value in the series.

   b. The value by which to divide each value in the series.

   c. The difference between each number in the series.

   d. The difference between the first number and the last number in the series.

Microsoft

4. Which of the following functions can you replace with **Flash Fill**?

    Select all that apply.

    a. **UPPER**

    b. **LEFT**

    c. **VLOOKUP**

    d. **CONCAT**

Lesson 3: Auditing formulas

Overview

Have you ever wondered where you would be without help from the people you interact with every day? Excel uses precedents and dependents to track how cells affect each other. In this lesson, you'll learn how to trace precedents and dependents of cells and how to use the **Watch Window** to keep track of cells in the same worksheet or other worksheets.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. You can use formula auditing tools to:

    Select the correct option.

    a. Determine if a formula result is legal.

    b. Identify why a formula is not working as expected.

    c. Find specified text within a formula.

    d. Insert functions into a formula.

2. What is a cell that affects the value of other cells known as?

    Select the correct option.

    a. A dependent

    b. A precedent

    c. A source

    d. A circular reference

3. On which tab will you find **Watch Window**?

    Select the correct option.

    a. **Page Layout**

    b. **Formulas**

    c. **Review**

    d. **View**

4. Which of the following statements is correct?

   Select all that apply.

   a. You can add watches from other workbooks while you are working in another workbook, but only if the other workbooks are open.

   b. You can add watches from other workbooks while you are working in another workbook, even if the other workbooks are closed.

   c. You can track a watch from another workbook if you have added the watch from the workbook you are currently working in.

   d. You can track a watch from another workbook if you have added the watch from the workbook you are currently working in, but only if the other workbook is open.

Topic 1: Trace precedents and dependents

Have you ever found yourself struggling to work out what's going on with your data? Have there been errors that you haven't been able to detect? Well, you can use the **Trace Precedents** and **Trace Dependents** commands in the **Formula Auditing** group to help. Using these commands is especially helpful, because they display arrows on the screen to help you trace which cells depend on other cells. An error in one cell can affect other cells exponentially! (Remember that word from the earlier lesson?)

Trace precedent cells

When you trace precedent cells, Excel displays arrows to indicate which cells affect the current value of the selected cell. To trace precedent cells:

1. Select the cell to you want to check.

2. Select the **Formulas** tab and then select **Trace Precedents** from the **Formula Auditing** group, as the following screenshot depicts:
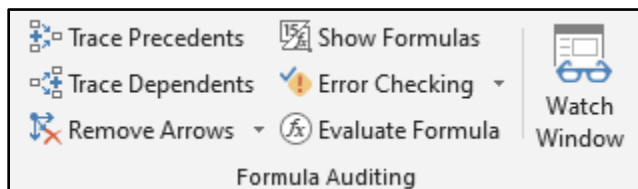
*Figure 10: **Formula Auditing** group*

3. Excel displays arrows on screen, pointing to the precedent cells. The color of the arrow varies, depending on whether there is a problem with the connection, as the following screenshot depicts:

*Figure 11: **Dependent** and **Precedent** arrows*

4. Select **Precedent** again to display the precedent of the precedent; do this as many times as necessary. If you would prefer not to have arrows displayed, you can select the Ctrl+[keys to go to the precedent cell. Repeat the process of selecting the Ctrl+[keys to go to that cell's precedent.

If a precedent or dependent cell is in another worksheet or workbook, the arrow will have a grid attached, as depicted in the following screenshot. Double-click the dotted black line to open the **Go To** dialog box, then select **Special...**,and then select the precedent cell. As an alternative, you can use the keyboard shortcut Ctrl+[.

Figure 12: Precedent in another worksheet

Trace dependent cells

When you trace dependent cells, Excel displays arrows to indicate which cells are affected by the current cell. To trace dependent cells:

1. Select the cell to you want to check.

2. Select the **Formulas** tab and then select **Trace Dependents** from the **Formula Auditing** group.

3. Arrows display on the screen, pointing to the dependent cells. The color of the arrow varies, depending on whether there is a problem with the connection.

4. Select **Trace Dependents** again to display the dependent for that cell; do this as many times as necessary. If you would prefer not to have arrows displayed, you can select the Ctrl+] keys to go to the dependent cell. Repeat the process of selecting the Ctrl+] keys to go to that cell's dependent cell; do this as many times as necessary.

Remove arrows

You can remove all the arrows in a worksheet if you want to or only the precedent or dependent arrows. To remove arrows:

1. Select the **Formulas** tab, and then select **Remove Arrows** in the **Formula Auditing** group, or

2. Select the **Remove Arrows** drop-down list, and then select **Remove Precedent Arrows** or **Remove Dependent Arrows**.

Additional information

For more information on tracing formulas, go to: Display the relationships between formulas and cells

---

Activity: Discuss and learn

In this activity, your teacher will initiate a discussion on the ways in which you'll troubleshoot formulas for the precedents and dependents tools. The workbook you'll be working with does not contain errors, but you'll have the opportunity to experiment with the precedents and the dependents. Imagine you're a detective tracing the paths from cell to cell!

Resources required

You'll need the following resources for this activity:

- **L3_T1_act_shipments.xlsx** and **L3_T1_members.xlsx** in this lesson's **Learning Activity Resources** folder.

Activity instructions

Participate in the activity by following these instructions:

1. Follow the discussion.

2. Observe the teacher's demonstrations and your own Excel window, and follow any instructions given.

3. Experiment with any cell that contains a formula.

Try-it: Trace precedents and dependents

In this standalone try-it activity, you'll trace precedents and dependents. Consider why there are red arrows on screen, indicating an error. Can you fix the error that is causing the problem?

Resources

You'll need the following resources for this try-it:

- **L3_T1_try_CSA_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Trace the precedents and dependents of cell **G5**.

2. Trace the precedents of cell **L4**.

3. Remove all arrows.

4. Edit the error in cell **G5**.

5. Trace the precedents and dependents of cell **G5** and the precedents of **L4**. The arrows should now be blue.

6. Leave the arrows on screen and compare your file with your neighbor. Are they both the same?

7. Close and save the workbook as the same name *plus your initials*.

Topic 2: Use the Watch Window

The **Watch Window** keeps track of cell values that don't easily display on screen. Using the **Watch** Window, you can work on your data and track the effect of your work on important cells in your workbook. That will save you from having to scroll through your worksheets when you only want to find out what's happening to specific cells. You could compare the **Watch Window** to a neighborhood watch, except that you are watching data.

Add cells to the Watch Window

To add cell(s) to the **Watch Window**:

1. On the **Formulas** tab, select **Watch Window** in the **Formula Auditing** group. The **Watch Window** dialog box displays, as the following screenshot depicts:
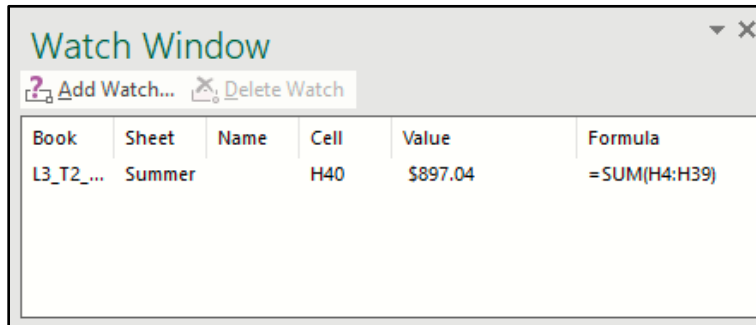
*Figure 13: **Watch Window** dialog box*

2. Select **Add Watch**. The **Add Watch** dialog box displays, with the current cell already entered, including the worksheet name. The following screenshot displays the **Add Watch** dialog box:
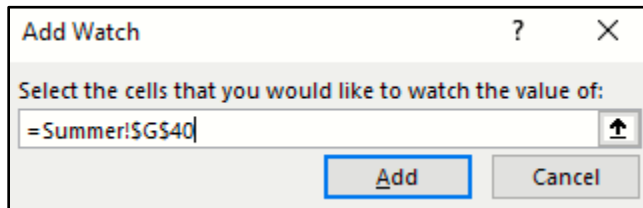
*Figure 14: **Add Watch** dialog box*

3. Select the cell(s) you want to add directly in the worksheet or any other open workbook. You can select the collapse button if you want to shrink the dialog box, but it is not necessary.

4. Select **Add**.

5. Repeat steps 2 through 4 until you have added all the cells you want.

6. Close the dialog box when you no longer need it.

You can select **Watch Window** at any time to track the cells you have added. However, when you want to track them, you must make sure that all the workbooks that have cells in the **Watch Window** are open.

Microsoft

Remove cells from the Watch Window

To remove cells from the **Watch Window**:

1. Open the workbook that contains the watch that you want to delete.
2. On the **Formulas** tab, select **Watch Window** in the **Formula Auditing** group.
3. Select the cell to remove from the list of watches.
4. Select **Delete Watch**.
5. Close the dialog box.

Additional information

For more information on using the **Watch Window**, go to: Watch a formula and its result by using the **Watch Window**

Activity: Discuss and learn

In this activity, your teacher will lead a discussion on how to use the **Watch Window**. You'll then add and remove watches.

Resources required

You'll need the following resources for this activity:

- **L3_T2_act_CSA_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Activity instructions

Participate in the activity by following these instructions:

1. Follow along with the discussion.
2. Observe the teacher's demonstrations and your own Excel window, and follow any instructions your teacher gives.

Try-it: Use the Watch Window

In this leveled try-it activity, you'll display the **Watch Window**. You'll then either edit a precedent cell to note the effect on the watch or add and edit a watch.

Try-it 1

Display the **Watch Window** and note the existing watch, edit a precedent cell, and note the change in value.

Resources

You'll need the following resources for this try-it:

- **L3_T2_try1_CSA_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open the **Watch Window**.

2. Edit the cost of lettuce for **June** and **July** to **0.35**.

3. Enter the watch value for **G38** in cell **J5** and change the cost for lettuce back to **0.30**.

4. Edit the retail cost for cherries in **August** to **1.97**.

5. Enter the watch value for **H38** in cell **J8** and change the cost of cherries back to **1.99**.

6. Save the workbook as the same name *plus your initials*.

Try-it 2

Display the **Watch Window** and add a watch from the same worksheet, edit a precedent cell, and note the change in value.

Resources

You'll need the following resources for this try-it:

- **L3_T2_try2_CSA_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open the **Watch Window**.

2. Add a watch for the cell **G38**.

3. Edit the retail cost for cherries in **August** to **1.97**.

4. Enter the watch value for **H38** in cell **J5** and undo the change you made to cherries.

5. Edit the cost of cucumbers for **July** to **0.15**.

6. Enter the watch value for **G38** in cell **J8** and change the cost of cucumbers back to **0.10**.

7. Save the workbook as the same name *plus your initials*.

Microsoft

Validating and auditing data

Try-it 3

Display the **Watch Window**. Add a watch from the same worksheet and a watch from another worksheet, edit a precedent cell, and note the change in value.

Resources

You'll need the following resources for this try-it:

- **L3_T2_try3_CSA_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open the **Watch Window**.

2. Select the **August** worksheet.

3. Add a watch for the cells **E50** and **F50** on the **Summary** worksheet.

4. Edit the retail cost for cherries on the **August** worksheet to **1.97**.

5. Enter the watch value for **Summary F50** in cell **J5** on the **August** worksheet and undo the change you made to cherries.

6. Edit the cost of cucumbers for **July** to **0.15**.

7. Enter the watch value for **Summary E50** in cell **J5** on the **July** worksheet and undo the changes you made to cucumbers.

8. Save the workbook as the same name *plus your initials*.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Which of the following keyboard shortcuts can you use to navigate to a precedent or dependent cell?

   Select all that apply.

   a. Ctrl+[

   b. Ctrl+(

   c. Ctrl+]

   d. Ctrl+)

Microsoft   38

2. When a cell has a precedent in another workbook, what is attached to the arrow?

    Select the correct option.

    a. A blue arrowhead

    b. A red arrowhead

    c. A black grid

    d. A black arrowhead

3. To keep track of important cells that don't easily display while you're editing a worksheet, you can add a watch to the _____.

    Fill in the blank space.

4. To remove a watch from a worksheet, you need to follow these steps.

    Indicate the correct sequence by adding numbers 1-4 next to the following items and add an X next to the step that is not required.

    a. Open the workbook. - _____

    b. Select the cell that has been added as a watch. - _____

    c. Select the watch to remove. - _____

    d. Select **Delete watch**. - _____

    e. Select **Watch Window** from the **Formula Auditing** group. - _____

Lesson 4: Checking and evaluating data

Overview

In this lesson, you'll continue to learn more about the **Auditing Formulas** group on the **Formulas** tab. You'll learn about error checking rules, types of errors, and evaluating formulas.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. When Excel detects a possible error in a cell, which of the following indicators will the cell display?

   Select the correct option.

   a. A blue square in the corner

   b. A red border

   c. A blue border

   d. A green triangle in the corner

2. If a cell has a **#####** error code, what does it indicate?

   Select the correct option.

   a. The function uses an incorrect operator.

   b. The cell has the wrong type of formatting applied.

   c. The column is not wide enough to display the cell contents.

   d. The cell contains a circular reference.

3. Which of the following commands does not belong to the **Formula Auditing** group?

   Select the correct option.

   a. **Calculation Options**

   b. **Remove Arrows**

   c. **Error Checking**

   d. **Show Formulas**

4. Which of the following commands can help fix errors in a worksheet?

   Select all that apply.

   a. **Watch Window**

   b. **Remove Arrows**

   c. **Error Checking**

   d. **Evaluate Formula**

Topic 1: Work with error checking rules

In this topic, you'll learn about checking for errors in a workbook. Sometimes, errors on a worksheet can be obvious and you can easily find them. However, when you're working with huge amounts of data, errors might be a little more difficult to notice. Depending upon your Excel options, errors might not even be marked!

Additional information

For more information on error checking, go to: [Detect errors in formulas](#)

Find Errors

There are many methods you can use to detect errors. If a cell contains an error, it will usually be marked with a green triangle in the corner, unless your Excel settings have changed. The green triangle is not always an error. It might indicate an inconsistency that Excel has detected, even though the formula is correct, and the value is exactly what you wanted.
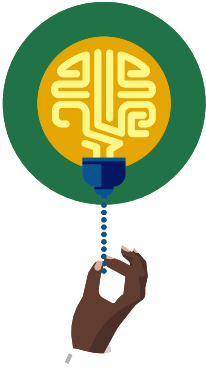
Did you know?

You can choose to disable error checking and also change the color that Excel uses to indicate errors! These options are on the **Formulas** tab of **Excel Options**.

To investigate an error, one of the first things you might do is select any cell in the worksheet you want to check, and then:

1. Select **Error Checking** on the **Formulas** tab in the **Auditing Formulas** group. The **Error Checking** dialog box, which the following screenshot displays, provides help on the first error Excel detects.
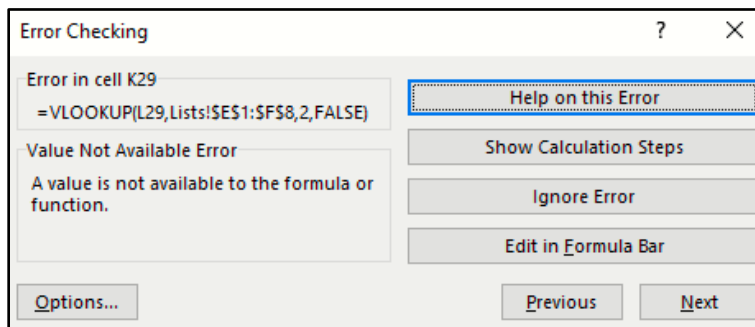
Figure 15: *Error Checking* dialog box

2. Select **Help on this Error** to open Microsoft Office Support if you want to find out more about that specific type of error.

3. Select **Show Calculation Steps** to open the **Evaluate Formula** dialog box.

4. Select **Ignore Error** if you want to ignore the error or, to edit the formula yourself, select **Edit in Formula Bar**.

5. Select **Previous** or **Next** to go from one error to the next.

6. Select **Options** to open the **Excel Options** dialog box. You can also select the **File** tab, select **Options**, and then select **Formulas** to open the **Excel Options** dialog box, where you can check the settings for error checking. The following screenshot depicts the **Excel Options** dialog box.

Microsoft
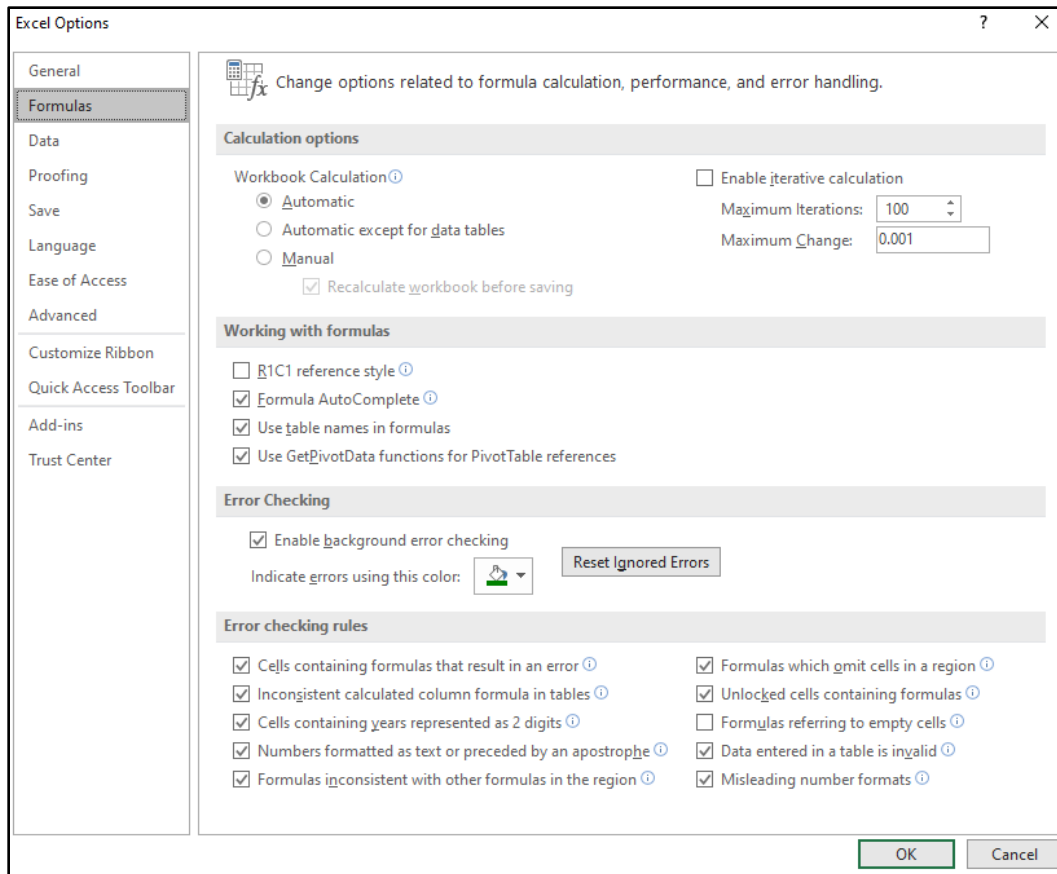
*Figure 16: **Formulas** tab in the **Excel Options** dialog box*

7. In the **Error Checking** section, you can choose to disable error checking entirely by selecting the **Enable background error checking** check box. From here, you can also change the default color to use to indicate errors. This could be very helpful if you have color blindness or you just don't like green!

8. Select or clear any option for checking in the **Error Checking Rules** section.

Another way to investigate errors is to:

1. Select **Find & Select** from the **Editing** group on the **Home** tab, and then select **Go To Special**. You might also select Ctrl+G, and then select **Special**. The **Go To Special** dialog box displays, as the following screenshot depicts:
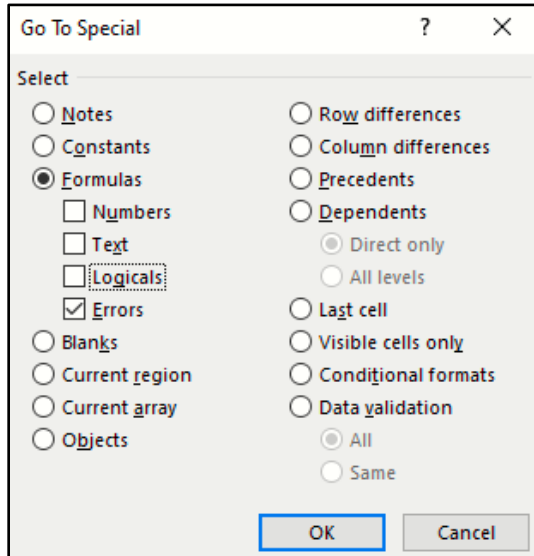
*Figure 17: **Go To Special** dialog box*

2. Select **Formulas** and then clear the **Numbers**, **Text**, and **Logicals** check boxes.

3. Select either **OK** or Enter to close the dialog box. Any cells that contain an error will have a different shading applied. This shading disappears when you select any cell.

Another way to investigate errors is to select a specific cell to check and perform one of the following steps:

- Select **Trace Precedents** or **Trace Dependents** to help trace cells that are causing errors.
- Select the **Error Checking** drop-down list, and then select **Trace Error**.
- Select **Evaluate Formula** in the **Formula Auditing** group.
- Select the cell that has a green triangle in the corner, move your cursor over the warning symbol that displays, select the drop-down list, and then select any option on the submenu. The example in the following screenshot depicts a **#DIV/0!** error, which means the formula is attempting to divide by zero.
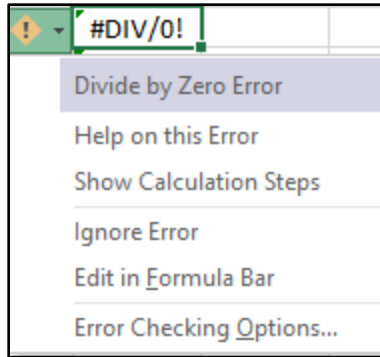
*Figure 18: **#DIV/0!** error warning submenu*
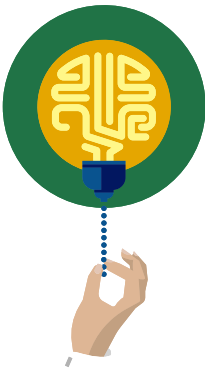
Did you know?

You can hide errors on a worksheet so that your data displays better. To do so, in your workbook, use functions such as **IFERROR**, **ISNA**, or **IFNA**. You can also use conditional formatting. Only an expert in Excel would know how to discover the truth!

Additional information

For further information on hiding errors, go to: Hide error values and error indicators in cells

Error Types

There are many types of errors that can occur in Excel. However, it is important to note that sometimes an error result is okay and might be what you're expecting. For example, when you use an exact match for the range lookup in a **VLOOKUP** function, and the result is **#N/A**, it is indicating that the value you are searching for is not there, which might be what you want. The following table provides a brief outline of error types.

Activity: Pose a challenge

Error Code	Possible reason(s) for error
######	• The data is too wide for the cell width. • One date has been subtracted from another date, and the result is a negative number.
#DIV/0!	• The number or cell reference has been divided by zero or a blank cell or text.
#N/A	• A required argument in a function has been omitted. • The cell that contains the argument is blank or contains the wrong type of entry.
#NAME?	• A named range or function has been referenced that does not exist. • Text has been used in a formula without quotes around it. • A named range or function has been misspelled. • A colon has been omitted from a formula. Note: Any text written in a formula that is not recognized by Excel will result in the **#NAME?** error.
#NULL!	• An intersection has been referred to that does not exist; for example, a space has been used instead of a comma (,).
#NUM!	• Text or a blank cell has been used in a formula where a number is required. • The formula is too small or too large for Excel to handle.
#REF!	• Cells required by a formula have been deleted.
#VALUE!	• Text has been entered in a cell that requires a number. • The wrong type of argument or operator has been used. • A value is not available to the formula or function. • AutoCorrect cannot correct the formula.

In this activity, your teacher will pose some questions regarding errors in a workbook. You don't need to correct the errors, but you need to identify the different types of errors within the workbook.

Resources required

You'll need the following resources for this activity:

- **L4_T1_act_members.xlsx** in this lesson's **Learning Activity Resources** folder.

Activity instructions

Participate in the activity by following these instructions:

1. Observe the teacher's demonstrations and your own Excel window, and follow any instructions given. There are two worksheets that have errors.

2. Consider these questions:

   o Why are there green triangles in the corners of some cells?

   o What if you would rather not have errors display in green?

   o How can you find out what is causing errors?

   o Can you turn off the error checking feature?

Try-it: Work with error checking rules

In this standalone try-it activity, you'll match the error description with the correct error code. You can work with your neighbor or a partner if you want to.

Resources

You'll need the following resources for this try-it:

- **L4_T1_try_error_types_starter.docx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. In the first column of the table, read the description of the error.

2. In the second column of the table, enter the matching error code. A list of codes has been provided.

Topic 2: Evaluate formulas

You can use the **Evaluate Formula** command to break down a function by component. It's especially helpful if you're trying to evaluate a nested function or complex function. The **Evaluate Formula** command is not always for checking for errors, though. Sometimes, you might just want to understand what the function is doing. You could consider it a bit like getting into Microsoft Excel's brain.

Evaluate a formula

The **Evaluate Formula** command won't fix an error or edit a formula. It'll just help you understand what's going on with a formula. To evaluate a formula, select the cell containing the formula to evaluate, and then:

1. Select **Evaluate Formula** from the **Auditing Formulas** group on the **Formulas** tab.
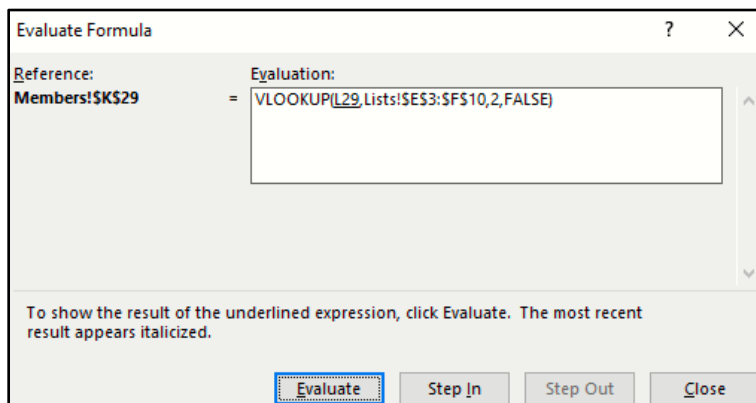
*Figure 19: **Evaluate Formula** dialog box*

2. Select **Evaluate** to break down, or debug, the formula in the **Evaluation** box. You can continue to select **Evaluate** from component to component until **Evaluate** changes to **Restart**, at which point you can start the evaluation again. The preceding screenshot depicts the underlining of the component within the formula that is currently being evaluated. In this case, the value in **L29** does not exist in the table array in the **VLOOKUP** function.

3. Select **Step In** to break down the result of underlined part of the formula in the **Evaluation** box, which the following screenshot depicts:
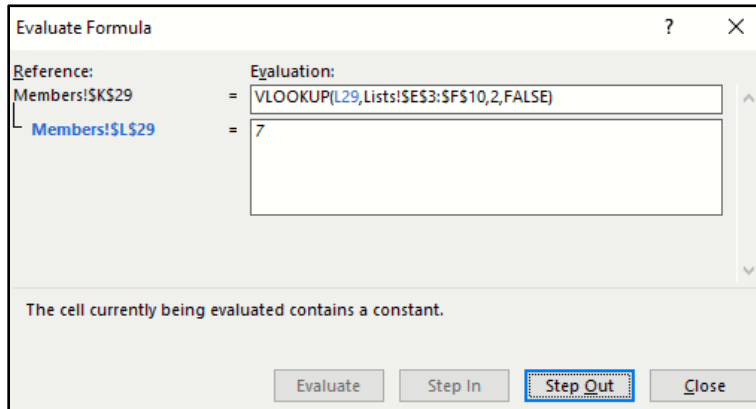
Figure 20: **Evaluate Formula** dialog box **Step In**

4. Select **Step Out** to go back to the previous component or formula.

5. Select **Close** to return to your worksheet.

Additional information

For more information on evaluating formulas, go to: <u>Evaluate a nested formula one step at a time</u>

Activity: Think-pair-share

In this activity, you'll try to explain to your neighbor the problem with a formula in a worksheet. You can then use the **Evaluate Formula** command to check if you were correct.

Resources required

You'll need the following resources for this activity:

- **L4_T2_act_members_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Activity instructions

Participate in the activity by following these instructions:

1. Examine the data in the worksheet and try to understand the problem with any error that you find.

2. Describe the error to your neighbor.

 Microsoft

3. Use the **Evaluate Formula** command to evaluate the function.

4. Correct the errors if possible. (**Hint**: For the event ID error, the member's choice was 'Pick your own produce'.)

Try-it: Evaluate formulas

In this standalone try-it activity, you'll use the **Evaluate Formula** command on a complex formula in the sheet.

Resources

You'll need the following resources for this try-it:

*   **L4_T2_try_members_starter.xlsx** in this lesson's **Learning Activity Resources** folder.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Examine the data in the table.

2. Select any cell that contains an error and evaluate it.

3. Fix the error if possible.

Wrap-up

Use these questions to check what you learned in this lesson:

1. To step into a formula, what command would you use?

    Select the correct option.

    a. **Trace precedents**

    b. **Trace dependents**

    c. **Evaluate Formula**

    d. **Error checking**

2. Which of the following keyboard shortcuts can you use to help locate errors in a worksheet?

   Select all that apply.

   a. F3

   b. F5

   c. Ctrl+G

   d. Ctrl+F

3. To change the color of the error indicator in a cell, which tab would you select in the **Excel Options** dialog box?

   Select the correct option.

   a. **Advanced**

   b. **Data**

   c. **Formulas**

   d. **General**

4. To help debug a formula, you can use the _____ **Formula** command.

   Fill in the blank

Glossary

Audit	Assess or inspect data.
Cell-picker window	A field window inside a dialog box with a collapse button that allows the user to collapse the dialog box, thereby displaying more of the worksheet cells. These windows indicate that users can directly select cells to insert the cell references.
Criteria	Set conditions to be checked in a function.
Dependent	A cell or cells affected by the current cell.
Duplicate	A repeated entry of data.
Evaluate	Assess a formula.
Precedent	A cell that affects the value of the current cell.
Validate	A general reference used to help ensure that the correct data is entered into cells in a worksheet.
Watch Window	A window that can display values in cells that don't easily display while you are working in a workbook.

Table 3: Glossary terms and definitions

Cornerstone

Overview

In this Cornerstone, you'll validate data by using **Data Validation**, **Remove Duplicates**, and **Flash Fill**.

Objectives

The following table outlines the Cornerstone objectives and their corresponding Microsoft Office Specialist (MOS) exam objectives:

Validate data	• 2.2.2: Configure data validation
Remove duplicates	• 2.2.5: Remove duplicate records
Use Flash Fill	• 2.1.1: Fill cells by using Flash Fill
Add a watch	• 3.5.2: Monitor cells and formulas using the **Watch Window**
Evaluate formulas	• 3.5.4: Evaluate formulas

Table 4: Cornerstone objectives

Duration

50 minutes

Instructions

1. Complete the following tasks for each file.

2. When saving your file, add your name to the end of the filename; for example, **Members_Dwayne_Espino.xlsx**. Follow your teacher's directions for where to save your files.

3. When you're done with the Cornerstone, assess your completion and enter the points you think you earned within the following task lists. You can use the help of your teacher if required.

Microsoft

Tasks

You'll work with two files in this Cornerstone. The following are the tasks you need to do within each file:

File 1: Cornerstone_members_starter.xlsx

Task: Remove duplicates (2 points)

1. Open **Cornerstone_members_starter.xlsx**.

2. Remove any duplicates in the **States** listed in the **Lists** worksheet. (2 points) (Exam objective 2.2.5)

Points scored: _____ / 2

Task: Apply data validation (6 points)

1. Apply a validation rule for all of column **H** on the **Members** worksheet that uses the **Abbr**. column on the **Lists** worksheet to ensure that only states that have been validated can be entered in future. (2 points) (Exam objective 2.2.2)

2. Clear the **Data Validation** from the cells **H1** to **H4**. (2 points) (Exam objective 2.2.2)

3. Circle invalid data on the **Members** worksheet. (1 point) (Exam objective 2.2.2)

4. Enter the comment **Check the Ref ID for this member** (or note if you're using Office 365) into the cell in column **L** containing the error on the **Members** worksheet. (1 point)

Points scored: _____ / 6

Task: Edit validation error message (2 points)

1. Edit the existing validation rule on column **L** of the **Members** worksheet so that the style is **Stop** instead of **Warning**. (1 point) (Exam objective 2.2.2)

2. Enter the error message **Please enter a number from 0 to 6 only.** (1 point) (Exam objective 2.2.2)

Points scored: _____ / 2

Microsoft

Task: Use Flash Fill (2 points)

1. Use **Flash Fill** to enter the **Member Num**, **State**, and **ZIP code** as one string of text in column **M** of the **Members** worksheet for all members listed. (2 points) (Exam objective 2.1.1)

2. Close and save the file as **Members**_plus your name._

Points scored: _____ / 2

FILE 1 TOTAL POINTS: _____ / 12

File 2: Cornerstone_shipments_starter.xlsx

Task: Find errors (3 points)

1. Open **Cornerstone_shipments_starter.xlsx**.

2. Use any method to locate any errors on both worksheets within the workbook. (1 point)

3. Edit the comment or note in cell **A1** of the **July Summary** worksheet to note how many errors you have found in the entire workbook. (2 points)

Points scored: _____ / 3

Task: Add a watch (2 points)

- Add a watch for cell **H108** on the **Shipments July** worksheet and close the **Watch Window**. (2 points) (Exam objective 3.5.2)
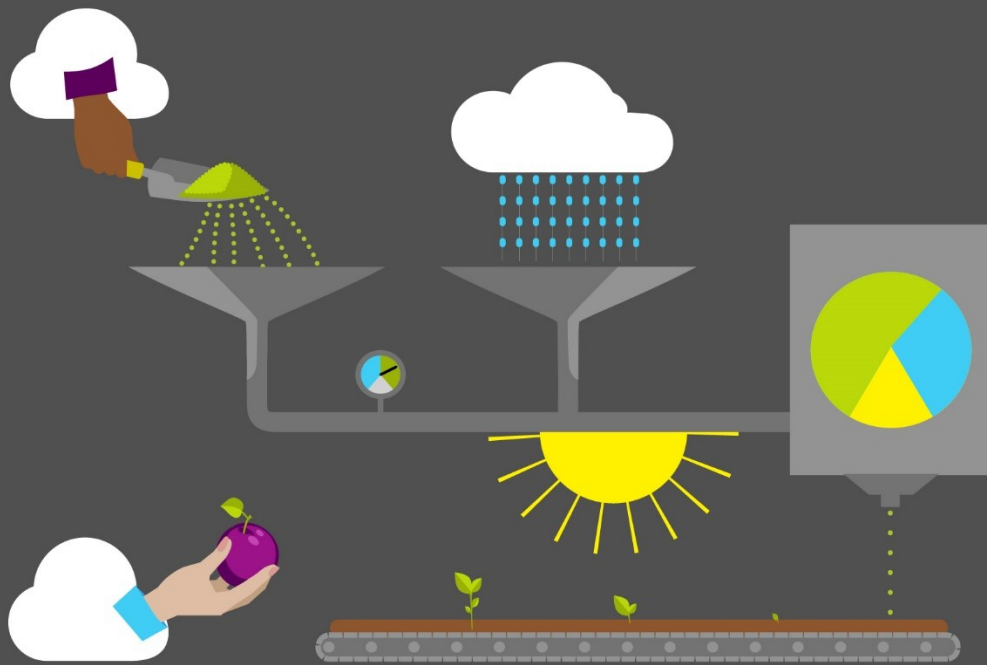
Points scored: _____ / 2

Task: Fix errors (3 points)

1. Use any formula auditing tool to help fix the errors you have found. (3 points) (Exam objective 3.5.4)

2. Close and save the file as **Shipments**_plus your name._

Points scored: _____ / 3

FILE 2 TOTAL POINTS: _____ / 8

Microsoft

Student Guide

40571A
Microsoft Excel expert 2019

Module 4: Analyzing data

Contents

Microsoft

Microsoft

Module overview

Description

In Module 3, you learned about validating and auditing data. In this module, you'll learn various techniques to analyze and predict data, including nested functions, **Forecast Sheet**, **Goal Seek**, and the **Scenario Manager**. The skills that you learn in this module will help you in the future, should you decide to take out a bank loan or make an investment. You can use **Goal Seek** to find the correct value you need to use to get the correct output, taking away the guesswork you would otherwise need to make.

The **Scenario Manager** can store several versions of values for your formulas, which you can display at any time for quick reference. You can even use the **Scenario Manager** to create a summary report to easily compare different values in one worksheet. In the final lesson, you'll create and modify charts. It's always advisable to be able to present your data in a graphic form, if possible. As usual, the module will conclude with a Cornerstone project to consolidate your skills.

At any time during this module, take a few minutes to review the video on making predictions with data. This video will help orient you toward using basic data analysis by stating goals, gathering data, ensuring that the data is usable, and then using software tools to develop predictive models.

Video

To review the video on making predictions with data, go to: [Making predictions with data](#)

Lesson	Learning objective	Exam objective(s)
Forecasting data	Use the **IF** and **AND** functions and create a forecast sheet to predict data.	• 3.4.3
Analyzing financial data	Analyze data by using the **PMT** and **NPER** functions.	• 3.4.3 • 3.4.4
Performing a what-if analysis	Use **Goal Seek** and **Scenario Manager** to reach various results from existing data.	• 3.4.2

Lesson	Learning objective	Exam objective(s)
Creating advanced charts	Add a secondary axis to a chart and create and modify various types of charts.	• 4.1.1 • 4.1.2
Cornerstone: Deciding whether to produce more sweet corn	Forecast and analyze data.	• 3.4.2 • 3.4.3 • 3.4.4 • 4.1.2

Table 1: Objectives by lesson

Scenario

Every year, Munson's Pickles and Preserves Farm sells out of sweet corn, disappointing many potential customers, including a local food-processing chain. They are considering increasing the number of acres devoted to sweet corn.

There are a few givens: they can purchase land at $4,500 per acre, or they can rent it at $80 per acre per month. If they buy land at $4,500 per acre, the interest will be 5.4 percent on a five-year loan. Before Munson's management team decides to spend money to plant more sweet corn, they must answer the following questions:

• How much more corn will we have to sell to be able to buy or rent the land?
• How much will it cost per month, depending on various interest rates, loan amounts, and loan periods?
• Will we have to increase the sweet corn retail price?
• What should the retail price be to increase the forecast profit?
• Will the extra crop revenue cover the loan repayment?
• If we increase corn planting initiatives by 5 percent, that will increase production costs (seeds, fertilizer, hydration) and increase yield at the end of the season. Will this help pay off the loan?

Microsoft

Cornerstone

This module concludes with a Cornerstone project, in which you'll use logical operations and charts, and analyze different scenarios to find the most profitable outcome for Munson's corn-planting initiative. During the Cornerstone, you'll:

- Edit the **PMT** function.
- Create a nested **IF AND** function.
- Use **Goal Seek**.
- Modify a chart.
- Create scenarios for analysis.
- Create a summary report.

Microsoft

Lesson 1: Forecasting data

Overview

In this lesson, you'll forecast data by using logical operations and the **Forecast Sheet** command. You can use a forecast to help predict things such as future sales, inventory requirements, future costs, or consumer trends.

Warm-up

Ask your neighbor what they enjoyed the most about the previous modules. Do they remember how to create an **IF** function? After a brief discussion, use the following questions to find out what you already know about this lesson's topics:

1. To which of the following categories do the **IF**, **AND**, **OR**, and **NOT** functions belong?

   Select the correct option.

   a. **Statistical**

   b. **Financial**

   c. **Logical**

   d. **Text**

2. Which of the following commands can you use to help predict trends?

   Select the correct option.

   a. **Subtotal**

   b. **Forecast Sheet**

   c. **Filter**

   d. **Advanced Filter**

3. When a formula contains another formula within it, it is known as a _____ function.

   Fill in the blank space.

4. You can find the **Forecast Sheet** command on the _____ tab, in the _____ group.

   Fill in the blank spaces.

Microsoft

Topic 1: Use logical operations

If you took the Microsoft Excel associate course, you'll be familiar with basic **IF** functions. In this lesson, you'll learn about nesting an **AND** function into an **IF** function. Nesting functions will help you perform many kinds of analysis, and in this lesson, it'll help with forecasting data.

What is a nested IF?

You can use an **IF** function to ask one question of your data, and the result will be either *true* or *false*. If you need to ask more than one question, for which the result will be either true or false, you'll need to add other function(s) to the **IF**. For example, you could add **OR**, **AND**, **NOT**, or **VLOOKUP**. This is known as a nested formula.

If you nest an **AND** into an **IF** function, it's like getting a result for, as an example, "If this condition is true, and this condition is true, and this condition is true, then do this. If not, do that." The do-this or do-that choices are up to you. The choices might be to return a text string, return a value. or perform a further calculation.
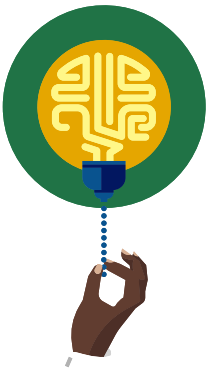
Did you know?

The **AND** and **OR** functions can accommodate up to 255 conditions. Let's hope that you never have to create a formula that has 255 conditions!

As you've learned in previous lessons, you can create any function:

- By entering it yourself.
- By using the **Insert Function**, next to the **Formula Bar** or on the **Formulas** tab, and then locating the function there.
- By using the **Formulas** tab and selecting the category the function belongs to.

The syntax for **IF** is **IF(Logical_test, [Value_if_true], [Value_if_false])**. Anything within square brackets is optional.

The syntax for **IF** with a nested **AND** is **IF(AND(Logical1, Logical2,...)[Value_if_true], [Value_if_false])**.

Create a nested IF function by entering it yourself

To nest an **AND** into the **IF**, you start by entering **=IF(AND(**, in the cell you want the result in, and then perform the following steps:

*Figure 1: The **IF** with **AND** function*

1. Enter your question.

2. Enter a comma and ask your second question.

3. Repeat this process until you have asked all your questions.

4. Enter a closed parenthesis, (**)**), to close off the **AND** function.
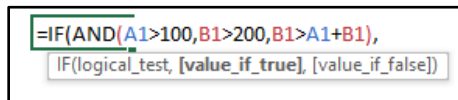
*Figure 2: The **IF** with **AND** function, continued*

5. Enter a comma and then let Excel know what should happen if all your questions are true. You can do this by entering text in quotes, entering a value, or inserting a formula for calculations using different cells.

6. Enter another comma and let Excel know what should happen if the answers to all your questions are false. The following screenshot is an example.
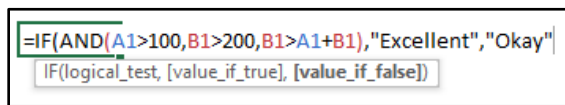
*Figure 3: The **IF** with **AND** function true and false values*

7. Finish the function with a closed parenthesis.

The following snippets depict a few examples of nested **IF** functions:

=IF(AND(A10>=100,A11>=200),"Good","Poor")

The above example translates as, "If the value in cell **A10** is greater than 100 and the value in cell **A11** is greater than 200, then the result is good; otherwise the result is poor."

=IF(AND(B10<100,C10<100,D10>100),A10*5%,A10*2%)

This example translates as, "If the value in cell **B10** is less than 100, the value in cell **C10** is less than 100, and the value in cell **D10** is greater than 100, then multiply **A10** by 5 percent; otherwise multiply **A10** by 2 percent."

Microsoft

Create a nested IF function by using the Function Arguments dialog box

To create a nested **IF** function by using the **Function Arguments** dialog box, perform the following steps:

1. Select the **Insert Function** box, which is next to the **Formula Bar**. In the **Insert Function** dialog box, in the **Select a function** section, select the **IF** function, and then select **OK**. The **Function Arguments** dialog box displays.

   Note: You can also open the **Function Arguments** dialog box by going to the **Formulas** tab, and then, in the **Function Library** group, selecting **Logical**, and then selecting **IF**.

2. Before entering anything into the **Logical_test** box in the **Function Arguments** dialog box, go to your spreadsheet. Select the **Name Box** drop-down list directly beneath the ribbon. The following screenshot depicts this step.
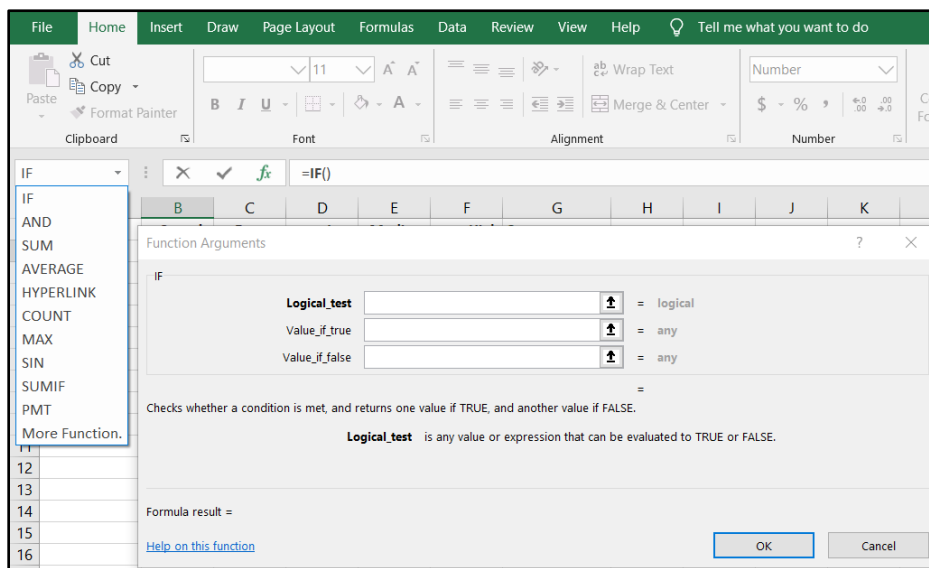
*Figure 4: The **Name Box** drop-down list*

3. Select **AND** if it is listed. If not, select **More Functions** and then, in the **Insert Function** dialog box, in the **Select a function** section, select **AND**, and then select **OK**.

Microsoft

4. The **Formula Bar** will display **=IF(AND())**. You can now ask your first question in the **Logical1** box, which the following screenshot depicts.
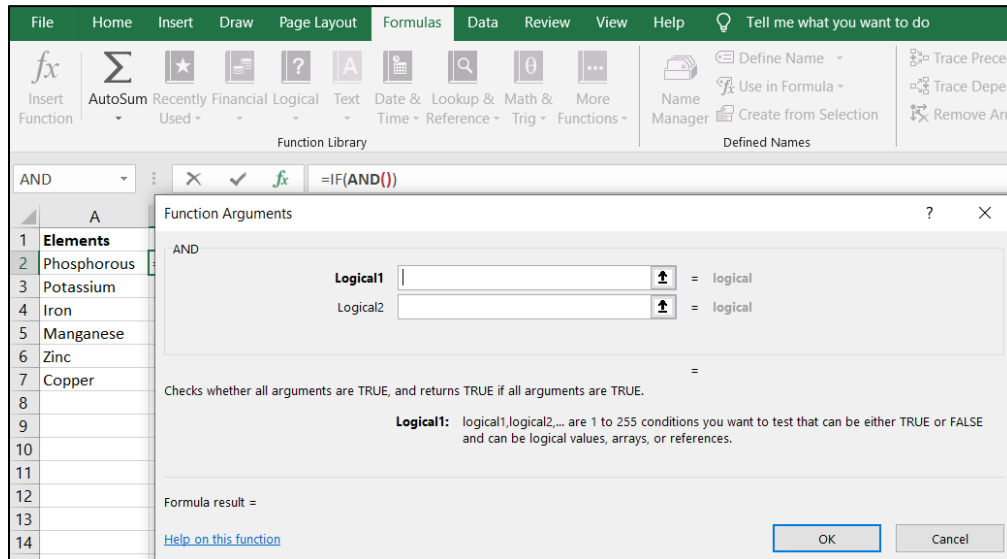
*Figure 5: The **Formula Bar** and **Function Arguments** dialog box*

5. Enter your second question into **Logical2** and continue in **Logical3**, **Logical4**, and others if you have further questions. Excel automatically provides more boxes for you to enter your questions.

6. When you've asked all your questions, select the **IF** formula directly in the **Formula Bar**.

7. The **Function Arguments** box will return to the **IF** function where you can enter the **value_if_true** and then the **value_if_false**.

8. Select **OK** or select Enter to complete the function.

Note: When you're using the **Function Arguments** dialog box to edit a nested function, when you select the function name directly in the **Formula Bar**, the **Function Arguments** dialog box will open the corresponding dialog box for that part of the formula. For example, in Figure 5, the **AND** part is selected. If you select the **IF** part, then the **IF** function dialog box will open. Select the **AND** part again and you will be returned to the **AND** dialog box.

Video

To review the video on using **IF** with **AND**, go to: Using IF with AND, OR and NOT functions
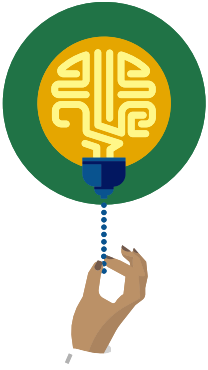
Did you know?

There's an exciting new addition in Excel! Instead of creating a nested **IF**, you can use the **IFS** function. Of course, if you were paying attention during Module 2, you know that already. If you have extra time, why not try nesting an **IFS** with an **AND** or an **OR** function? How much fun would that be?

Activity: Discuss, demo, and learn

Your teacher will start a discussion about the formulas that are already in a workbook containing sample test results. The teacher will then demonstrate how to create a nested **IF** function and how to edit a nested **IF** with **AND** function.

Resources required

You'll need the following resources for this activity:

- Open **L1_T1_act_soil_report_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Examine the formula in cell **G2** on the **Samples** worksheet.

2. Think about the question "Could the formula be written in any other way?"

3. Follow the demonstration on how to create the same formula in cell **G3**.

4. Examine the formula in cell **F2** on the **Trace Elements** worksheet.

   Is the formula correct?

5. Follow the teacher's demonstration on how to edit the formula.

Try-it: Use logical operations

In this leveled try-it activity, you'll examine a nested function, describe the intention of a nested function, or create a nested function.

Try-it 1

Use an existing function to help create another function.

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try1_results_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Examine the formula in cell **C5**.

2. Create a similar formula in cell **C6** that asks if the value in cell **B6** is less than **200** and less than the **Potassium** value in **B2**. If so, that is ideal. If not, the result must be retested. (You can copy the formula and then edit the cells if you want.)

3. Save the file as the same filename plus your initials.

Try-it 2

Enter a description next to a few functions to help your classmates understand what the formula does.

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try2_results_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Examine the formula in cell **C5** and enter a description of what the formula is intending to do in cell **D5**.

2. Examine the formula in cell **C15** and enter a description of what the formula is intending to do in cell **D15**.

3. Save the file as the same filename plus your initials.

Try-it 3

Create an **IF** with a nested **AND** function.

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try3_results_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Create a formula in cell **C6** that gives a result of **Ideal** if the sample result for **Magnesium** is less than **200** and less than the sample results of **Potassium**. If not, the result should be **Retest**.

2. Fill the formula for **Sodium** and **Sulphur**.

3. Save the file as the same filename plus your initials.
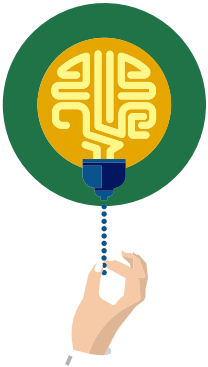
Did you know?

Potassium is a mineral that's important for the heart, kidneys, and other organs to work normally. Some foods that contain potassium are bananas, tomatoes, peas, broccoli, and melons.

Topic 2: Create a forecast sheet

If your data contains consistent time-based data, you can use the **Forecast Sheet** command to create a new worksheet that can help you forecast data trends in the future. It's a great command to experiment with, although you might need a good dictionary to understand some of the mathematical terminology! To create a forecast sheet, perform the following steps:

1. Select the cells containing the known dates and data.

   Note that if you select more than one row, Excel will use the last selected row to create the forecast.

2. Select the **Data** tab and then, in the **Forecast** group, select **Forecast Sheet**. A **Create Forecast Worksheet** dialog box opens and displays the data as a line chart, as the following screenshot depicts.

Microsoft
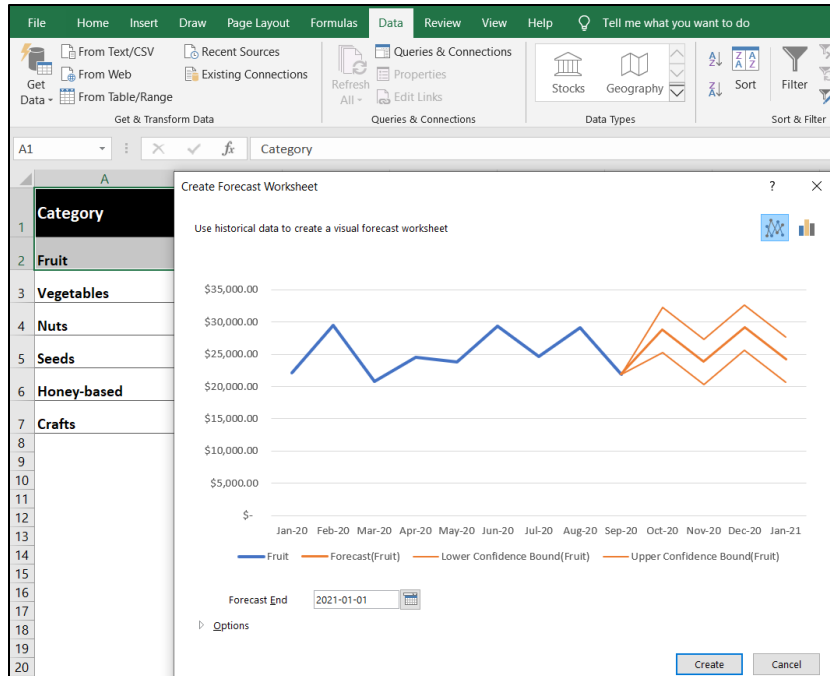
*Figure 6: The **Create Forecast Worksheet** dialog box*

3. Select a line or column chart from the corner of the dialog box.

4. Set the **Forecast End** date if you need to change it.

5. Select **Options** to expand the dialog and refine the forecast details.

6. Select **Create** to proceed to create the forecast sheet.

Microsoft

7. A separate worksheet will display in your workbook, as the following screenshot depicts.

	A	B	C	D	E
1	Category ▼	Fruit ▼	Forecast(Fruit) ▼	Lower Confidence Bound(Fruit) ▼	Upper Confidence Bound(Fruit) ▼
2	Jan-20	$22,063.00			
3	Feb-20	$29,435.00			
4	Mar-20	$20,836.00			
5	Apr-20	$24,559.00			
6	May-20	$23,754.00			
7	Jun-20	$29,395.00			
8	Jul-20	$24,623.00			
9	Aug-20	$29,125.00			
10	Sep-20	$21,932.00	$ 21,932.00	$ 21,932.00	$ 21,932.00
11	Oct-20		$ 28,774.84	$ 25,292.00	$ 32,257.68
12	Nov-20		$ 23,815.45	$ 20,332.59	$ 27,298.30
13	Dec-20		$ 29,141.97	$ 25,630.25	$ 32,653.68
14	Jan-21		$ 24,182.57	$ 20,670.81	$ 27,694.33

Figure 7: A Forecast Worksheet

8. Edit the **Forecast**, **Lower Confidence Bound**, or **Upper Confidence Bound** headings and figures if you want, because this won't affect the actual data.

Microsoft

Forecast sheet options

The following screenshot depicts the **Options** section in the **Create Forecast Worksheet** dialog box, in which you can configure additional settings.
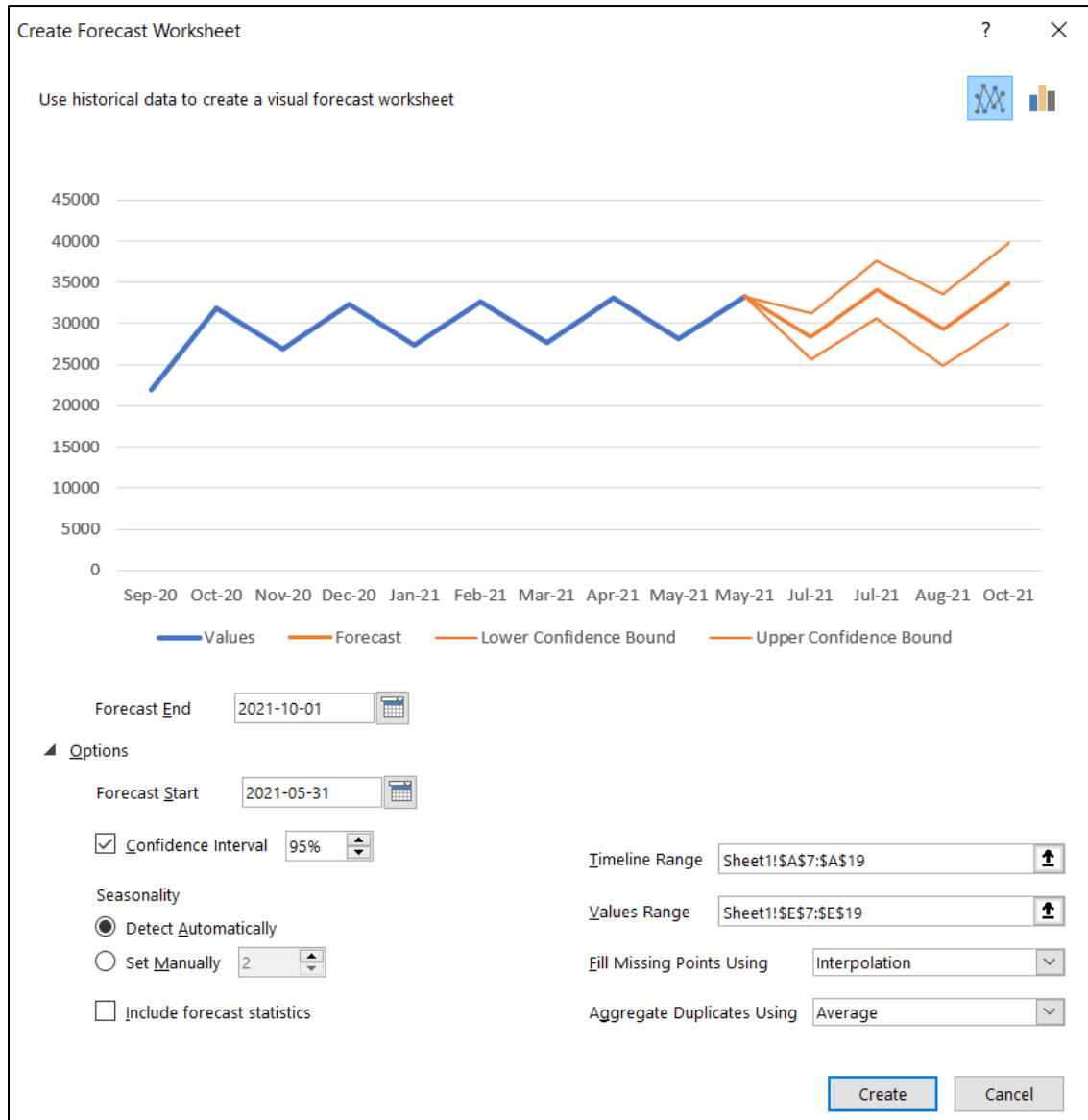
*Figure 8: **Forecast Sheet** options*

The following table describes the settings that you can configure in the **Options** section of the **Create Forecast Worksheet** dialog box.

Forecast Start	Set the date for the forecast to begin. If you pick a date before the end of the historical data, Excel only uses the data prior to the start date in the prediction. This is sometimes referred to as *hindcasting*.
Confidence Interval	Select or clear the **Confidence Interval** checkbox to display or hide it. A smaller interval implies more confidence in the forecast prediction.
Seasonality	Leave this option as **Detect automatically** if your data is something like an annual sales cycle with monthly figures. In such cases, Excel will detect the seasonality as 12. If you select **Set manually** instead, avoid setting the value to less than 2 cycles of historical data to help Excel identify the seasonal components.
Timeline Range	Use this option if you need to change the range for your timeline; it must match the **Values Range** values.
Values Range	Use this option if you need to change the value range; it must match the **Timeline Range** values.
Fill Missing Points Using	Use **Interpolation** to create an average for missing points in your data. You can have up to 30 percent missing data and Excel will still be able to create a forecast sheet. Use **Zeros** if you want to treat the missing data as zeros.
Aggregate Duplicates Using	If your data contains multiple values with the same date, Excel will average the values. You can choose to aggregate duplicates by using **Average**, **Count**, **CountA**, **Max**, **Median**, **Min**, and **Sum**.
Include forecast statistics	Select this checkbox if you want to add additional statistical data. Excel will add a table of statistics by using the **Forecast.Est.Stat** function.

Table 2: Forecast Worksheet options

Microsoft

Additional information

For more information on forecast sheets, go to: [Create a forecast in Excel for Windows](#)

Activity: Show and tell

In this activity, you'll examine a workbook containing a forecast sheet. Follow your teacher as the teacher creates a forecast for **Nuts**.

Resources required

You'll need the following resources for this activity:

- Open **L1_T2_act_forecast_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Examine the data on the **Sales by Category** worksheet and note that the data is not complete for the entire year.

2. Switch to the **Forecast Seeds** worksheet and examine the information that has been created by using the **Forecast Sheet** command.

3. Follow along as your teacher creates another forecast for **Nuts**.

Try-it: Create a forecast sheet

In this leveled try-it activity, you'll create a forecast worksheet or edit the options for a forecast worksheet.

Try-it 1

Create a forecast worksheet and accept all defaults.

Resources

You'll need the following resources for this try-it:

- Open **L1_T2_try1_forecast_vegetables_starter.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Instructions

The following are the general tasks that you must perform during this try-it:

1. From the **Sales by Category** worksheet, create a forecast sheet for **Vegetables** by using the default settings.

2. Rename the new worksheet **Forecast Vegetables** and move the worksheet after the **Sales by Category** worksheet.

3. Save the file as the same filename plus your initials.

Try-it 2

Create a forecast sheet with set specific options.

Resources

You'll need the following resources for this try-it:

- Open **L1_T2_try2_forecast_vegetables_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. From the **Sales by Category** worksheet, create a forecast sheet with a column chart for **Vegetables** with the forecast end date in four months and a confidence level of **80%**.

2. Accept all other default settings.

3. Rename the new worksheet **Forecast Vegetables** and move the worksheet behind the **Sales by Category** worksheet.

4. Save the file as the same filename plus your initials.

Wrap-up

Record why you might need to nest a formula. Hand in your answer before leaving the classroom. You can then use the following questions to check what you learned in this lesson:

1. Instead of creating a nested **IF** function, what single function can you use if you have multiple criteria to meet?

   Select the correct option.

   a. **AND**

   b. **IFS**

   c. **OR**

   d. **NOT**

2. Which type of chart can you use when using the **Forecast Sheet** command?

   Select all that apply.

   a. Pie

   b. Bar

   c. Column

   d. Line

3. How many conditions can you have within an **AND** function?

   Select the correct option.

   a. 255

   b. 64

   c. 1

   d. 8

4. A _____ interval implies more confidence in the forecast prediction when you're using the **Forecast Sheet** command.

   Fill in the blank space.

Lesson 2: Analyzing financial data

Overview

In this lesson, you'll use the **PMT** and **NPER** functions to analyze financial data. You can use the **PMT** function to calculate how much of the loan repayments will be based on the interest rate and the amount loaned, and how often the repayments are made. You can use the **NPER** function to calculate the number of payments you'll need to make to reach a set target, based on the amount you want to reach and the interest rate.

Warm-up

Do you have any concerns about the last lesson? Make sure that you note your concern and share it with the class to ask for their assistance. Use the following questions to find out what you already know about this lesson's topics:

1. What is **PMT** an abbreviation of?

    Select the correct option.

    a. Interest paid

    b. Periodic interest

    c. Payment

    d. Previous coupon data

2. What does **NPER** stand for?

    Select the correct option.

    a. Net present value

    b. Net future value

    c. Nominal interest rate

    d. Number of periods

Microsoft

3. Which of the following categories does the **NPER** function belong to?

   Select the correct option.

   a. **Logical**

   b. **Financial**

   c. **Text**

   d. **Math & Trig**

4. In the **PMT** function, **Rate** refers to the _____ rate per period for a loan.

   Fill in the blank space.

Topic 1: Use the PMT function

The **PMT** function calculates the payment for a loan, based on constant regular payments and a constant interest rate. Imagine having to borrow money from a bank and you wanted to know how much it would cost you to repay per month. The **PMT** function can help you work it out; however, you'll need to gather some facts first, such as:

- What is the interest rate?
- What is the interest term period?
- How much money do you want to borrow?

Create a PMT function manually

You can create a **PMT** function by using the **Insert Function** or by selecting the **Formulas** tab on the **Ribbon**, then selecting **Financial** and then **PMT**. Alternatively, you can create a **PMT** function manually, which is a bit more work. To create a **PMT** function manually, perform the following steps:

1. Enter **=PMT(** in the cell in which you want to make the calculation.

2. Enter the interest rate per period, followed by a comma, such as **5%/12**.

3. Enter the number of periods over which you'll make the payment, followed by a comma, such as **120** or **10*12**.

4. Enter the amount of money that you are borrowing.

5. If you want to have no balance left and make payments at the end of each month, close the function by using a closed parenthesis, **)**, and then select **Enter** to complete the function. If not, enter a comma.

Microsoft

6. Enter the future value if you would like to leave a balance outstanding, followed by a comma.

7. Enter **1** for payment at the beginning of the period or **0** for payment at the end of the period.

8. Enter a closed parenthesis, **)**, to finish the formula, and then select **Enter** to complete the function.

Create a PMT function by using the Function Arguments dialog box

Rather than creating a **PMT** function manually, why not take advantage of a little assistance from the **Function Arguments** dialog box? To do so, perform the following steps:

1. On your worksheet, select the **Insert Function** next to the **Formula Bar**, locate the **PMT** function, and then select **OK**. Alternatively, you can select the **Formulas** tab, select **Financial** in the **Function Library** group, and then select **PMT**.

2. In the **Function Arguments** dialog box, in the **Rate** box, enter the interest rate.

3. In the **Nper** box, enter the number of payments that you will make over the entire loan period. Note that as you select each part of the formula, a description will result that you might find helpful.

4. In the **Pv** box, enter the amount loaned.

5. In the **Fv** box, enter the balance that you would like to remain at the end of the loan period. Leave it empty if you would like no balance left.

6. Finally, in the **Type** box, enter **1** if the payment will be made at the beginning of the period. Leave the **Type** box blank or enter **0** if the payment will be made at the end of the period.

7. Select **OK** or select **Enter** to complete the function.

In the following screenshot, the amount loaned is $40,000 over a period of 10 years at an interest rate of 5 percent annually. In this example, the calculation is monthly. Therefore, the loan period and interest rates should be adjusted accordingly.
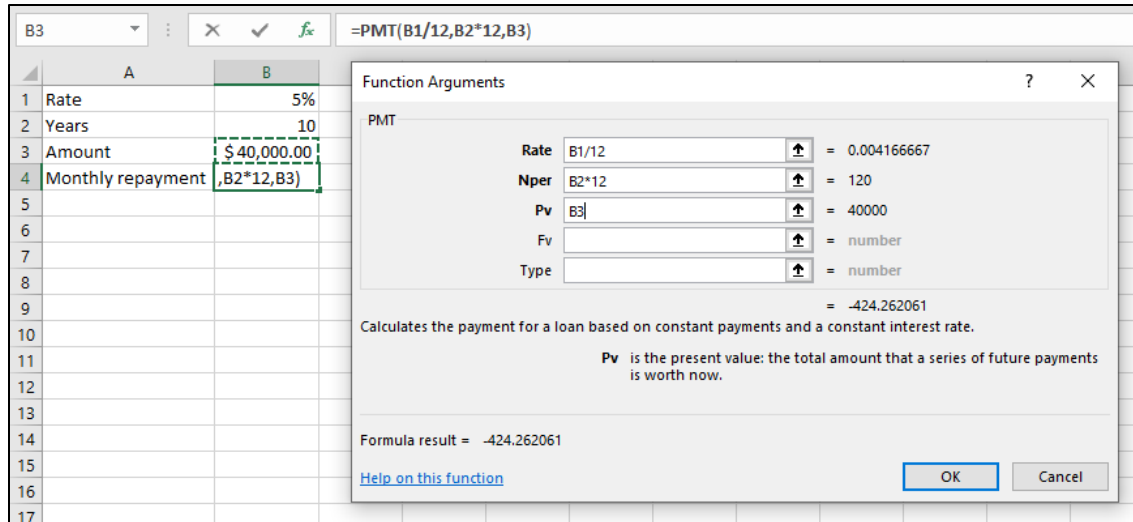
*Figure 9: The **PMT Function Arguments** dialog box*

The syntax for **PMT** is **PMT(rate, nper, pv, [fv], [type])**. The following table describes these arguments.

Rate	The interest rate per period for the loan. For example: • Quarterly would be **B1/4** or **5%/4**. • Monthly would be **B1/12** or **5%/12**.
Nper	The total number of payments for the loan. For example: • Quarterly would be **B2*4** or **10*4**. • Monthly would be **B2*12** or **10*12** or **120**.
Pv	The present value (the total amount that a series of future payments is worth now).
Fv	This value is optional. It is the future value, or a cash balance you want to reach after the last payment is made. If you leave this blank, the assumption is that a balance of zero is required.
Type	This value is optional. Enter **1** for payment at the beginning of the period. Leave this value blank or enter **0** if payment is at the end of the period.

*Table 3: **PMT** arguments*

Microsoft
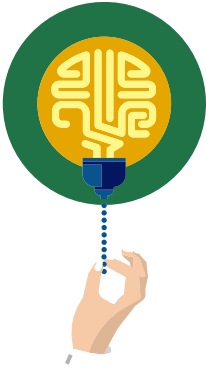
Did you know?

You can easily switch a result from a negative result to a positive result by inserting a minus after the equals. For example, the **PMT** function gives a result that is negative by default because it is a debit rather than credit. If you edit the beginning of the formula to **=-PMT**(…), the result will be positive.

Additional information

For more information on the **PMT** function, go to: [PMT function](#)

Activity: Discuss and learn

In this activity, your teacher will initiate a discussion about the **PMT** function.

Resources required

You'll need the following resources for this activity:

- Open **L2_T1_act_tractor_price.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Select cell **B5**.

2. Select **Insert Function** next to the **Formula Bar**.

3. Follow the teacher's explanation of the formula.

4. Consider why this function might be useful to you in the future. For example, what might you, your friends, or family need a loan for?

Try-it: Use the PMT function

This is a leveled try-it, in which you'll edit an existing **PMT** function or create one from scratch.

Try-it 1

In this try-it, you'll edit cells that will affect the monthly repayment amount.

Microsoft

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try1_tractor_price_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Examine the formula in cell **B5**.

2. Edit the annual interest rate to **7%** and note the monthly repayment result in cell **G3**.

3. Edit the annual interest rate to **6%** and note the monthly repayment result in cell **G4**.

4. Edit the annual interest rate to **5%** and edit the loan period to **8 years**.

5. Note the monthly repayment result in cell **G5**.

6. Save the file as the same filename plus your initials.

Try-it 2

Create a **PMT** formula that will calculate the monthly repayment amount for a loan over five years, and then calculate the loan's amount for one year.

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try2_tractor_price_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Examine the **PMT** function in cells **B5** and **B14**.

2. Create a **PMT** function in cell **B24** that will calculate the monthly repayment if the annual interest is **5%**, the loan period is **5 years**, and the amount of loan is **100000**. Also include the price of a loader and backhoe, which is listed in the table.

3. Calculate the annual payment total for a year in cell **B25**.

4. Save the file as the same filename plus your initials.

Microsoft

Try-it 3

Create a **PMT** function from scratch in a blank workbook for a loan that's paid off quarterly over five years.

Resources

You'll need the following resources for this try-it:

- Open a blank workbook.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Enter the following information into the worksheet:

   a. In cell **A1**, enter **Loan amount**, and in **B1**, enter **5000**.

   b. In cell **A2**, enter **Interest rate**, and in **B2**, enter **4.5%**.

   c. In cell **A3**, enter **Loan period**, and in **B3**, enter **20**.

   d. In cell **A4**, enter **Quarterly repayment**.

2. In cell **B4**, create a **PMT** function that will calculate the monthly repayment by using the contents of cells **B1**, **B2**, and **B3**.

3. Change the result to a positive number.

4. Save the file as **Loan_calculation_**plus your initials.

Topic 2: Use the NPER function

The **NPER** function is similar to the **PMT** function, except that it refers to an investment rather than a loan. Use the **NPER** function to determine the number of periods for an investment if you're making constant payments periodically at a constant interest rate. As with the **PMT** function, you can create it yourself or use **Insert Function** to help you.

Create an NPER function manually

You can create an **NPER** function by using the **Insert Function** or by selecting the **Formulas** tab on the **Ribbon**, then selecting **Financial** and then **NPER**. To create an **NPER** function manually, perform the following steps:

1. Enter **=NPER(** in the cell in which you want to make the calculation.

2. Enter the interest rate per period followed by a comma, such as **5%/12,**.

3. Enter the amount you are paying as a negative number followed by a comma, such as **-100,**.

4. Enter the amount that you have paid to date, followed by a comma, such as **2000,**.

5. Enter **1** to calculate the payment from the beginning of the month, or **0** to pay at the end of the month, as in **120** or **10*12**.

6. Enter the target amount you want to reach, followed by a comma, such as **20000,**.

7. Enter **1** for payment at the beginning of the period or **0** for payment at the end of the period.

8. Enter a closed parenthesis, **)**, to finish the formula, and then select **Enter** to complete the function.

Create an NPER function by using the Function Arguments dialog box

When you create an **NPER** function by using the **Function Arguments** dialog, you might observe similarities with the **PMT** function. As you select each part of the formula, a description will result that you might find helpful.

1. On your worksheet, select the **Insert Function** next to the **Formula Bar**, locate the **NPER** function, and then select **OK**. Alternatively, you can select the **Formulas** tab, select **Financial** in the **Function Library** group, and then select **NPER**.

2. In the **Function Arguments** dialog box, in the **Rate** box, enter the interest rate.

3. In the **PMT** box, enter the amount to pay per period.

4. In the **Pv** box, enter the amount saved to date.

5. In the **Fv** box, enter the amount that you want to save.

6. Finally, in the **Type** box, enter **1** if the payment will be made at the beginning of the period. Leave the **Type** box blank or enter **0** if the payment will be made at the end of the period.

7. Select **OK** or select **Enter** to complete the function.

In the following screenshot, which depicts the **Function Arguments** dialog box for **NPER**, the amount to save is $10,000 with an interest rate of 1% annually. An amount of $100 is paid monthly, and $1,500 has been saved to date. The interest rate needs to be divided by 12 to make it monthly. To reach the target of $10,000, it will take 81 months.

Microsoft
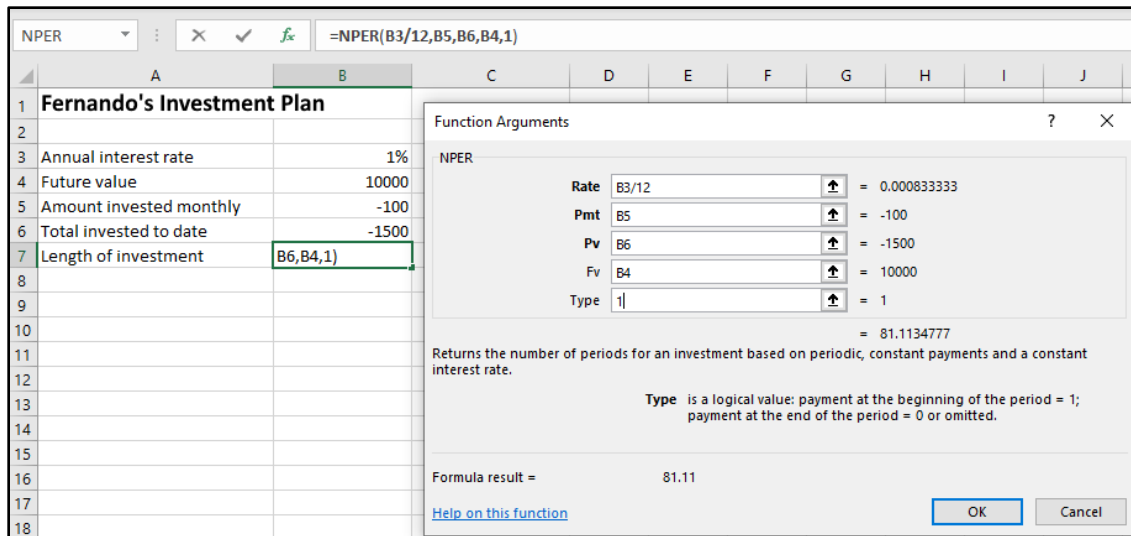
Figure 10: The **NPER** function dialog box

The syntax for the **NPER** function is **=NPER(rate, pmt, pv, [fv], [type])**. Note the similarities with the **PMT** syntax. The following table describes these arguments.

Rate	The interest rate for each period for the investment.
Pmt	The payment that you'll make for each period. Note that you cannot change this for the life of the investment. You usually enter this value as a negative number.
Pv	The present value or lump sum (the amount that a series of future payments is worth now). You usually enter this value as a negative number.
Fv	This value is optional and specifies the future value, or a cash balance that you want to achieve after making the last payment. If you leave this blank, the assumption is that a balance of zero is required.
Type	This value is optional. Enter **1** if you'll pay at the beginning of the period. Leave it blank or enter **0** if you'll pay at the end of the period.

Table 4: **NPER** arguments

Additional information

For more information on the **NPER** function, go to: NPER function

For more information on the financial functions available in Microsoft Excel 2019, go to: Financial functions (reference)

Activity: Tell a story

In this activity, your teacher will tell a story about monthly investments that Fernando Vasquez, the Munson's beekeeper, is making to save for some new beekeeping equipment.

Resources required

You'll need the following resources for this activity:

- Open **L2_T2_act_investment.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Examine the contents of cell **B7**.

2. Consider how long the investment would be if the interest rate was higher, if Fernando paid more money per month, or if the future value was changed.

Try-it: Use the NPER function

In this leveled try-it, you'll examine an **NPER** function and edit it, or create one from scratch.

Try-it 1

Edit the monthly investment amount and note the new investment period value.

Resources

You'll need the following resources for this try-it:

- Open **L2_T2_try1_investment_starter.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Analyzing data

Instructions

The following are the general tasks that you must perform during this try-it:

1. Edit the contents of cell **B5** to **-150**.

2. Enter the new value for the investment period in cell **B13**.

3. Edit the contents of cell **B5** to **-200**.

4. Enter the new value for the investment period in cell **B14**.

5. Save the file as the same filename plus your initials.

Try-it 2

Edit an **NPER** function to set the payment to be due at the beginning of the month.

Resources

You'll need the following resources for this try-it:

- Open **L2_T2_try2_investment_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Select cell **B7** and use the **Insert Function** to change the payment to be due at the beginning of the month.

2. Save the file as the same filename plus your initials.

Try-it 3

Create an **NPER** function, with the payment due at the end of each month. The aim is to save $2,000 with an annual interest rate of 1.5 percent, paying $50 per month.

Resources

You'll need the following resources for this try-it:

- Open **L2_T2_try3_investment_starter.xlsx** in this lesson's Learning Activity Resources.

Microsoft   32

Instructions

The following are the general tasks that you must perform during this try-it:

1. Examine the formula in cell **B7**.

2. Insert a new worksheet and rename it **My Investment Plan**.

3. Enter the following data into the new worksheet:

   a. Enter **Annual interest rate** in cell **A1** and **1.5%** in cell **B1**.

   b. Enter **Total to reach** in **A2** and **2000** in cell **B2**.

   c. Enter **Present value** in **A3** and **500** in cell **B3**.

   d. Enter **Monthly investment** in cell **A4** and **-50** in cell **B4**.

   e. Enter **Length of Investment** in cell **A5**.

4. Create a formula in cell **B5** that calculates the length of the investment by using the data in cells **B1**, **B2**, **B3**, and **B4** with the payment due at the end of each month.

5. Save the file as the same filename plus your initials.

Wrap-up

Discuss with your classmates when you think you might need the **NPER** or **PMT** function in the future. If you could save money, what would you like to invest in? What expenditure would you take out a loan for? After your discussion, use the following questions to check what you learned in this lesson:

1. Which of the following must you complete when creating an **NPER** function?

   Select all that apply.

   a. **Rate**

   b. **Pmt**

   c. **Pv**

   d. **Fv**

2. The **PMT** function returns a _____ value by default.

   Fill in the blank space.

3. If a function's syntax contains brackets ([ ]) around any segment of the function (for example, [pv]), that means that segment is _____.

   Fill in the blank space.

4. What's the order of the syntax for the **PMT** function?

    Indicate the correct sequence by adding numbers 1-5 next to the following items.

    a. Fv

    b. Pv

    c. Rate

    d. Type

    e. Nper

Lesson 3: Performing a what-if analysis

Overview

Have you or a friend ever wondered "what if this happened?" or "what if that happened?" when you're thinking about a financial or numerical calculation? Well, Excel can help answer questions like that. In this lesson, you'll perform a what-if analysis by using **Goal Seek** and **Scenario Manager**.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. Which of the following belongs to the what-if analysis tools?

   Select all that apply.

   a. **Data Tables**

   b. **Scenario Manager**

   c. **Goal Seek**

   d. **Data Validation**

2. Which of the following describes what you can do with **Goal Seek**?

   Select the correct option.

   a. Find the correct input for the value you want.

   b. Create different groups of values or scenarios.

   c. Display the results of multiple inputs at the same time.

   d. Choose from a list of rules to limit the type of data that people can enter.

3. Which of the following statements are false?

    Select all that apply.

    a. **Goal Seek** can replace one value at a time.

    b. **Goal Seek** can replace multiple values at the same time.

    c. You can use **Goal Seek** to limit the type of data that people can enter.

    d. **Goal Seek** can create different groups of values.

4. You can find **Scenario Manager** on the _____ tab, in the _____ group.

    Fill in the blank spaces.

Topic 1: Perform a goal seek

Goal Seek is a command that you can use when you know the result that a formula should provide, and you want to know the value an item must to give that result. You could keep guessing what the value should be and you might get to the result you want; however, **Goal Seek** can do the work for you much faster.

Use Goal Seek

In **Goal Seek**, you can only use one variable input and the variable item must be in the existing formula. If you need to use multiple variable inputs, Excel has an excellent **Solver** add-in that you can activate via **File** > **Options** > **Add-ins**. To use **Goal Seek**, perform the following steps:

1. Create the formula that you need in your worksheet.

2. Select the **Data** tab, and then, in the **Forecast** group, select **What-If Analysis**.

3. Select **Goal Seek**.

4. In the **Goal Seek** dialog box, in the **Set cell** box, enter the cell that you want to set.

5. In the **To value** box, enter the value that you want the result to be.

6. In the **By changing cell** box, enter the cell to be changed.

7. Select **OK** to finish.

In the following screenshot, the **PMT** function is used and the desired result is 400 per month. You could change the interest rate, the length of the loan period, or the amount loaned because all of these are in the result cell.

Note: The value entered is -400 because the current result is a negative number.
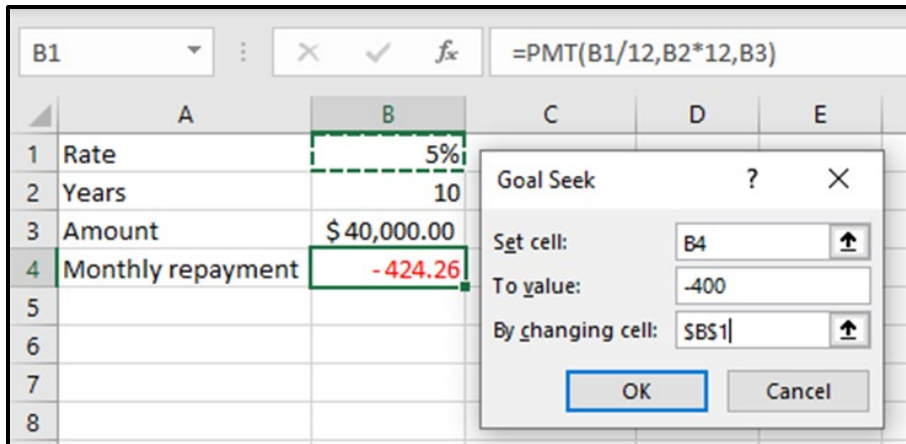
*Figure 11: **Goal Seek** dialog box*

If you aren't satisfied with the changes to your data, you can select **Undo** on the **Quick Access Toolbar** (or Ctrl + Z) to return to the original values. You can then run **Goal Seek** again to change a different variable.

Additional information

For more information on **Goal Seek**, go to: Use Goal Seek to find the result you want by adjusting an input value

For more information on **Solver**, go to: Define and solve a problem by using Solver

Activity: Tell a story

In this activity, your teacher will continue the story of Fernando's investment plans, and how **Goal Seek** can be useful in performing an analysis.

Resources required

You'll need the following resources for this activity:

- Open **L3_T1_act_investment.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Examine the formula in cell **B7**, as a reminder of how the **NPER** function works.

2. Your teacher will demonstrate using **Goal Seek** to find the best interest rate to pay off the loan within 30 months.

3. Your teacher will split the class into two groups. One group will guess the amount to save monthly to be able to pay off the loan within 30 months. The other group will guess what the future value will be to pay off the loan within 30 months.

4. Perform the **Goal Seek** to get the actual value. How close where you in guessing the correct value?

5. What would your preferred solution be if you were Fernando?

Try-it: Perform a goal seek

In this leveled try it activity, you'll use **Goal Seek** to reduce the monthly repayment to $40 for a new drone.

Try-it 1

The maximum amount that you can afford to pay for a new drone is $40 per month. Use **Goal Seek** to help reduce the monthly repayment value down to **-40** to keep within your budget.

Resources

You'll need the following resources for this try-it:

- Open **L3_T1_try1_drone_payment_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Use **Goal Seek** to reduce the monthly repayment value to **-40** by changing the amount you borrow.

2. Save the file as the same filename plus your initials.

Try-it 2

The maximum amount that you can afford to pay for a new drone is $40 per month. Use **Goal Seek** to help reduce the monthly repayment value to **-40**. You aren't sure if you should try to find a lower interest rate, reduce the loan amount, or increase the loan period. You decide to note three values to discuss with your colleagues before you make a final decision.

Microsoft

Resources

You'll need the following resources for this try-it:

- Open **L3_T1_try2_drone_payment_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Use **Goal Seek** to calculate the best interest rate to reduce the monthly repayment value to **$40**.

2. Note the value suggested in cell **B9**, and then undo the solution.

3. Repeat for the loan period and note the value in cell **B10**.

4. Repeat for the loan amount and note the value in cell **B11**.

5. Save the file as the same filename plus your initials.

Topic 2: Use the Scenario Manager

Have you ever created multiple worksheets that contain versions of the same data, with minor differences, and then find yourself switching from sheet to sheet to compare results? Well, the **Scenario Manager** could be just the tool for you. The tool will not only save time but also will keep everything in one place and enable you to easily switch between different sets of data when necessary.

Create a scenario

The scenario in the following example is a simple one based on changing one cell. You can change as many cells as you need to in each scenario you create. To create a scenario, perform the following steps:

1. Select the **Data** tab, and then, in the **Forecast** group, select **What-If Analysis**.

2. Select **Scenario Manager**.

3. In the **Scenario Manager** dialog box, select **Add** to create a new scenario.

4. In the **Add Scenario** dialog box, in the **Scenario name** box, enter a suitable name for the scenario.

Microsoft
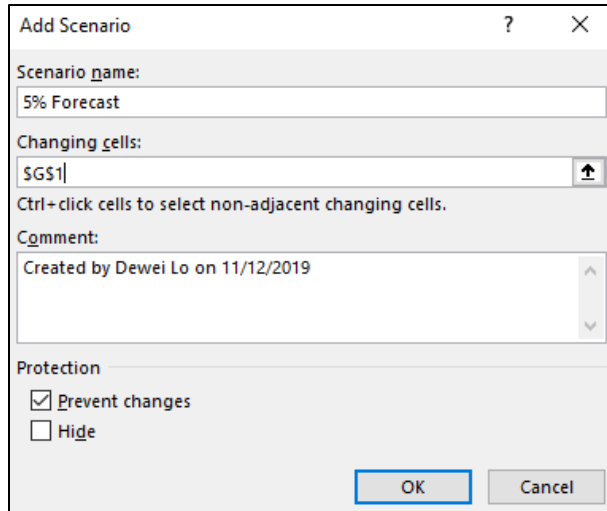
*Figure 12: The **Add Scenario** dialog box*

5. In the **Changing cells** box, enter the cell(s) to be changed. You can do this by entering their cell reference or by selecting the cells on the worksheet.

6. Add a comment in the **Comment** box if you want to, and then select **OK**. The **Scenario Values** dialog box displays, as depicted in the following screenshot.

*Figure 13: The **Scenario Values** dialog box*

7. In the **Scenario Values** dialog box, select **OK**. The values that are currently in the cells will be entered automatically.

8. Repeat the above steps until you have created all the scenarios that you need.

9. Select **OK** to return to the **Scenario Manager** dialog box, which the following screenshot depicts.
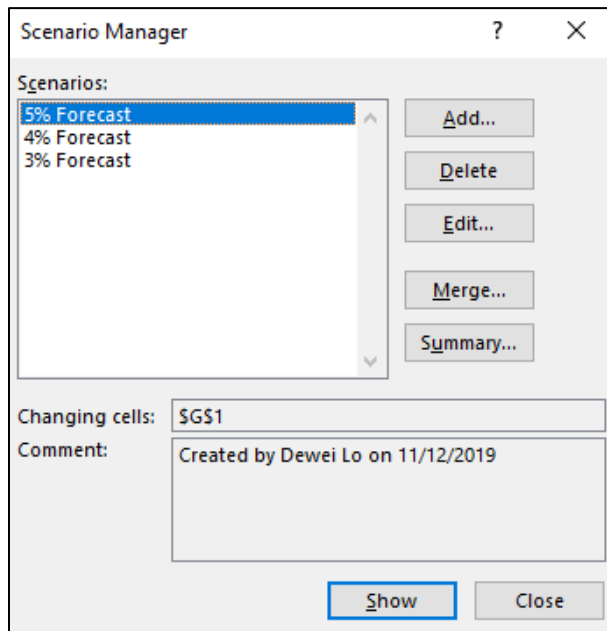
Figure 14: *Scenario Manager dialog box*

10. In the **Scenario Manager** dialog box, select any scenario in the **Scenarios** box, and then select **Delete** to remove it or **Edit** to make alterations.

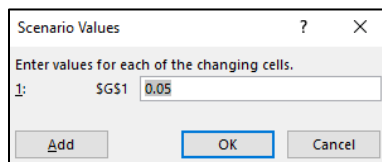11. To switch to a different scenario, select any scenario, and then select **Show**. Your data will update to that scenario.

12. Select **Close** to close the dialog box.

At any time, you can access the **Scenario Manager** and switch to a different scenario, edit existing scenarios, and delete scenarios. You can also merge scenarios from another workbook.

Create a summary report

When you've created multiple scenarios, you might decide to create a report that will summarize the data for every scenario. To do this, you can create a summary report by performing the following steps:

1. Select the **Data** tab, and then, in the **Forecast** group, select **What-If Analysis**.

2. Select **Scenario Manager**.

3. In the **Scenario Manager** dialog box, select **Summary**, and then the **Scenario Summary** dialog box, which is depicted in the following screenshot, in the **Results cells** box, enter the cell on which to base the report. (In most cases, it will be the total value cell.)
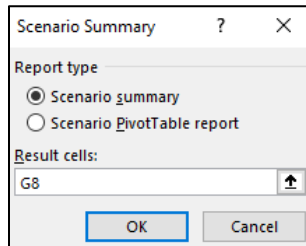
*Figure 15: The **Scenario Summary** dialog box*

4. Select **OK**.

   A Summary report will be created in a separate worksheet for easy comparison, as depicted in the following screenshot.

Figure 16: A Summary report

5. Edit the references in the report to make it easier to understand if you want to. For example, in Figure 16, **$G$1** could be edited to Predicted Percentage Increase.

Additional information

For more information on the **Scenario Manager**, go to: Switch between various sets of values by using scenarios

Microsoft

Activity: Remind, explain, and learn

In this activity, your teacher will remind you about a few formulas that you learned in Module 2. You'll then create several scenarios, with your teacher's help.

Resources required

You'll need the following resources for this activity:

- Open **L3_T2_act_forecast_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Examine the formulas in cells **I8**, **I9**, and **I10**.

2. What does each formula calculate? Prepare to share with the class if you're asked.

3. Consider the following questions:

    a. What if you wanted the summary for different months and seasons?

    b. What if the forecast value was different?

    c. Imagine creating different worksheets to summarize different values or having to create lots of different formulas to get the answers you want. You might end up duplicating a lot of work and losing track of where you are. How would you avoid this?

4. Follow the teacher's instructions to create several scenarios.

Try-it: Use the Scenario Manager

In this leveled try-it, you'll either edit an existing scenario or create new scenarios.

Try-it 1

Rename an existing scenario, edit a scenario value, and display the results.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try1_sales_forecast_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Edit the scenario named **Farm Shop** to **Farm Shop Autumn** and change the current value in the last scenario value to **November**.

2. Show the **Farm Shop Autumn** scenario.

3. Save the file as the same filename plus your initials.

Try-it 2

Create two additional scenarios and display a scenario result.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try2_sales_forecast_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Create a new scenario named **Wholesale Winter** that stores the contents in cells **H2**, **H5**, **H6**, and **H7:J7** as they currently exist.

2. Create an additional scenario named **Wholesale Summer** that changes the cells as follows:

   o **H2** to **4%**
   o **H5** to **Wholesale Summary** (unchanged)
   o **H6** to **Summer**
   o **H7** to **June**
   o **I7** to **July**
   o **J7** to **August**

3. **Show** the **Wholesale Summer** scenario.

4. Save the file as the same filename plus your initials.

Try-it 3

Create two new scenarios and create a summary report.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try3_sales_forecast_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Create a new scenario named **Wholesale Winter** that stores the contents in cells **I2**, **I6**, and **I7:K7** as they currently exist.

2. Create an additional scenario named **Wholesale Spring** that changes the cells as follows:

   - **I2** to **3%**
   - **I6** to **Spring**
   - **I7** to **March**
   - **J7** to **April**
   - **K7** to **May**

3. **Show** the **Wholesale Spring** scenario.

4. Create a **Summary report** based on cells **I2**, **I10**, **J10**, and **K10**.

5. Rename the summary worksheet as **Wholesale Summary**.

6. Save the file as the same filename plus your initials.

Wrap-up

Ask your neighbor if there is anything they don't understand from today's lesson, and then help them if possible. If you're unable to assist, help your neighbor note down the problem for the mud puddle or parking lot. Then, use these questions to check what you learned in this lesson:

1. Which of the following commands are available in the **Scenario Manager** dialog box?

   Select all that apply.

   a. **Merge**

   b. **Summary**

   c. **Add**

   d. **Show All**

2. Which of the following statements are correct?

Select all that apply.

a. The cell changed when you use **Goal Seek** does not need to be a precedent of the value you want to set.

b. The cell changed you use **Goal Seek** must be a precedent of the value you want to set.

c. The cell changed when you use **Goal Seek** must be a dependent of the value you want to set.

d. The cell changed when you use **Goal Seek** does not need to be a dependent of the value you want to set.

3. Which of the following command categories is **Goal Seek** part of?

Select the correct option.

a. **What-If Analysis**

b. **Formula Auditing**

c. **Calculation options**

d. **Financial functions**

4. Which of the following steps isn't required to delete an existing scenario in a workbook?

Indicate the incorrect step by marking it as false.

a. Select **What-If Analysis**.

b. Select **Scenario Manager**.

c. Select the scenario to delete.

d. Select **Delete**.

e. Select **OK**.

f. Select **Close**.

Lesson 4: Creating advanced charts

Overview

In this lesson, you'll create dual-axis charts and an advanced chart. Sometimes, you might need to display several categories in a chart that have vastly different numerical values. For example, one series might contain values between 50 and 100, another series might contain values between 1000 and 2000, and another might contain values that are all less than 10. If you were to display all the categories on one axis, it would make the lower number very difficult to understand. If the series containing numbers between 1000 and 2000 were plotted against a different axis in the same chart, it would be much easier to understand.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. When a chart combines two or more types of charts, what is it known as?

   Select the correct option.

   a. **Doughnut**

   b. **Combo**

   c. **3D bar**

   d. **Surface**

2. To display progressively smaller steps, which of the following charts would you use?

   Select the correct option.

   a. **Sunburst**

   b. **Scatter**

   c. **Radar**

   d. **Funnel**

3. Which of the following are types of charts?

   Select all that apply.

   a. **Waterfall**

   b. **Win/Loss**

   c. **Box-and-whisker**

   d. **3D map**

4. How many series of data can you use in a pie chart?

   Select the correct option.

   a. A maximum of 6

   b. A maximum of 3

   c. 2

   d. 1

Topic 1: Create dual-axis charts

Have you ever observed a chart that uses a wide range of data, thereby making it difficult for you to understand the data? For example, in a column chart, some columns might be very small when compared to other columns that are huge. Such data might be perfect for a dual-axis chart, also known as a secondary axis chart. The following screenshots contain a few examples. Which one can you understand better?

The following is a column chart with totals alongside the categories.
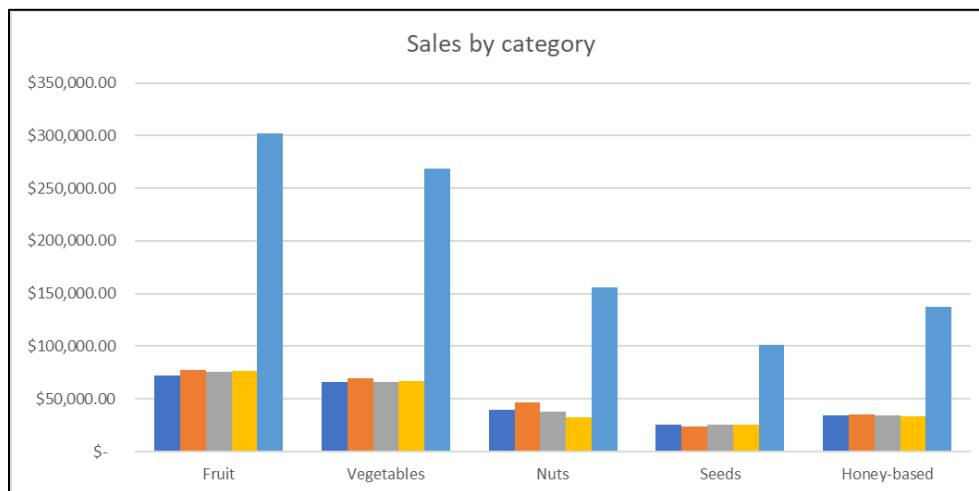
Figure 17: A column chart

The following is a combo chart displaying the totals as a line against a secondary axis.

Figure 18: A combo chart with secondary axis

Add a secondary axis

To add a secondary axis to a chart, perform the following steps:

1. Select the chart that you want to edit.

2. On the **Chart Tools** contextual tab, select the **Design** tab.

3. In the **Type** group, select **Change Chart Type**.

4. In the **Change Chart Type** dialog box, in the navigation pane, select **Combo**.

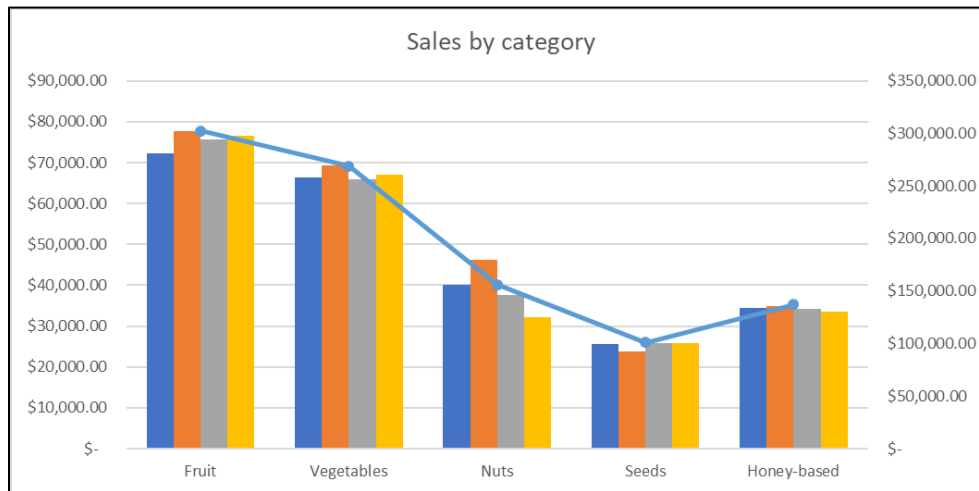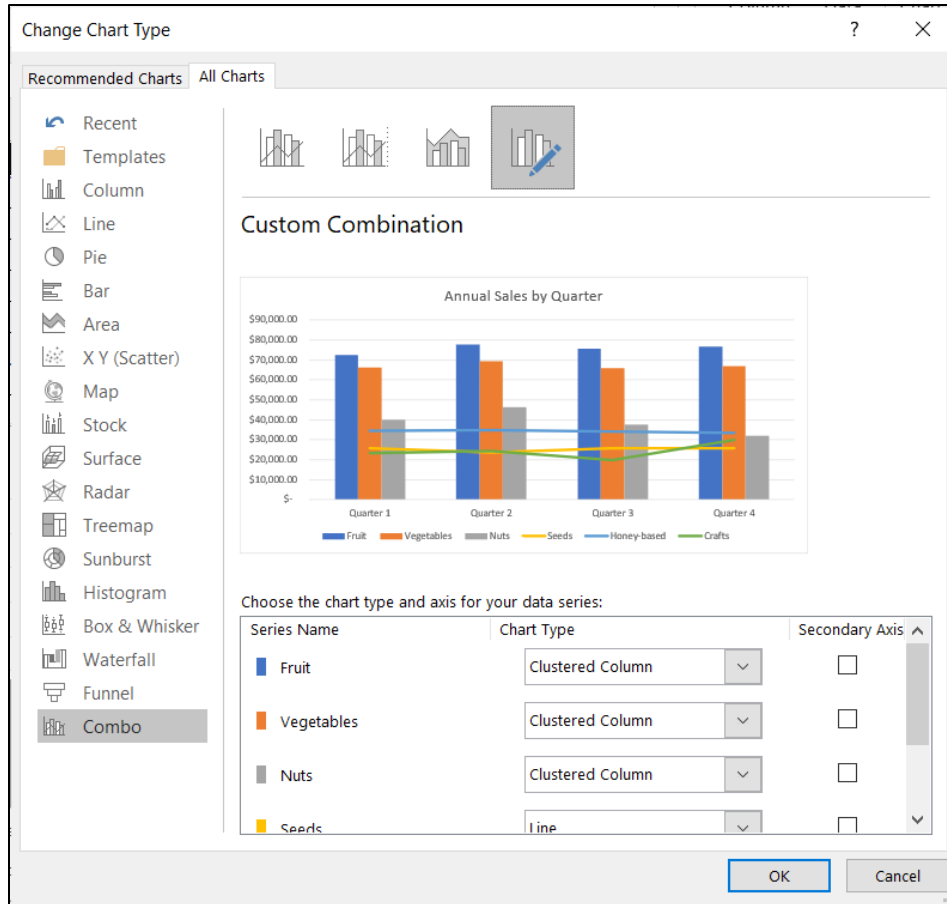*Figure 19: A **Change Chart Type** dialog box*

5. In the **Secondary Axis** column, select the check box against the series that you want to display against a secondary axis.

6. If you also want to change the chart type, in the **Chart Type** column, select the drop-down list, and then select a different type of chart, for example, **Line with Markers**.

7. Select **OK** to close the dialog box.

Video

To review the video on dual-axis charts, go to: Add or remove a secondary axis in a chart in Excel

To review the video on data visualization, go to: Data visualization

Activity: Discuss and learn

This activity is student driven. You or one of your classmates will use the teacher's computer to edit an existing chart.

Microsoft

Resources required

You'll need the following resources for this activity:

- Open **L4_T1_act_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Volunteer to add the totals per quarter to the existing chart on the teacher's computer, which will be projected on-screen. You could also offer assistance to your classmate.

2. After including the totals, determine if there is anything unusual about the chart.

3. Consider what could help make the chart easier to understand.

4. Be prepared to share your thoughts with the class.

Try-it: Create dual-axis charts

In this leveled try-it, you'll change a chart to a combo chart and add a secondary axis.

Try-it 1

Change an existing chart to a combo chart with a secondary axis.

Resources

You'll need the following resources for this try-it:

- Open **L4_T1_try1_average_price_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Display the **Fresh sweetcorn** category as a **Line with Markers** chart against a secondary axis.

2. Save the file as the same filename plus your initials.

Try-it 2

Add a data series to an existing chart and change it to a combo chart, with one series plotted on a secondary axis.

Resources

You'll need the following resources for this try-it:

- Open **L4_T1_try2_average_price_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Add **Fresh sweetcorn** to the existing chart.

2. Display the **Canned** and **Frozen** sweet corn categories as a **Line with Markers** chart type.

3. Display the **Fresh sweetcorn** category as an **Area** chart against a secondary axis.

4. Save the file as the same filename plus your initials.

Topic 2: Create and modify charts

Have you observed how many types of charts are available in Excel 2019? There are loads of chart types that you can try out. Maybe on a rainy day, you can practice creating and modifying them! In the meantime, why not review the video on Data visualization that demonstrates how data can come to life when you create various kinds of charts? Of course, maybe you've reviewed it already!

Create a chart

If you took the Excel associate course, you probably created many different types of charts, such as column, line, pie, or bar charts. In this topic, you'll create some of the newer, more specialized charts, such as a box-and-whisker, combo, funnel, histogram, map, sunburst, and waterfall chart.

To create a chart, perform the following steps:

1. Select the data that you want to include in the chart.

2. On the **Insert** tab, in the **Charts** group, select the category of chart that you would like to create.
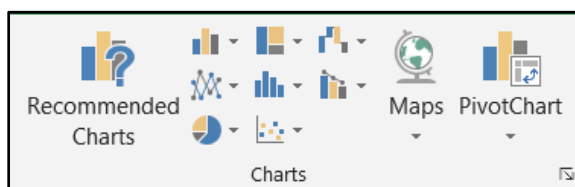

*Figure 20: The **Charts** group on **Insert** tab*

3. Select the chart from the gallery.

4. A chart will immediately load into the current worksheet.

Funnel chart

You typically use a *funnel* chart for values across phases in a process. However, you can use it for any single series of data. This type of chart is more effective to sort the values in descending or ascending order. That way, the chart will resemble a funnel. The following screenshot indicates that the Development phase will cost the most and that the Testing phase will cost the least.
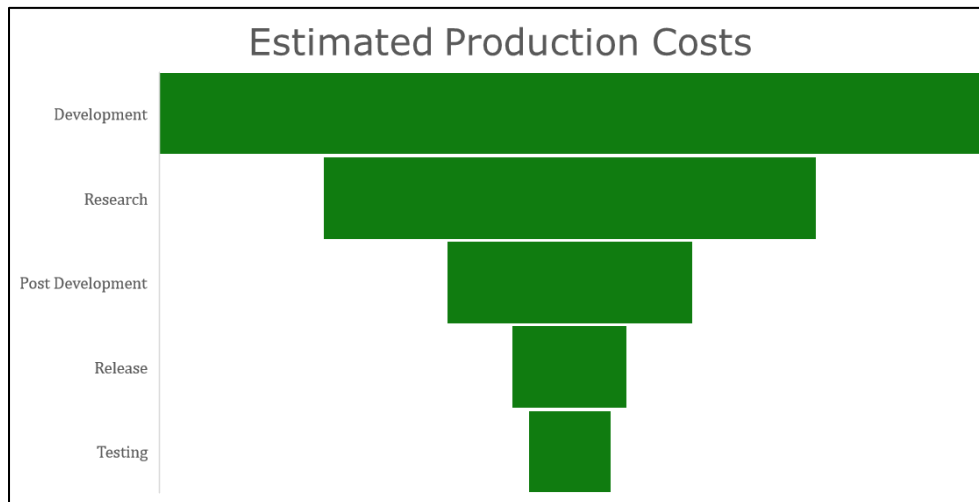

Figure 21: A funnel chart

Additional information

For more information on **Funnel** charts, go to: [Create a funnel chart](#)

Treemap chart

A *treemap* chart is useful when you have a lot of data that is organized hierarchically within a few categories. It displays proportions within hierarchal levels in squares or rectangles. In the following screenshot, the chart indicates that vegetables have the biggest proportion of sales, with summer and autumn sales nearly equal. Nuts comprise the smallest proportion of sales, particularly in winter. There are no variations on a treemap chart.
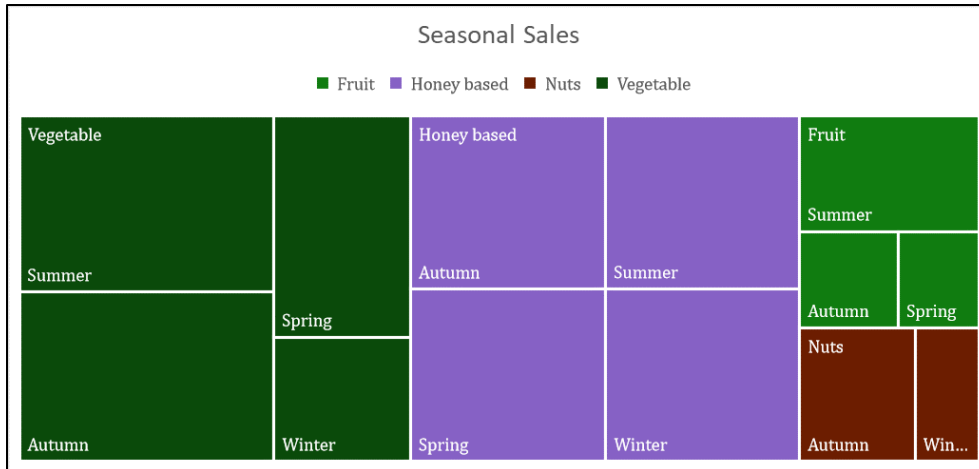
Figure 22: A treemap chart

Waterfall chart

You typically use a *waterfall* chart to help understand the breakdown of a running total; for example, cash coming in and cash going out. Positive values usually display in blue and negative values display in red or orange. This might vary if you are using a theme other than the Office theme in your workbook. You can change the colors by using the **Change Colors** command on the **Design** tab. You could also, as with all other charts, select an individual value or the whole series and change the color on the **Format** tab.

The following screenshot indicates that from a starting point of zero, the final amount is approximately 400. Money going out displays downward and money coming in displays upward.
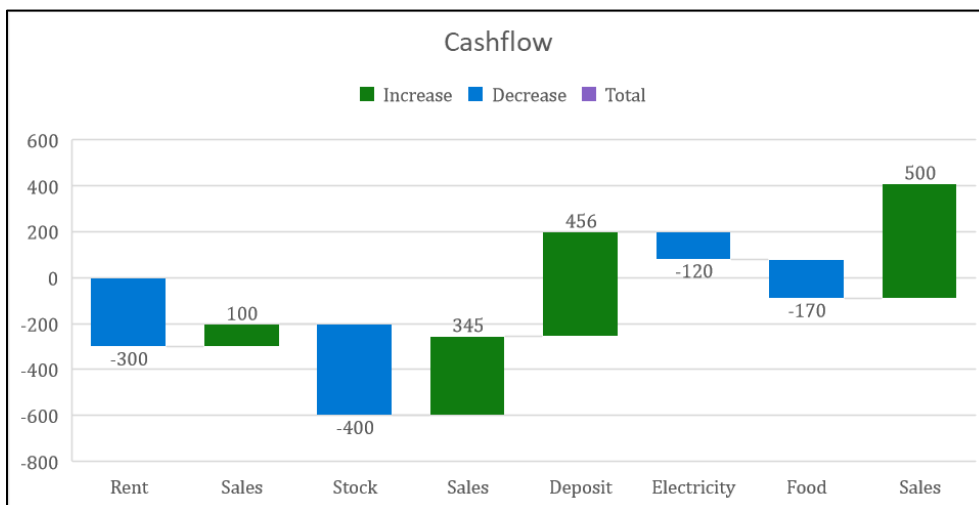

Figure 23: A waterfall chart

Sunburst chart

A *sunburst* chart is a hierarchical chart like a treemap chart, except that the data displays in rings. A ring displays each level, with the innermost ring being the top level. The outer rings or segments are the breakdown of the inner ring. The following screenshot indicates the seasonal sales by category, with vegetables comprising the largest segment of the innermost ring.
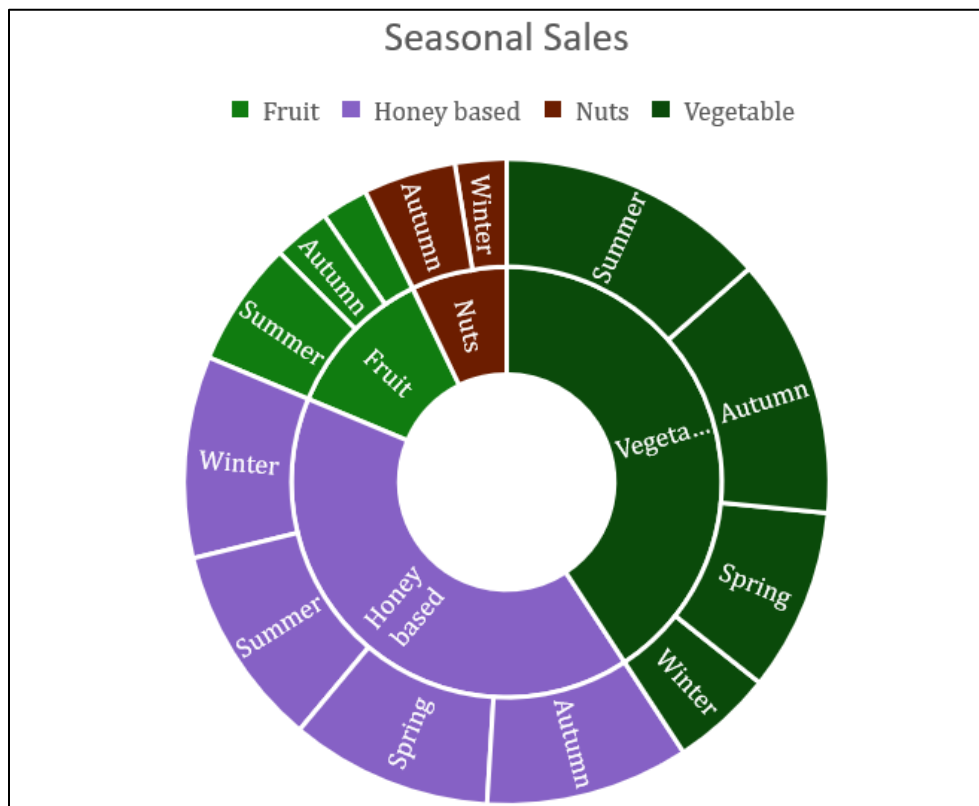

Figure 24: A sunburst chart

Pareto chart

The *Pareto* chart belongs to the histogram category of charts. Pareto charts are ideal for representing frequencies within a list of values. Imagine a list of temperatures across all U.S. states for the month of January. A histogram chart can depict how many times temperatures fall within set ranges. For example, it can depict the number of occurrences between 0°C and 5°C, or between 22°F and 34°F.

Columns are called bins and the line in a Pareto chart represents the aggregate total percentage. You can edit the number of bins to display, and set the width (range) of the bins, the overflow value, and the underflow value. Values between the overflow or underflow range will not display.

The image indicates that donations within the range 17 to 32 are the most frequent amounts and donations within the range 77 to 92 are the least frequent.
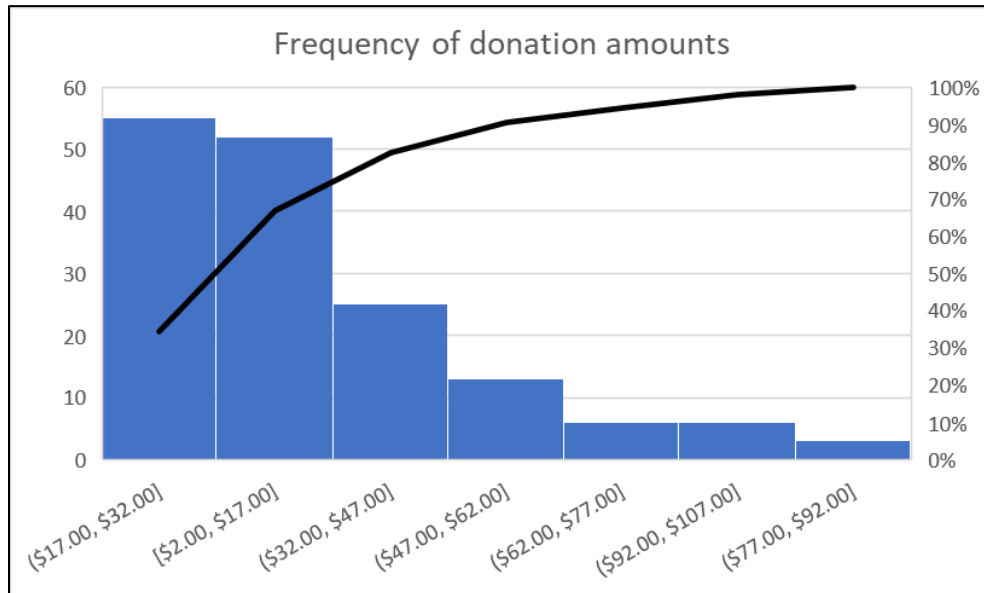

Figure 25: A Pareto chart

Additional information

For more information on Pareto charts, go to: Create a Pareto chart

Box-and-whisker chart

You can use a *box-and-whisker* chart to display variations with a set of data that is arranged from lowest to highest. You can use the box-and-whisker chart with multiple sets of related data. In this chart type, the whiskers are the lines that stick out of the boxes. These lines depict the variability outside the upper and lower quartiles. An outlier is any point that is outside the whisker.

The following screenshot indicates the time that visitors spent at the farm in one day. The mean (average) in each hour block is marked with a line inside each block, and there are three outliers that are outside the upper and lower quartiles.

Microsoft
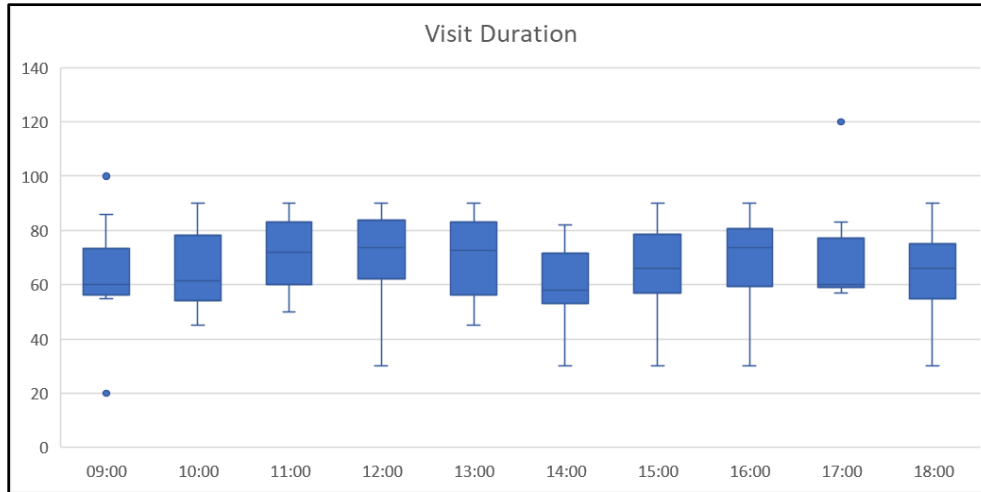
Figure 26: A box-and-whisker chart

Additional information

For more information on box-and-whisker charts, go to: Create a box and whisker chart

Map

If your data contains values with geographical labels, a *map* chart is ideal. You'll need to accept that your data will be shared with Bing, and you'll need internet access. You format the map to display only regions with data, by country/region, by multiple countries/regions, and even by the entire world. The following screenshot indicates the number of bee colonies in the United States, with California having the most colonies, followed by Texas and Florida.

Microsoft

Figure 27: A map chart

Which chart to choose?

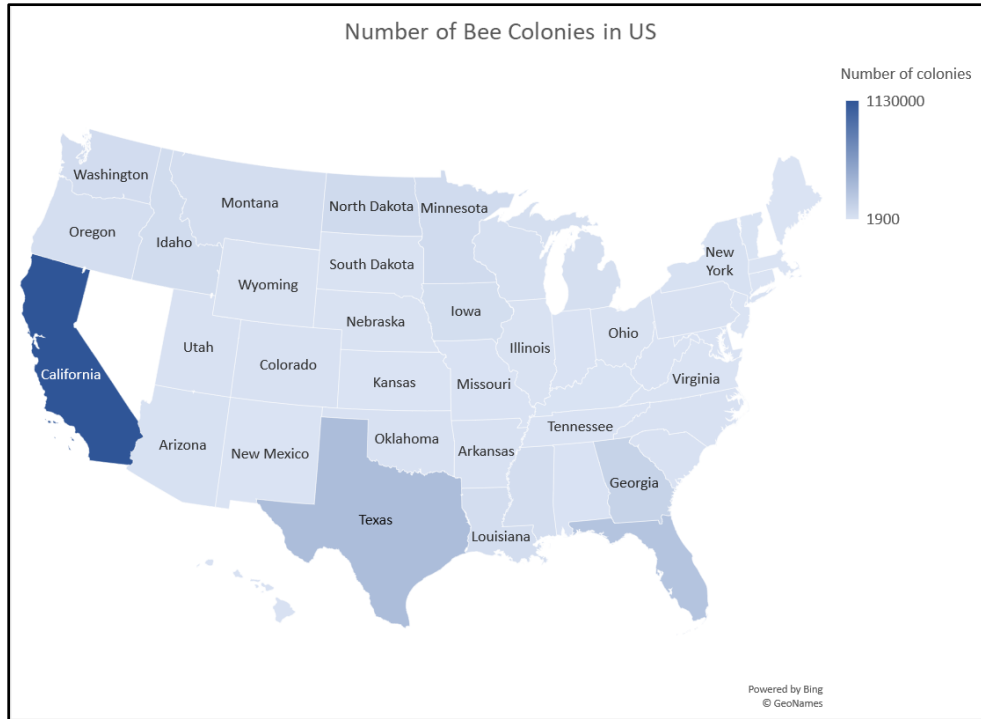In most cases, this decision is objective and is totally up to you. However, to get your message across, you might sometimes need to give your chart selection a little more consideration. When deciding which chart to use, ask yourself two questions:

- Which chart would be the best type to represent my data?
- Is the data prepared well enough to effectively use the chart that I want to choose?

Additional information

For more information on the types of charts available in Office 2019, go to: [Available chart types in Office](#)

Modify a chart

When you've created a chart, you can use the **Chart Tools** contextual tabs (**Design** and **Format**) to make any alterations that you need. On the **Chart Tools** contextual **Design** tab, you can:

- Select **Add Chart Element** in the **Chart Layouts** group to add or remove chart elements, such as labels, gridlines, and chart and axis titles. The following screenshot depicts this option.
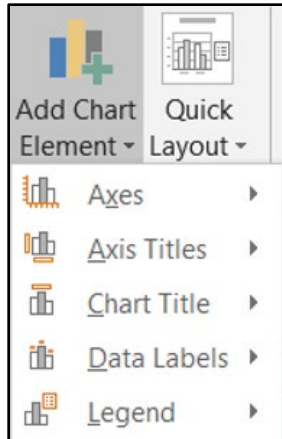
*Figure 28: The **Add Chart Element** button*

- Apply quick layout styles for quick formatting by using **Quick Layout** in the **Chart Layouts** group.
- Select **Change Colors** in the **Chart Styles** group to apply a colorful or monochromatic color scheme.
- Select any of the options in the **Chart Styles** group to apply different styles.
- Reselect the data used to create the chart by using **Select Data** in the **Data** group. You can also simply drag the current area inward or outward to redefine the area used in the current chart.
- Select **Change Chart Type** in the **Type** group to apply a different chart type to an existing chart.
- Move the chart to a different location in the same workbook by using **Move Chart** in the **Location** group.

Depending on the chart type, you might also be able to:

- Transpose the chart by selecting **Switch Row/Column** in the **Data** group.
- Remove a series from the chart.
- Add a series to the chart.
- Add a trendline by using **Add Chart Element** in the **Chart Layouts** group.

The following screenshot depicts the **Design** tab within the **Chart Tools** contextual tab, which appears when you select a chart.
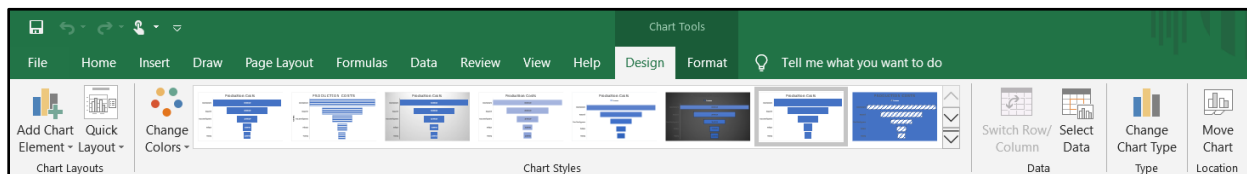

*Figure 29: The **Chart Design** tab*

![Microsoft]

Depending upon the type of chart that you have created and what elements you've selected within the chart, you can use the **Chart Tools** contextual **Format** tab to:

- Apply styles to whatever you have selected within the chart.
- Format elements within the chart by using the options in the **Shape Styles** group.
- Apply formatting if you select text in the chart and use an option in the **WordArt Styles** group. You can also do this by using options in the **Font** group on the **Home** tab.
- Add a description for the chart by using **Alt Text** in the **Accessibility** group.
- Resize the chart to an exact width and height by using the options in the **Size** group.
- Open the **Selection Pane** in the **Arrange** group. This is very helpful when you have a lot of data or objects on screen.
- Select any of the dialog-box launchers on the groups on the **Format** tab. This will open the format pane for detailed editing options that are not available on the ribbon.
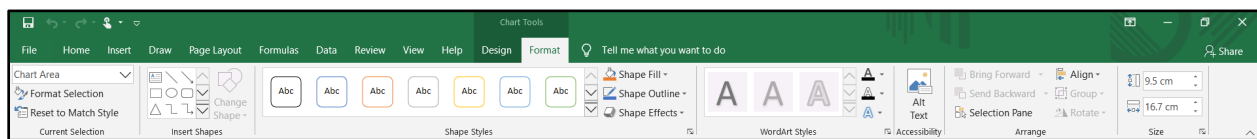
Figure 30: **Format** *tab*

Alternatively, you can perform the following steps:

1. Select the chart and then select the **Chart Elements** plus button (**+**) on the side of the chart to add or remove chart elements.

2. Select the arrow on the side of each element listed for further options.

3. As an example, like the following screenshot depicts, you can open the **Format Data Labels** pane by selecting the arrow next to **Data Labels**, and then selecting **More Data Label Options**.
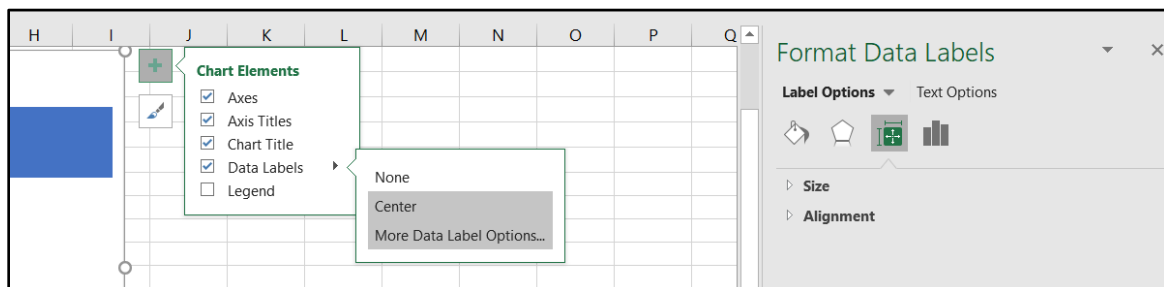
Figure 31: **Chart Elements**

Microsoft

You could also select the chart and then select **Chart Styles** (paintbrush) on the side of the chart to apply a different style to the chart or color scheme.
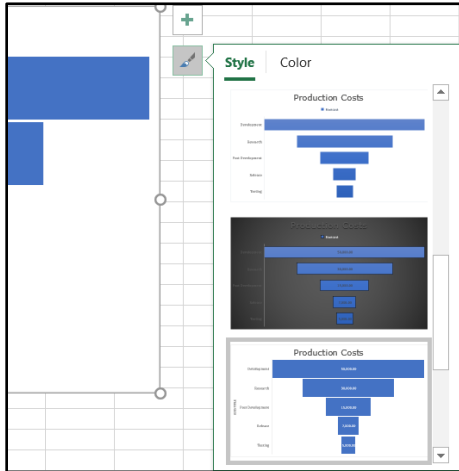
*Figure 32: **Chart Styles***

You can also:

1. Double-click any element within the chart to open the format pane. You can also right-click or activate the context menu for the element, and then select the formatting option. For example, if you have selected the **Chart Title**, you'll open the **Format Chart Title** pane.

*Figure 33: The **Format Chart Title** pane*

2. Select any of the tabs on the format pane to switch between options.

3. Select the drop-down list at the top of the format pane to select a different chart area. For example, you can switch from **Chart Title** t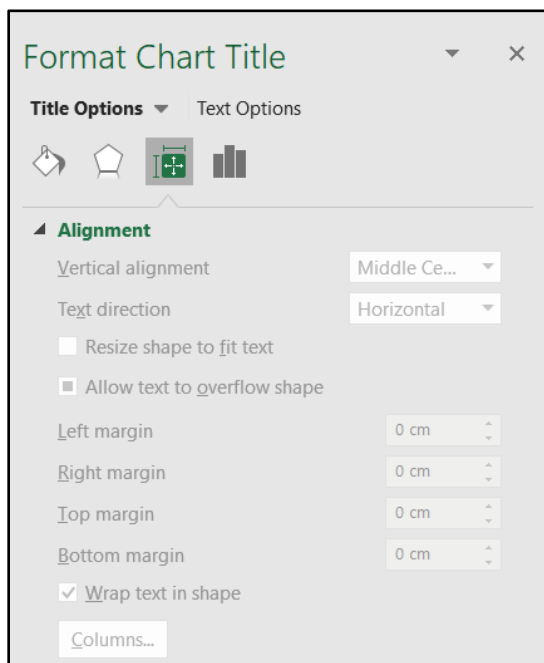o **Plot Area**. These options are also available on the **Chart Elements** drop-down list in the **Current Selection** group on the **Format** tab. Both of these methods are very helpful if you're having difficulty selecting specific elements within the chart.
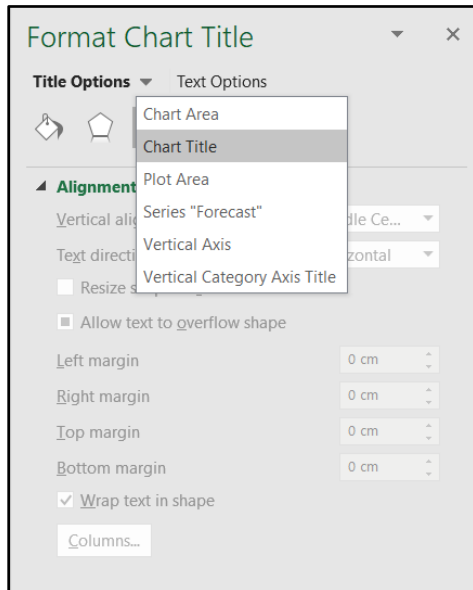
*Figure 34: Title options on the **Format Chart Title** pane*

4. Select **Close** (the **X** in the corner of the pane) to close it.

Another option is to right-click or activate the context menu for the chart element that you want to edit, and then select the option for formatting that particular element.

As with many of the fantastic Excel features, the best way to learn about charts is to go ahead and create one—and don't be afraid to experiment! Remember, depending upon the type of chart that you have used and the element you have selected within that chart, the modifications you can make will differ.
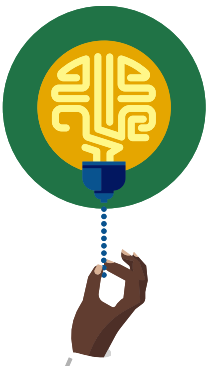
Did you know?

There are many types of color blindness. However, Microsoft has a **Color filter** tool that can help! Select **Start**, select **Settings**, and then search for color filters. Why don't you give it a try? Using the tool might make your charts and other graphics easier to understand.

Microsoft

Video

To review the video on adding a trendline to a chart, go to: [Add a trend or moving average line to a chart](#)

Activity: Team research

In this activity you'll be given a chart type to research. Partner with anyone who has the same chart type as you have, and then work together to find out as much as possible about it.

Resources required

You'll need the following resources for this activity:

- Open **L4_T2_act_charts.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Partner with anyone who has the same chart type as you have.

2. Use any method available to research the chart type that you have been allocated.

3. Use **L4_T2_act_charts.xlsx** if you want, for reference or to use any data that you have access to.

4. Consider these questions while researching:

   a. What type of formatting can be applied?

   b. Are there any important things to prepare within the data before creating the chart?

   c. Is there anything unique or special about the chart?

5. You'll get a chance to create the chart that you have researched in the try-it.

Try-it: Create and modify charts

In this standalone try-it activity, you'll remain in the same group and work together to create and modify a chart.

Try-it

Create and modify the chart that your team researched. If you perform this try-it by yourself, instead of with a team, make sure to compare your chart with everyone who has selected the same chart type as you have.

Resources

You'll need the following resources for this try-it:

- Open **L4_T2_try_charts_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Select the worksheet labeled with the chart that you have been researching, then do one of the following as appropriate:

   a. **Funnel:** Create a funnel chart that displays all the data in an upside-down funnel. Change the gap width between each series to **5%**. Apply **Quick Layout 2**. Enter the chart title **Estimated Production Costs**.

   b. **Treemap:** Create a treemap chart that displays all the data with **Season** as the top level. Display the value on each segment and the **Category** name. Apply **Quick Layout 6**. Enter the chart title **Seasonal Sales**.

   c. **Sunburst:** Create a sunburst chart that displays all the data with **Season** as the top level. Apply **Quick Layout style 3**. Move the **legend** to the bottom and enter the chart title **Seasonal Sales**.

   d. **Waterfall:** Create a waterfall chart for all the data. Apply **Quick Layout 4** and **remove connector lines**. Set the series gap width to **60%** and enter the chart title **Cashflow**.

   e. **Pareto:** Create a Pareto chart that displays the frequency of all the donations. Change the gap width between each series to **5%**. Apply **Quick Layout 2**. Enter the chart title **Frequency of donation amounts**.

   f. **Box-and-whisker:** Create a box-and-whisker chart that displays the time and number of visitors. Set the **Quartile Calculation** as the **Inclusive Median** and remove the **mean markers**. Apply **Quick Layout 4** and enter the chart title **Number of visitors per hour**.

   g. **Map:** Create a map chart for the percentage of bee colonies renovated in the United States. Apply **Quick Layout style 2** and format the data series to display **Map labels** for all states. Enter the chart title **% of Bee Colonies renovated in US**.

Microsoft

2. Reposition/resize the chart to ensure that the chart doesn't cover any data and that the chart is large enough to display all categories clearly.

3. Add **Alt Text** describing the chart content. Note: Screen readers read alt-text or alternative text to help people with low vision understand the images and other objects in a document.

4. Save the workbook as the same name plus the team name that the team chooses.

5. Compare your chart with other teams if time permits.

Wrap-up

If time permits, create any other chart in the **L4_T2_try_charts_starter.xlsx** workbook. Then, use these questions to check what you learned in this lesson:

1. To create a dual-axis chart, which chart type should you use?

   Select the correct option.

   a. Bar

   b. Column

   c. Combo

   d. Line

2. What is the additional axis on a dual-axis chart also known as?

   Select the correct option.

   a. Vertical axis

   b. Horizontal axis

   c. Horizontal (category) axis

   d. Secondary vertical (value) axis

3. Which of the following charts would be useful for displaying frequencies?

   Select all that apply.

   a. Pareto

   b. Sunburst

   c. Waterfall

   d. Histogram

Microsoft

4. In a box-and-whisker chart, any point outside of the whisker is known as an
_____.

Fill in the blank space.

Glossary

Outlier	A value outside the quartile range within a box-and-whisker chart.
Quartile	A calculation used in a box-and-whisker chart. More detail is provided in Lesson 4, Topic 2, plus a link to Microsoft Office support.
Stacked	An option available within various chart types.
Summary Report	A report created automatically on a separate worksheet by using the **Scenario Manager**.
Syntax	The order of a formula.

Table 5: Glossary terms and definitions

Cornerstone

Overview

In this Cornerstone, you'll analyze data by using the **PMT** function, **Goal Seek**, **Scenario Manager**, and a nested **IF** with **AND**. Munson's management team has been working on two workbooks, which you'll analyze further to answer several questions.

Objectives

The following table outlines the Cornerstone objectives and their corresponding Microsoft Office Specialist (MOS) exam objectives.

Perform a what-if analysis	• 3.4.2: Perform a what-if analysis by using **Goal Seek** and **Scenario Manager**.
Forecast data by using nested **IF** and **AND**	• 3.4.3: Forecast data by using the **AND**(), **IF**(), and **NPER**() functions.
Analyze financial data	• 3.4.4: Calculate financial data by using the **PMT**() function.
Modify a chart	• 4.1.2: Create and modify charts including box-and-whisker, combo, funnel, histogram, map, sunburst, and waterfall charts.

Table 6: Cornerstone objectives

Duration

50 minutes

Instructions

1. Complete the tasks for each file.

2. When saving your file, add your name to the end of the filename, for example: **Sweetcorn_Dwayne_Espino.xlsx**. Follow your teacher's directions for where to save your files.

3. When you're done with the Cornerstone, assess your completion and enter the points that you think you earned within the task lists. You can ask your teacher for help, if required.

Tasks

You'll work with two files in this Cornerstone. The following are the tasks you must complete within each file.

File 1: Cornerstone_sweetcorn_analysis_starter.xlsx

Task: Edit a PMT function (2 points)

1. Examine the **PMT** function on the **Buy Land** worksheet (cell **B5**).

2. Edit the function so that it returns the correct result. (2 points) (Exam objective 3.4.4)

Points scored: _____ / 2

Task: Create a nested IF AND function (4 points)

- In cell **B19** on the **Rent Land** worksheet, create a nested function that will calculate if **E9** minus **C9** is greater than **B4** on the **Rent Land**, and if **E12** minus **C12** is greater than **B7** on the **Buy Land** worksheet, return the value **No**, otherwise return the value **Yes**. (4 points) (Exam objective 3.4.3)

Points scored: _____ / 4

Task: Perform a goal seek (2 points)

- On the **Buy Land** worksheet, use **Goal Seek** to calculate how much the retail price for sweet corn should increase if the forecast profit (**E16**) is raised to 24000. (2 points) (Exam objective 3.4.2)

Points scored: _____ / 2

Microsoft

Task: Modify the chart (4 points)

1. On the **Forecast Chart** worksheet, edit the data source to display the **Forecast Buy Land** data instead of the **Forecast Rent Land** data. (2 points) (Exam objective 4.1.2)

2. Sort the table so that the chart resembles a funnel. (1 point) (Exam objective 4.1.2)

3. Apply the **Monochromatic Palette 3** color scheme to the chart. (1 point) (Exam objective 4.1.2)

Points scored: _____ / 4

FILE 1 TOTAL POINTS: _____ /12

File 2: Cornerstone_sweetcorn_scenarios_starter.xlsx

Task: Create three scenarios (7 points)

1. Create a scenario named **4% - 4 years** as follows:

   a. Change **B2** to **4%**

   b. Change **B3** to **4 years**

   c. Change **B4** to **$4000** (2 points) (Exam objective 3.4.2)

2. Create a scenario named **4.5% - 5 years** as follows:

   a. Change **B2** to **4.5%**

   b. Change **B3** to **5 years**

   c. Change **B4** to **$5000** (2 points) (Exam objective 3.4.2)

3. Create a scenario named **5% - 4 years** as follows:

   a. Change **B2** to **5%**

   b. Change **B3** to **4 years**

   c. Change **B4** to **$4500** (2 points) (Exam objective 3.4.2)

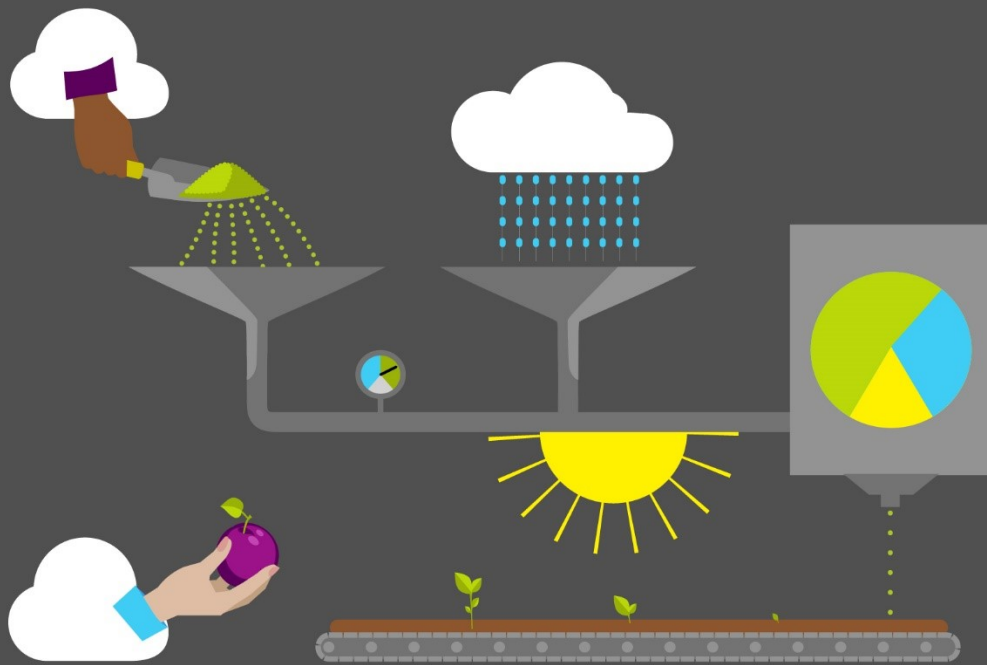4. Show the **5% - 4 years** scenario and close the **Scenario Manager** dialog box. (1 point)

Points scored: _____ / 7

Task: Create a summary report (3 points)

1. Create a summary report based on the cells **B5** and **B6**. (2 points) (Exam objective 3.4.2)

2. Rename the new worksheet **Loan Scenarios**. (1 points)

Points scored: _____ / 3

FILE 2 TOTAL POINTS: _____ / 10

Student Guide

40571A
Microsoft Excel expert 2019

Module 5: Using simple macros

Contents

Microsoft

Microsoft

Module overview

Description

As you use Microsoft Excel 2019, you're likely to find that you do certain tasks over and over again. Perhaps your boss asks you to create a report on a regular basis, and you always set up the same row and column headings. Maybe your company wants you to include the same information at the beginning of every spreadsheet, such as the logo and contact information. Macros help automate these repetitive tasks so that you can create and manage your workbooks more efficiently.

In this module, you'll learn how macros work and how you can record your own macros. You'll run, copy, and edit macros so that you can use them wherever and whenever you need them.

The following table outlines the lessons in this module and their corresponding learning and exam objectives.

Lesson	Learning objective	Exam objective(s)
Understanding macros	Display the **Developer** tab in the ribbon and enable macros in a workbook.	• 1.1.3
Recording and running macros	Record and run a simple macro.	• 3.6.1
Using the Visual Basic Editor	View Visual Basic for Applications (VBA) macros and reuse existing macros by copying VBA code from one workbook to another.	• 1.1.1
Editing macros	Name and edit an existing macro.	• 3.6.2 • 3.6.3
Understanding relative macros	Create and run a relative macro.	None

Microsoft

Lesson	Learning objective	Exam objective(s)
Cornerstone: Using macros	Automate report formatting by copying, editing, and recording macros.	• 1.1.1 • 1.1.3 • 3.6.1 • 3.6.2 • 3.6.3

Table 1: Objectives by lesson

Scenario

Based on your experience at Munson's Pickles and Preserves Farm, you think that creating some simple macros will help team members with less confidence in Excel easily carry out repetitive tasks—like applying Munson's branding to cells and setting workbooks for printing. For example, one repetitive task at the farm is importing reports to Excel and setting up those reports for printing. You'll use your knowledge of macros to help with this task.

Cornerstone

This module concludes with a Cornerstone in which you'll use macros to automate some repetitive reporting tasks at Munson's. In the Cornerstone, you'll:

• Enable and run a macro.
• Copy and edit a macro with Visual Basic Editor.
• Record a macro.

Lesson 1: Understanding macros

Overview

In this lesson, you'll learn how to add the **Developer** tab to the ribbon and use it to access tools for creating, editing, and running macros. You'll learn the role that macros play in Microsoft Excel, and how you can enable them when you open a workbook. The activities, discussions, and demonstrations in this lesson will enhance your learning and give you the opportunity to practice and articulate what you learn about using macros.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. Which tab includes commands related to macros?

   Select the correct option.

   a. **Home**

   b. **Insert**

   c. **Formulas**

   d. **Data**

   e. **Developer**

2. Which of the following do you use to automate repetitive tasks?

   Select the correct option.

   a. Filters

   b. Formulas

   c. Macros

   d. PivotTables

3. To save a workbook with macros, you must select _____ as the file type.

   Fill in the blank space.

Topic 1: Display the Developer tab

As you explore macros in this module, you'll need the commands on the **Developer** tab. The **Developer** tab includes features that are often unnecessary for day-to-day Excel use, so it's hidden by default. You must enable it if you want to create, edit, and run macros.

Select the **File** tab, and then, in the **Backstage** view, select **Options** to open **Excel Options**. In **Excel Options**, select **Customize Ribbon**. The following screenshot depicts **Excel Options** with **Customize Ribbon** highlighted:
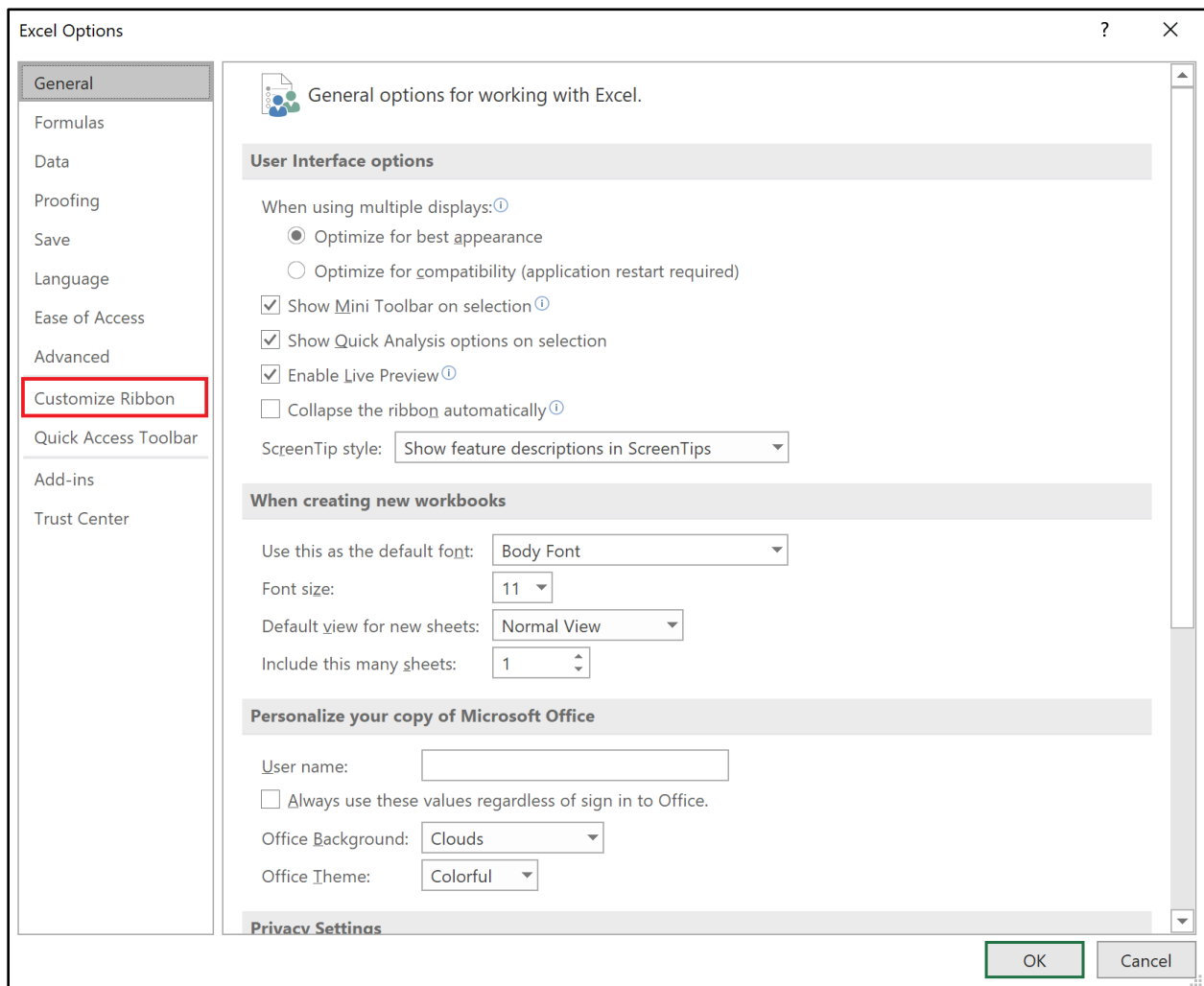
*Figure 1: **Excel Options** with **Customize Ribbon** highlighted*

In the **Customize the Ribbon** pane, in the **Main Tabs** section, select the **Developer** check box, and then select **OK** to close **Excel Options**. The following screenshot depicts the **Customize the Ribbon** pane in **Excel Options** with the **Developer** check box highlighted.
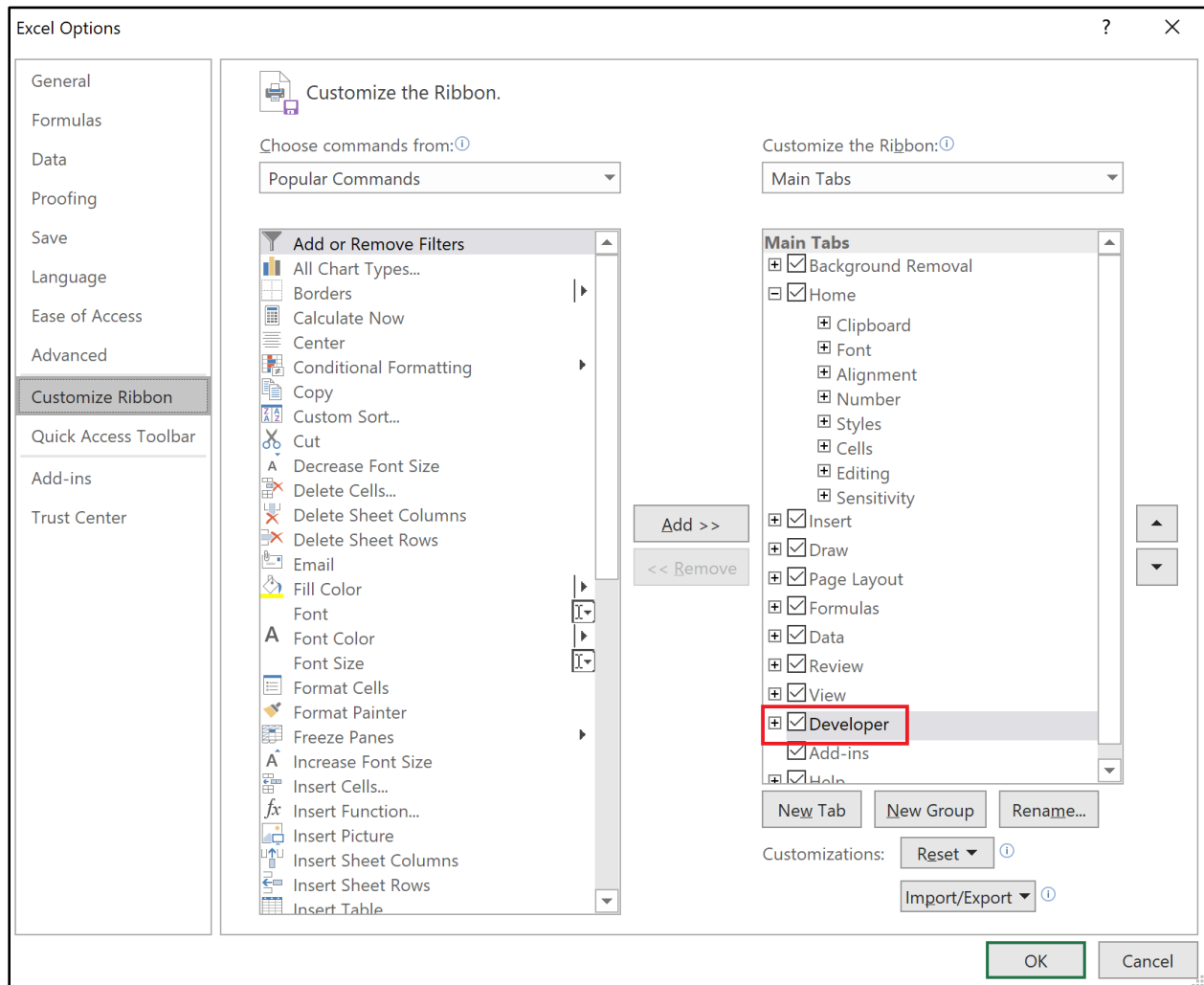
*Figure 2: **Excel Options** with **Customize Ribbon** selected and the **Developer** check box highlighted*

The **Developer** tab will remain available until you clear the **Developer** check box in **Excel Options** to disable it. Note that you might have to enable it again if you open Excel on a different device. The following screenshot depicts the **Developer** tab.
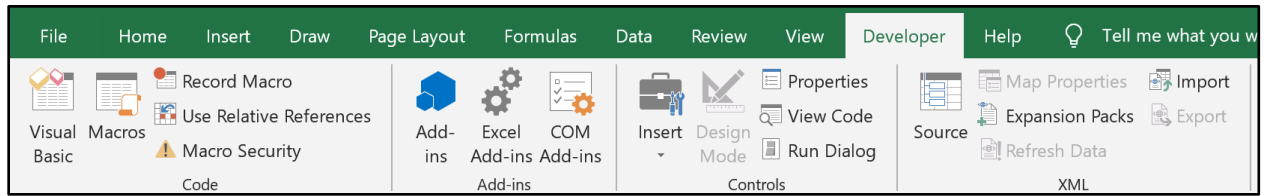
*Figure 3: The **Developer** tab*

Additional information

For more information on the **Developer** tab, go to: [Show the Developer tab](#)

Activity: Setting the scene

In this activity, your teacher will lead a discussion about macros. Then, the teacher will demonstrate how to add the **Developer** tab to the ribbon.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the class discussion and then follow along as the teacher demonstrates adding the **Developer** tab to the ribbon. Ask any clarifying questions that you might have.

Try-it: Display the Developer tab

In this leveled try-it activity, you'll practice customizing the ribbon to display the **Developer** tab.

Try-it 1

In this try-it activity, you'll enable the **Developer** tab on the ribbon.

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open Excel with a blank workbook.

2. Select the **File** tab to open the **Backstage** view and access **Excel Options**.

3. Select **Customize Ribbon**, select the check box for the **Developer** tab, and then close **Excel Options**.

4. Select the **Developer** tab to confirm that it's enabled.

5. If time allows, practice repeating the steps to remove the **Developer** tab and then add it again.

Try-it 2

In this try-it activity, you'll enable the **Developer** tab on the ribbon and learn about some of the commands that it includes.

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open a blank workbook in Excel.

2. Select the **File** tab to open the **Backstage** view and access **Excel Options**.

3. Select **Customize Ribbon**, select the check box for the **Developer** tab, and then close **Excel Options**.

4. Select the **Developer** tab to confirm that it's enabled.

5. Explore the **Developer** tab, hovering over different commands to reveal the ScreenTip. Focus on commands in the **Code** group.

6. As time allows, visit [Office Help and Training](#) and research commands that you'd like to know more about.

Microsoft

Topic 2: Get an introduction to macros

When you use Excel regularly, you might find that you do some tasks . For example, for school assignments, you might have to enter your name, the teacher's name, and the date at the beginning of every new worksheet. Or your boss at work might want you to add the same header and footer on each worksheet, so that they're easy to identify when you print them.

You can use macros to automate these kinds of repetitive tasks by grouping a series of actions together into a single command. You can create a macro with all the necessary steps to complete the repetitive task, and then replay the macro any time that you need it.

A macro consists of Visual Basic for Applications (VBA) code, which is a programming language available in most Microsoft Office applications. The code conducts the steps that you wish to repeat, and you can review or modify it by using the Visual Basic Editor.
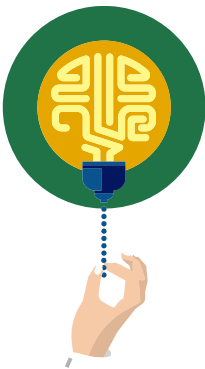
Did you know?

You don't need to know VBA to create macros, thanks to the macro recorder. This tool records the steps that you take to perform an action and creates the VBA code to repeat your steps.

The following is an example of VBA code for a macro that puts basic information at the beginning of a worksheet:

```
Range("A1").Select
ActiveCell.FormulaR1C1 = "Munson's Pickles and Preserves Farm"
Range("A2").Select
ActiveCell.FormulaR1C1 =
"http://www.munsonspicklesandpreservesfarm.com"
Range("A3").Select
ActiveCell.FormulaR1C1 = "=TODAY()"
```

Microsoft

In this example, the user selected **A1** and entered the text **Munson's Pickles and Preserves Farm**, and then selected **A2** and entered **http://www.munsonspicklesandpreservesfarm.com**. Finally, they selected **A3** and entered a formula to display the current date. The macro recorder created the VBA code based on those actions.
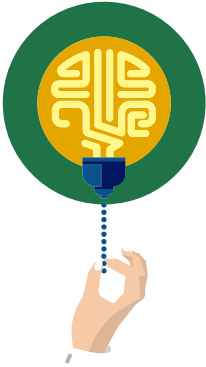
Did you know?

When it's recording, the macro recorder captures almost everything that you do. It even captures your mistakes! If you add a misspelled word to a cell and then delete it and add it back correctly, those incorrect steps and corrections become part of the macro. If you want to remove them, you'll have to record the sequence again or change the VBA code.

A macro is part of the workbook, so Excel uses a different file type to save workbooks that have macros. An **Excel Macro-Enabled Workbook** has the **.xlsm** file extension. If you attempt to save a workbook containing macros as an Excel Workbook with the **.xlsx** file extension, you'll receive a warning that the macro will be lost.

Additional information

For more information on macros, go to: Automate tasks with the Macro Recorder

Activity: Discuss and learn

In this activity, the teacher will lead a class discussion about basic macro concepts.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the group discussion and ask clarifying questions about any topics that you don't fully understand.

Try-it: Get an introduction to macros

In this leveled try-it, you'll summarize what you know about macros.

Try-it 1

In this try-it activity, you'll summarize basic macro concepts.

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Create a paragraph responding to the following prompts:

   o What is the purpose of a macro?
   o What are some tasks that using macros can help you with?
   o What programming language and tools do you use to create and edit macros?

2. If time allows, do some research by going to Office Help and Training to review concepts that you aren't sure about. Add what you learn to your response.

Try-it 2

In this try-it activity, you'll summarize basic macro concepts, including key terminology.

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Create a paragraph responding to the following prompts:

   o What is the purpose of a macro?
   o What are some tasks that using macros can help you with?
   o Explain what macro recorder does.
   o Explain the role of the Visual Basic Editor in creating and editing macros.

2. If time allows, do some research by going to Office Help and Training to review concepts you aren't sure about. Add what you learn to your response.

Topic 3: Enable macros in a workbook

Some macros can pose significant security risks, such as making your computer or network vulnerable to a virus or other malicious attacks. Therefore, Excel takes precautions when you open a file that includes a macro. By default, macros will be disabled when you open a macro-enabled workbook. To run a macro, you'll need to enable it.

Always think carefully before enabling macros in a file from a source you don't know or can't verify—malicious hackers can distribute workbooks with macros in hope that someone will enable their commands. If you don't enable macros, it's safe to open a workbook and examine—or even edit—its contents.

If you trust the source of the macro-enabled workbook, or if you created the workbook, you can enable macros and take advantage of the automation that they provide.

When you open a workbook with one or more macros, the **SECURITY WARNING** message bar displays with the **Enable Content** option. Select **Enable Content** to enable macros. The following screenshot depicts the **SECURITY WARNING** message bar with **Enable Content** highlighted.
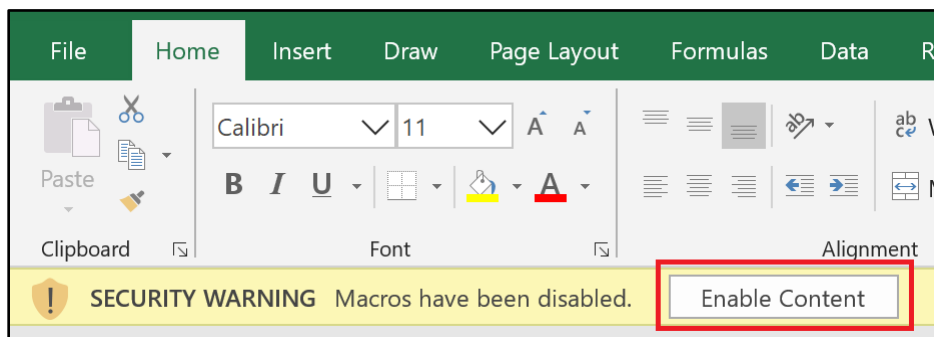
*Figure 4: The **SECURITY WARNING** message bar with **Enable Content** highlighted*

Microsoft

You can also enable macros from the **Backstage** view. Select the **File** tab, and then, in the **Backstage** view, select **Info**. Select the **Enable Content** drop-down box, and then select **Enable All Content**. The following screenshot depicts the **Backstage** view with the **Enable Content** drop-down box open and with **Enable All Content** highlighted.
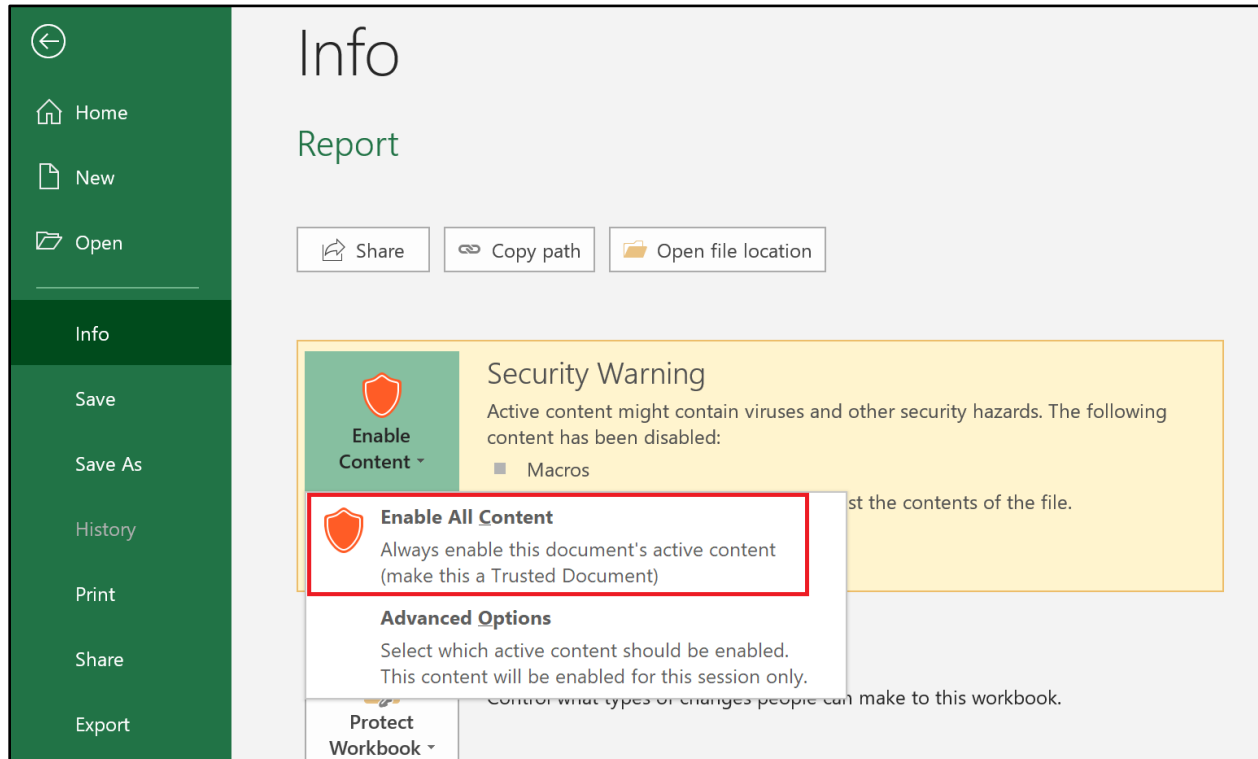
Figure 5: The **Backstage** *view with the* **Enable Content** *drop-down box open and* **Enable All Content** *highlighted*

Additional information

For more information on enabling macros, go to: Edit a macro

Activity: Pose a question

In this activity, the teacher will ask questions about macro security to engage the class in a discussion. Then the teacher will demonstrate how to enable macros when opening a macro-enabled workbook.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the group discussion and ask clarifying questions about any topics that you don't fully understand.

Try-it: Enable macros in a workbook

In this standalone try-it activity, you'll open a workbook and enable macros.

Resources

You'll need the following resources for this try-it:

- Open **L1_T3_try_munsons_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

- Open **L1_T3_try_munsons_starter.xlsm** and enable macros.

Wrap up

Use these questions to check what you learned in this lesson:

1. Which of the following converts actions that you perform into VBA code?

    Select the correct option.

    a. **Developer** tab

    b. Macro recorder

    c. Visual Basic Editor

    d. Visual Basic for Applications

2. Where can you enable macros when you open a macro-enabled workbook?

    Select all that apply.

    a. A command in the **Backstage** view

    b. On the **Home** tab

    c.   On the message bar

    d.   On the **Review** tab

3. To work with macros, you should first enable the _____ tab.

    Fill in the blank space.

Microsoft

Lesson 2: Recording and running macros

Overview

In this lesson, you'll learn how to record and run a simple macro. The activities, discussions, and demonstrations in this lesson will give you the opportunity to practice creating and running simple macros.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. Where can you find the **Record Macro** command?

   Select the correct option.

   a. On the **Data** tab

   b. On the **Developer** tab

   c. On the **Formulas** tab

   d. On the **Home** tab

2. By default, where are macros saved?

   Select the correct option.

   a. In the current workbook

   b. In a Personal Macro Workbook

   c. In a separate text file

3. On the **Developer** tab, select _____ to begin recording a macro.

   Fill in the blank space.

Topic 1: Record simple macros

You can create macros by writing VBA code, but the macro recorder makes it quicker and easier to create a simple macro, even if you don't know VBA.

Before recording a macro, you should carefully plan each step that you'll take to perform the tasks that you wish to automate. The macro recorder will capture almost everything you do, including mistakes, and create corresponding VBA code. It's a good idea to practice the steps prior to recording the macro.

To record a macro, select the **Developer** tab in the ribbon, and then, in the **Code** group, select **Record Macro**. The following screenshot depicts the **Code** group with **Record Macro** highlighted:
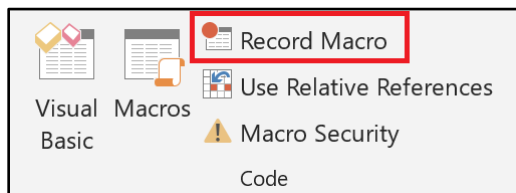

*Figure 6: The **Code** group with **Record Macro** highlighted*

This activates the **Record Macro** dialog box. In the **Macro name** box, enter a name for your macro. You might have more than one macro in a workbook; so, make sure that your macro names are descriptive. Macro names are often verbs that describe what the macro does, such as **SetupPage** or **FormatReport**. The first character of the name must be a letter, but subsequent characters can be numbers or underscore characters.

If you want to assign a keyboard shortcut to your new macro, select the **Shortcut key** box and enter any letter. It's a good idea to use **Ctrl+Shift** key combinations so that you don't overwrite any default Excel keyboard shortcuts. For example, if you use **Ctrl+Z** you won't be able to use that combination to **Undo** in Excel while that workbook is active, but **Ctrl+Shift+Z** does not overwrite **Undo**. Therefore, it's usually a good idea to include **Shift** in your shortcut combination to avoid conflicts.

In the **Store macro in** drop-down box, you can select a location for the macro that you're recording. Usually, you'll select **This Workbook** and keep the macro in the workbook that you're currently editing. However, you can also choose to store it in your **Personal Macro Workbook**, which will be created if it doesn't already exist. Finally, you can select **New Workbook** to create a new blank workbook for the new macro.

In the **Description** box, you can describe the macro's function, which is especially helpful in a workbook with more than one macro. It's a good idea to write a brief sentence explaining what the macro does.

Microsoft

The following screenshot depicts the **Record Macro** dialog box.
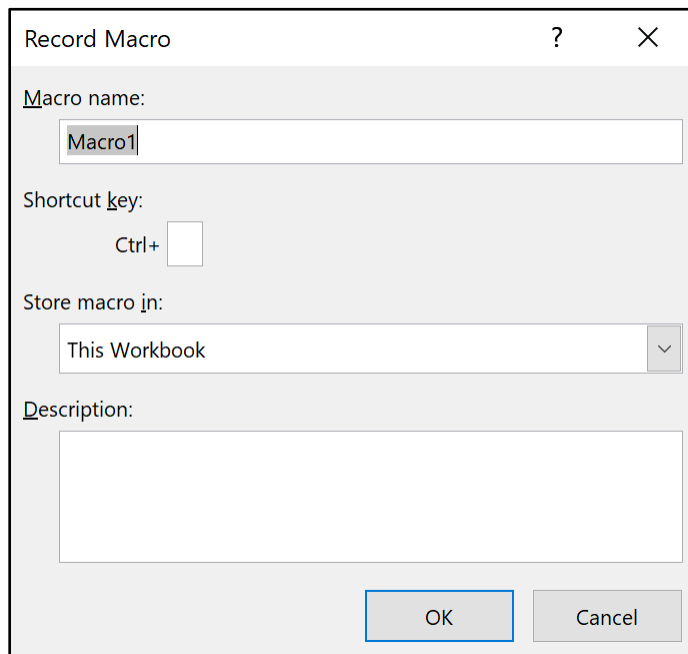
Figure 7: The ***Record Macro*** *dialog box*
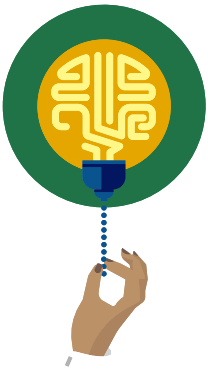
Did you know?

The keyboard shortcut to access the **Record Macro** dialog box is **Alt+T+M+R**.

After you've entered the information that you want in the **Record Macro** dialog box, select **OK** to begin recording. Perform the actions that you want to record. When you're ready to stop, select the **Developer** tab, and then, in the **Code** group, select **Stop Recording**. The following screenshot depicts the **Code** group with **Stop recording** highlighted.
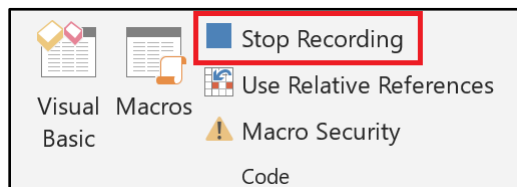
Figure 8: The ***Code*** *group with* ***Stop Recording*** *highlighted*

Microsoft

Remember that each action that you perform before selecting **Stop Recording** will be included in the macro, so it's a good idea to plan your steps carefully and rehearse them prior to recording.
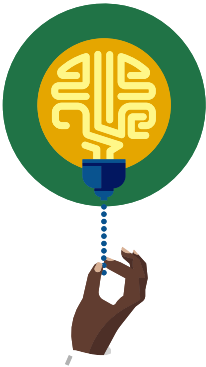
Did you know?

If you're planning to record a long process as a macro, consider breaking it up and recording smaller macros. Then, record one macro that runs each of the other macros in the correct sequence.

Additional information

For more information on recording a macro, go to: Quick start: Create a macro
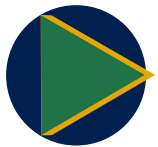
Video

To review the video on recording a macro, go to: Work with macros

Activity: Student-and-teacher collaboration

In this activity, the class will collaborate with the teacher to create a simple macro that formats a cell.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by collaborating with the teacher and other students to create a macro.

Try-it: Record simple macros

In this leveled try-it activity, you'll record a macro to apply formatting to a cell.

Microsoft

Try-it 1

In this try-it activity, you'll record a simple macro to format numbers.

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Create and save a new macro-enabled workbook named
   L2_T1_try1_number_style.xlsm.

2. Add random numbers with at least three decimal digits to cells **A1:A3**.

3. Select one of the numbers that you entered and record a macro named
   ApplyFancyFormat. In the macro, apply the following formatting to the cell:

   o Number displayed to one decimal place
   o Italics
   o Font color **Blue**

4. Stop recording and save your workbook.

Try-it 2

In this try-it activity, you'll record a simple macro to format dates, including a keyboard shortcut and description.

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Create and save a new macro-enabled workbook named
   L2_T1_try2_date_style.xlsm.

2. Add random date to cells **A1:A3**. You might wish to use your birthday or other
   significant dates.

Microsoft

3. Select one of the dates that you entered and record a macro named **ApplyFancyFormat** by using the following steps:

   a. Configure the macro to use the keyboard shortcut combination **Ctrl+Shift+D**.

   b. Enter the following text for the description: **Applies a fancy date format to the active cell**.

   c. In the macro, apply the following formatting to the cell:

      - Date is displayed in the format **2012-03-14**.

      - Italics

      - Font color is **Blue**

4. Stop recording and save your workbook.

Topic 2: Run simple macros

After you've recorded a macro, you can run it any time that you want to repeat the recorded steps. It's like recording a song and playing it whenever you want.

If you set up a combination shortcut key for the macro, simply select that keyboard combination and the macro will run. Regardless of whether the macro has a combination keyboard shortcut, you can run it from the ribbon. Select the **Developer** tab, and then, in the **Code** group, select **Macros** to open the **Macro** dialog box. The following screenshot depicts the **Code** group with **Macros** highlighted.
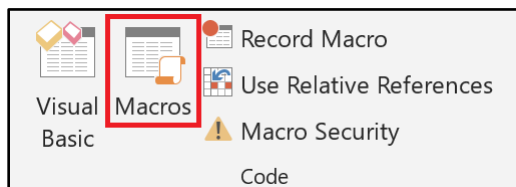
*Figure 9: The **Code** group with **Macros** highlighted*

In the **Macro** dialog box, select the macro that you want to run in **Macro name**, and then select **Run**. The following screenshot depicts the **Macro** dialog box with the **AddReportHeading** macro selected and **Run** highlighted.
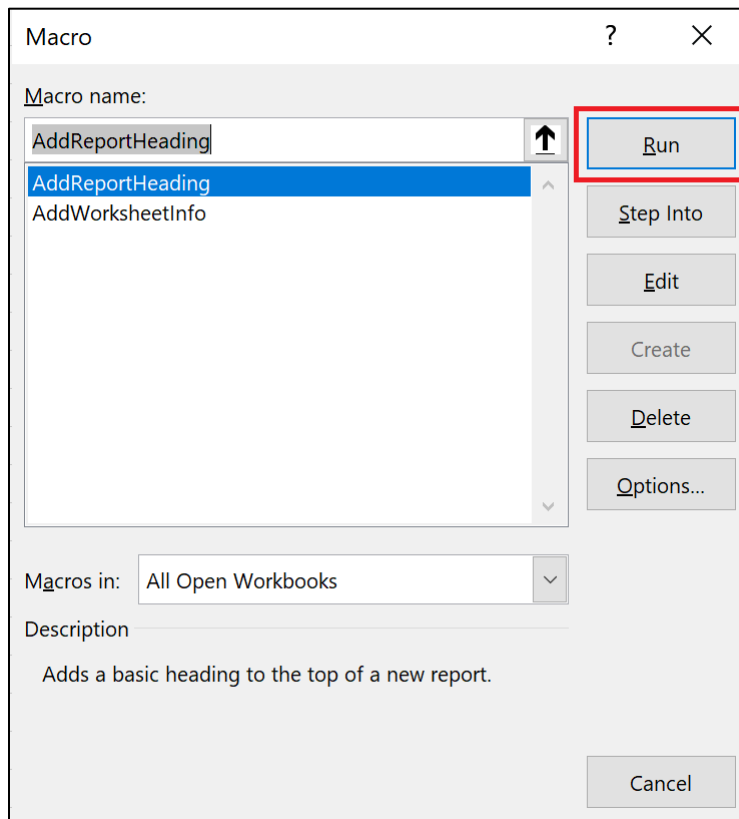
*Figure 10: The **Macro** dialog box with the **AddReportHeading** macro selected and **Run** highlighted*

Add a macro to the Quick Access Toolbar

To make it even easier to run a macro, you can add it to the **Quick Access Toolbar**. Select **File**, and then, in the **Backstage** view, select **Options** to open **Excel Options**. Select **Quick Access Toolbar**, and then use the **Choose commands from** drop-down list to select **Macros**. The following screenshot depicts **Excel Options** with **Quick Access Toolbar** and the **Macros** option highlighted:
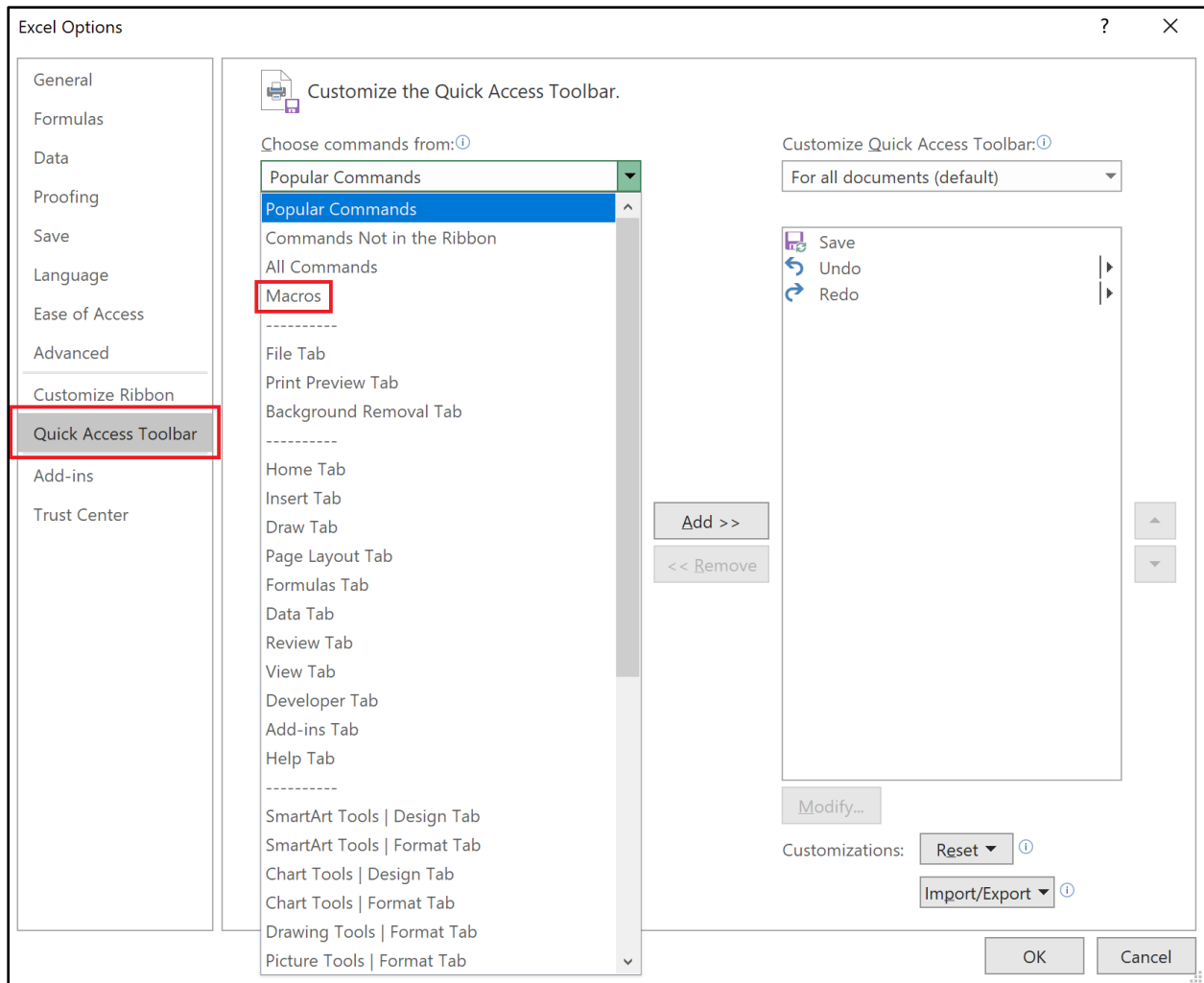
*Figure 11: **Excel Options** with **Quick Access Toolbar** and the **Macros** option highlighted*

Then, select the macro you want to add to the **Quick Access Toolbar** and select **Add**. Select **OK** to close **Excel Options**. The following screenshot depicts **Excel Options** with the **AddWorksheetInfo** macro added to the **Quick Access Toolbar** and the **Add** command highlighted.
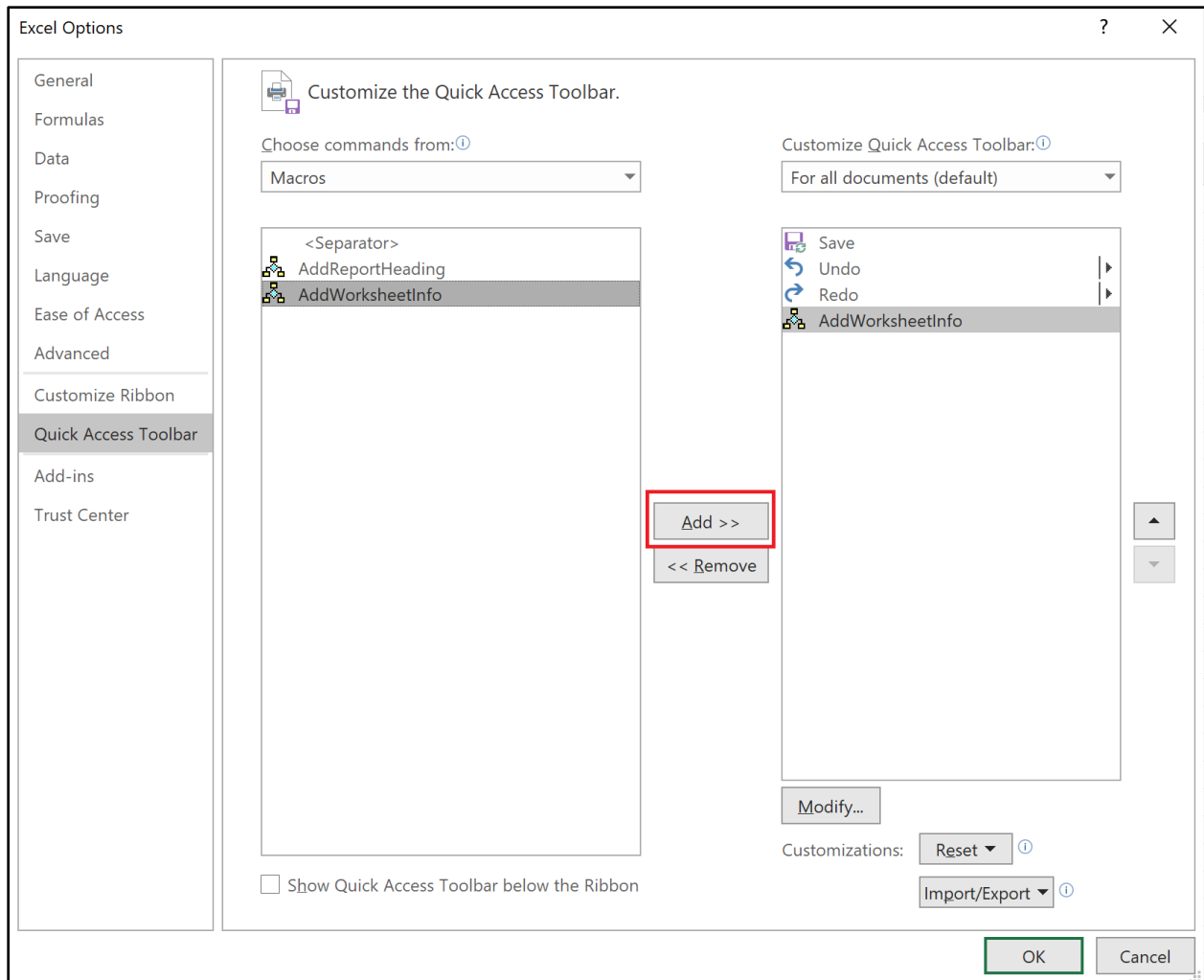
*Figure 12: **Excel Options** with the **AddWorksheetInfo** macro added to the **Quick Access Toolbar** and the **Add** command highlighted*

To run the macro, select the macro in the **Quick Access Toolbar**. The following screenshot depicts the **Quick Access Toolbar** with the macro icon highlighted:

*Figure 13: The **Quick Access Toolbar** with the macro icon highlighted*

Additional information

For more information on running macros, go to: Run a macro

Additional information

For more information on adding macro to the **Quick Access Toolbar**, go to: Assign a button to a macro

Video

To review the video on adding a macro to the **Quick Access Toolbar**, go to: Assign a button to a macro

Activity: Guess and learn

In this activity, the teacher will lead a group discussion about different ways to run macros. Then, the teacher will demonstrate several different options for running a macro.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Participate in the teacher-led group discussion.

2. Follow along as the teacher demonstrates how to run macros.

3. Ask any clarifying questions that you might have.

Try-it: Run simple macros

In this leveled try-it, you'll run macros by using the ribbon or a keyboard shortcut.

Try-it 1

In this try-it activity, you'll use the ribbon to run the macro that you created in the previous try-it.

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try1_number_style.xlsm** from the previous activity and save it as **L2_T2_try1_number_style_starter.xlsm**. Alternatively, open **L2_T2_try1_number_style_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Select one of the cells with a random number.

2. Use the ribbon to run the **ApplyFancyFormat** macro.

3. As time allows, repeat the process on other cells with random numbers.

Try-it 2

In this try-it activity, you'll use a keyboard shortcut to run the macro that you created in the previous try-it.

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try2_date_style.xlsm** from the previous activity and save it as **L2_T2_try2_date_style_starter.xlsm**. Alternatively, open **L2_T2_try2_date_style_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Select one of the cells with a date.

2. Run the **ApplyFancyFormat** macro by selecting Ctrl+Shift+D.

3. As time allows, repeat the process on other cells with dates.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Which of the following best describes what the macro recorder captures?

   Select the correct option.

   a. Almost all the actions that you perform

   b. Text input and cell formatting

   c. Actions you perform by using the ribbon

2. Which of the following can you configure from the **Record Macro** dialog box?

   Select all that apply.

   a. Description

   b. Macro name

   c. Security settings

   d. Shortcut key

3. Add a frequently used macro to the _____ to provide a convenient way to run it.

   Fill in the blank space.

4. To make a macro available to any worksheet that you open from the same computer, save it to a _____.

   Fill in the blank space.

Lesson 3: Using the Visual Basic Editor

Overview

In this lesson, you'll learn to review VBA code and reuse existing macros by copying macros from one workbook to another. The discussions, activities, and demonstrations will reinforce your learning and provide the opportunity to practice these skills.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. Which command opens the code for a macro?

    Select the correct option.

    a. **Macros**

    b. **Record Macro**

    c. **Visual Basic**

2. Macros consist of code in which programming language?

    Select the correct option.

    a. Basic

    b. C#

    c. Machine language

    d. Visual Basic for Applications

Topic 1: Access the Visual Basic Editor

Macros are saved as VBA code. This code is just text, and Office includes the **Visual Basic Editor** for viewing and editing VBA code.

To open macros in the **Visual Basic Editor**, select the **Developer** tab on the ribbon. Then, in the **Code** group, select **Visual Basic**. The following screenshot depicts the **Code** group with **Visual Basic** highlighted.
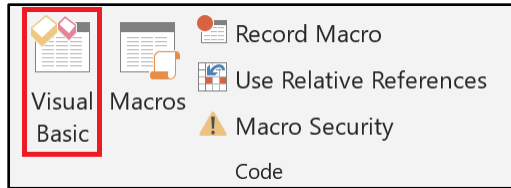
*Figure 14: The **Code** group with **Visual Basic** highlighted*
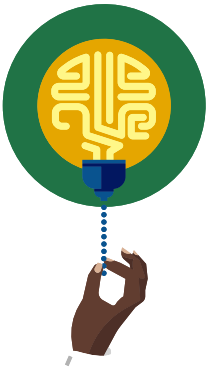
Did you know?

The keyboard shortcut to open the **Visual Basic Editor** is **Alt+F11**.

The **Visual Basic Editor** will open as a separate window displaying a text editor with the VBA code for all the macros in your workbook. The following screenshot depicts the **Visual Basic Editor** with the VBA code for a macro highlighted.
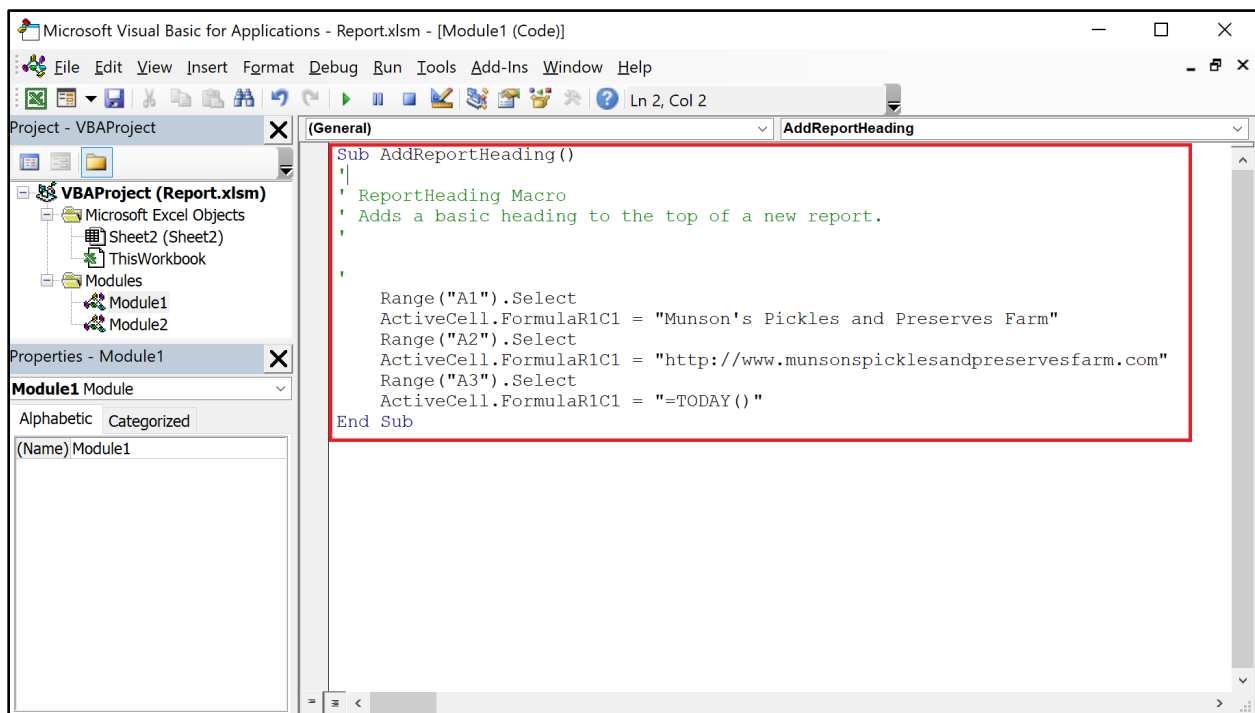
*Figure 15: The **Visual Basic Editor** with the VBA code for a macro highlighted*

Microsoft

The line **Sub AddReportHeading()** indicates the start of the **AddReportHeading** macro, which is called a *subroutine* in coding. **End Sub** indicates the end of the macro. These two lines establish the borders for all the information about the macro. Additional macros in the workbook would be listed following **End Sub**.

The first set of lines all start with an apostrophe and the editor shades them green. This indicates that those lines are informational and aren't part of the steps that the macro will take. In fact, Excel just skips those lines when running the macro. You can think of them as a heading that displays the name of the macro and the text that you entered in the **Description** box before you started recording. You can add a similar note, called a *comment* by programmers, by entering an apostrophe and entering any text that you want. Comments are often useful in providing additional information to people who read the code later.

The code itself displays in black text. Some of the lines might be easy to figure out, but others are not as obvious. For example, **Range("A1").Select** is the code that the macro recorder generated when the user selected cell **A1**. The line **ActiveCell.FormulaR1C1 = "Munson's Pickles and Preserves Farm"** is what the macro recorder generated when the user entered the name of the farm. Note that the creator then selected **A2** and entered the farm's web address, and then selected **A3** and entered a formula to display the current date.

If you make any changes to VBA code in the **Visual Basic Editor**, you'll need to use **Save** to save the changes to the macro-enabled workbook. You can close the editor at any time and reopen it from Excel.

Activity: Show and tell

In this activity, the teacher will demonstrate how to open and use the **Visual Basic Editor**. You'll examine the code for simple macros created with the macro recorder.

Resources required

You'll need the following resources for this activity:

- Open **L3_T1_act_days_starter.xlsm** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following along with the teacher's demonstration. During the demonstration, ask questions about topics or tasks that are unclear to you.

Try-it: Access the Visual Basic Editor

In this leveled try-it, you'll open the Visual Basic Editor and examine the VBA code for two macros.

Try-it 1

In this try-it, you'll open the Visual Basic Editor from the ribbon.

Resources

You'll need the following resources for this try-it:

- Open **L3_T1_try1_months_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Use the **Visual Basic** command on the ribbon to open the **Visual Basic Editor**.

2. If necessary, use the **View** menu to access **Project Explorer**.

3. If necessary, expand **Modules** and double-click **Module1**, or select it, and then select **Enter**.

4. After the line that reads **' MonthsV Macro**, add the following comment: **' Lists the months vertically starting in the active cell**.

5. Close the **Visual Basic Editor**.

Try-it 2

In this try-it, you'll open the Visual Basic Editor with the keyboard shortcut and elements of the **Project Explorer** and the VBA code for two macros.

Resources

You'll need the following resources for this try-it:

- Open **L3_T1_try2_months_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Use the **Visual Basic** command on the ribbon to open the **Visual Basic Editor**.

2. If necessary, use the **View** menu to access **Project Explorer**.

3. If necessary, expand **Modules** and double-click **Module1**, or select it, and then select **Enter**.

4. After the line that reads **' MonthsV Macro**, add the following comment: **' Lists the months vertically starting in the active cell**.

5. Close the **Visual Basic Editor**.

# Topic 2: Copy macros between workbooks

Unless you save a macro to a Personal Macro Workbook, it will only be attached to the workbook you were using when you recorded it. If you want the same automation in a different workbook, you can copy the macro, instead of recording it again.

When macros are attached to a workbook, they are organized into modules. By default, Excel creates a module named **Module1** when you record a macro, and each subsequent macro that you record is added to **Module1**.

To find **Module1** for your file, you'll need to open the **Project Explorer** in **Visual Basic Editor**. To do so:

1. Select the **Developer** tab, and then, in the **Code** group, select **Visual Basic**.

2. If the **Project Explorer** does not display, select the **View** tab, and then select **Project Explorer**.
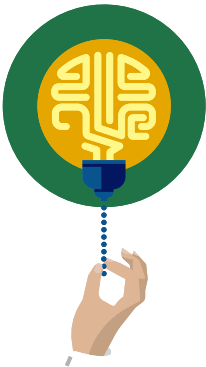
Did you know?

The **Project Explorer** displays a variety of VBA elements for each workbook that you have open at the time, not just the workbook that you're using.

Microsoft

The following screenshot depicts the **Visual Basic Editor** with **Project Explorer** highlighted.
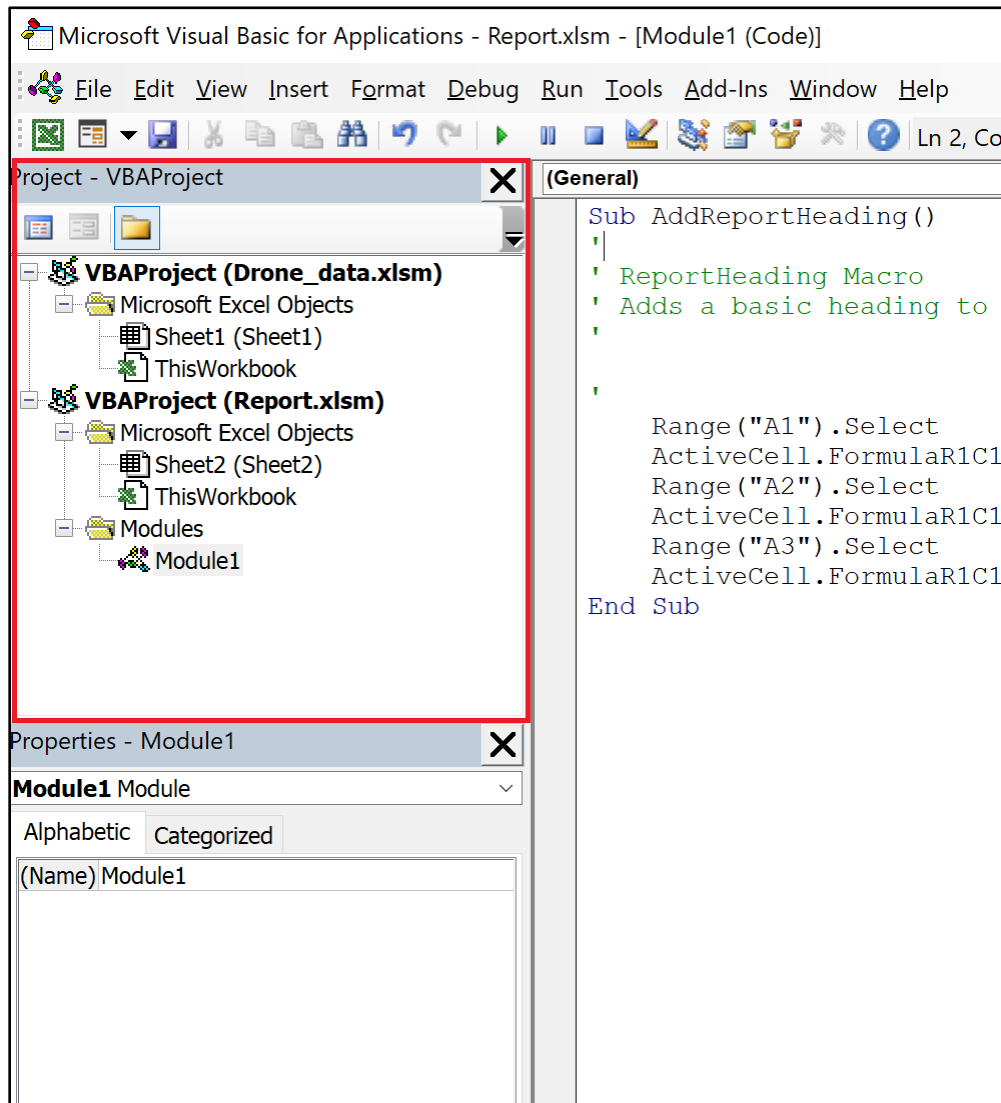
*Figure 16: The **Visual Basic Editor** with **Project Explorer** highlighted*

The screenshot depicts **Project Explorer** with two workbooks open: **Drone_data.xlsm** and **Report.xlsm**. **Drone_data.xlsm** doesn't have any modules because it doesn't contain any macros yet.

Copy and paste the VBA code for a macro

To copy an individual macro from one workbook to another, you can **Copy** and **Paste** the VBA code in the **Visual Basic Editor**. Begin by opening the workbook that contains the macro module that you want to copy and the workbook that you want to copy it to.

Select the **Developer** tab, and then, in the **Code** group, select **Visual Basic** to open the **Visual Basic Editor**. If **Project Explorer** is not already available, select the **View** tab, and then select **Project Explorer**.

In **Project Explorer**, select the module that you wish to copy, which is often **Module1**. This displays the VBA code for all macros in that module. Both the source and destination workbooks might have modules named **Module1**; so, you must make sure that you select the module within the source workbook. The following screenshot depicts the **Visual Basic Editor** with **Module1** in **Project Explorer** highlighted:

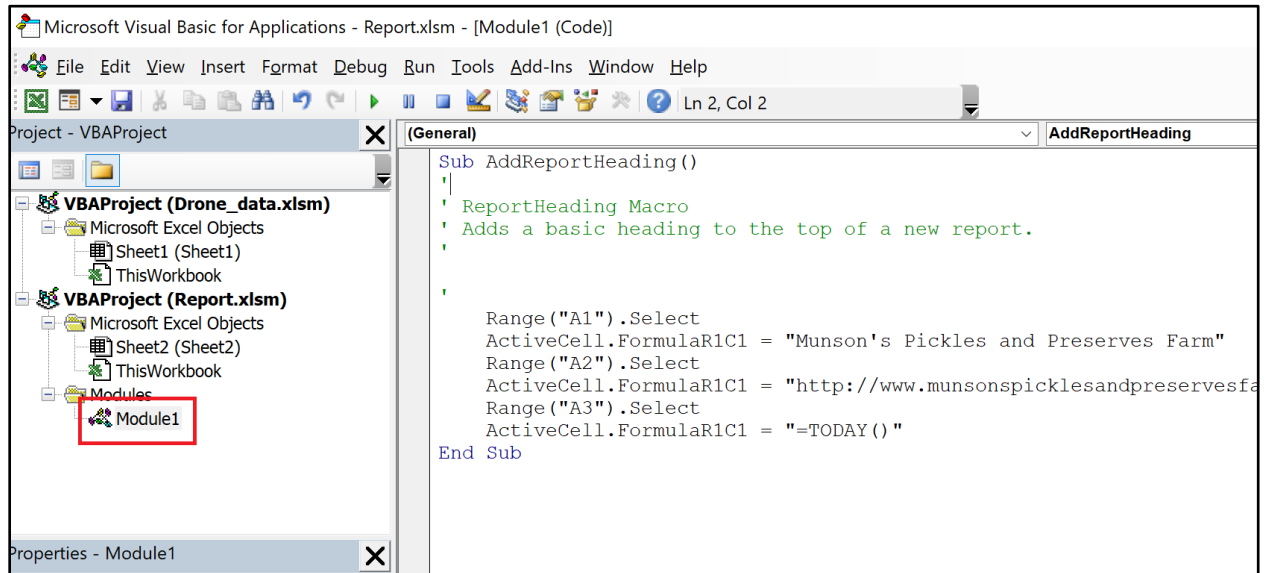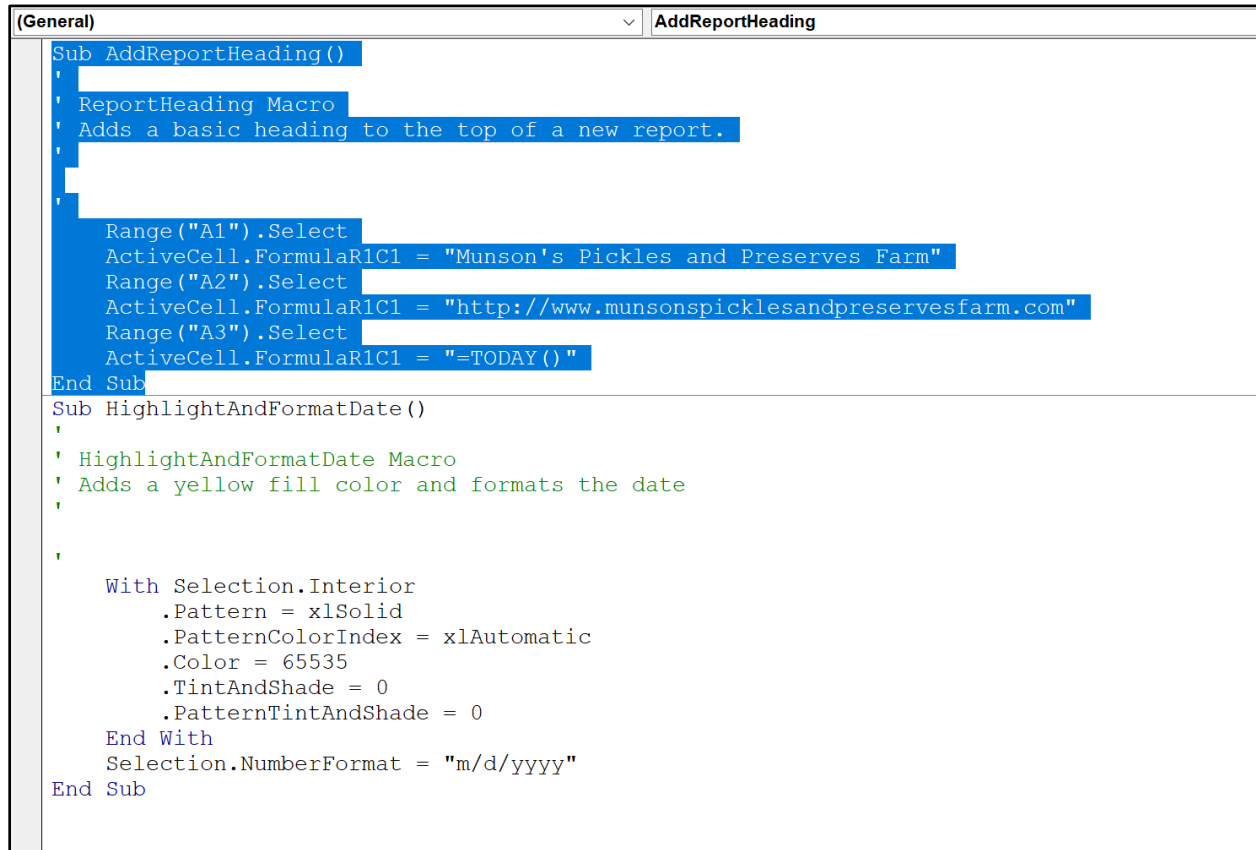*Figure 17: The **Visual Basic Editor** with **Module1** in **Project Explorer** highlighted*

Next, select the text for the entire macro that you wish to copy from the line that begins **Sub** to the line **End Sub**. Select the **Edit** menu, and then select **Copy**. The following screenshot depicts the Visual Basic Editor with a single macro selected in preparation for being copied.

```
(General)                                          AddReportHeading

Sub AddReportHeading()
'
' ReportHeading Macro
' Adds a basic heading to the top of a new report.
'


'
    Range("A1").Select
    ActiveCell.FormulaR1C1 = "Munson's Pickles and Preserves Farm"
    Range("A2").Select
    ActiveCell.FormulaR1C1 = "http://www.munsonspicklesandpreservesfarm.com"
    Range("A3").Select
    ActiveCell.FormulaR1C1 = "=TODAY()"
End Sub
Sub HighlightAndFormatDate()
'
' HighlightAndFormatDate Macro
' Adds a yellow fill color and formats the date
'


'
    With Selection.Interior
        .Pattern = xlSolid
        .PatternColorIndex = xlAutomatic
        .Color = 65535
        .TintAndShade = 0
        .PatternTintAndShade = 0
    End With
    Selection.NumberFormat = "m/d/yyyy"
End Sub
```

*Figure 18: The **Visual Basic Editor** with a single macro selected in preparation for being copied*

Microsoft

If the destination workbook doesn't have a module, or if you wish to copy the macro to a new module, right-click or activate the context menu for the destination workbook. Select **Insert**, and then select **Module**. A new module will be added to the workbook. The following screenshot depicts the context menu for a workbook in **Project Explorer**, with **Insert** selected and **Module** highlighted.
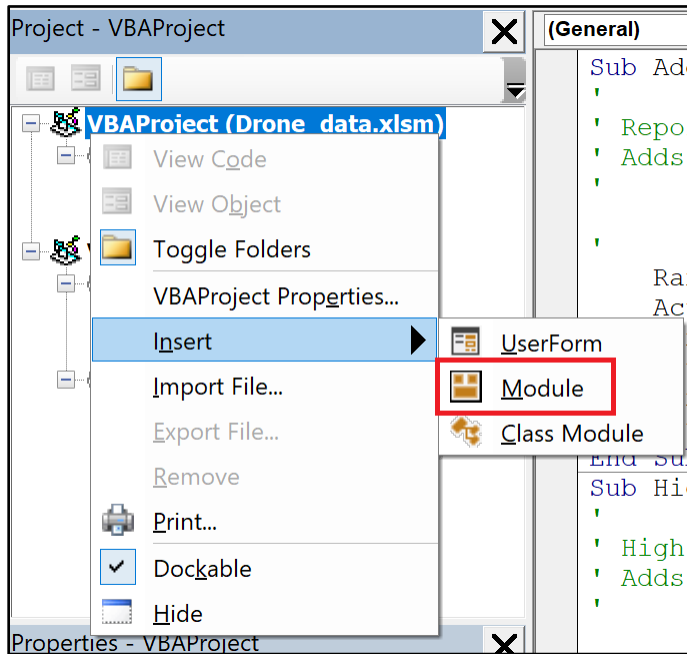

*Figure 19: The context menu for a workbook in **Project Explorer**, with **Insert** selected and **Module** highlighted*

To open the code, double-click the module name or select the module name, and then select **Enter**. Position the cursor after the last line of code. If there are no existing macros, position the cursor on the first line. Select the **Edit** menu, and then select **Paste**.

Copy a macro module

You can copy a macro module, including all the macros in that module, to another workbook. To do so, begin by opening the workbook that contains the macro module and the workbook that you want to copy it to.

Select the **Developer** tab, and then, in the **Code** group, select **Visual Basic** to open the **Visual Basic Editor**. If **Project Explorer** isn't already available, select the **View** menu and then select **Project Explorer**.

In **Project Explorer**, select the module that you wish to copy, which is often **Module1**. Drag the module to the destination workbook. The following screenshot depicts **Project Explorer** with the module to copy highlighted and the destination workbook highlighted.
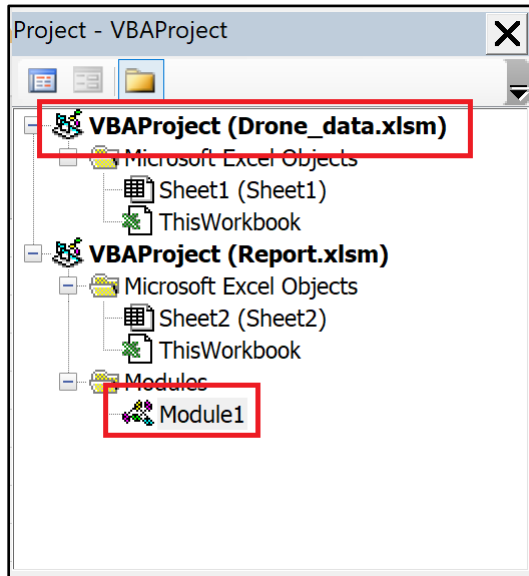

*Figure 20: **Project Explorer** with the module to copy highlighted and the destination workbook highlighted*

The macro module will be added to the destination workbook, and any macros that it contains will be usable in the destination workbook.

Additional information

For more information on copying macros, go to: [Copy a macro module to another workbook](#)

Activity: Show and learn

In this activity, the teacher will demonstrate how copy a macro module to a different workbook and how to copy a single macro by copying the VBA code.

Resources required

You'll need the following resources for this activity:

• Open **L3_T2_act_module_starter.xlsm** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity following along with the teacher's demonstration. During the demonstration, ask questions about topics or tasks that you're unclear about.

Try-it: Copy macros between workbooks

In this leveled try-it activity, you'll copy one or more macros to a new workbook.

Try-it 1

In this try-it, you'll copy an entire macro module to a new workbook.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try1_module_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Ensure that the starter file is open.

2. Create a new macro-enabled workbook named **L3_T2_try1_module.xlsm**.

3. Copy **Module1** from **L3_T2_try1_module_starter.xlsm** to **L3_T2_try1_module.xlsm**.

4. Close **L3_T2_try1_module_starter.xlsm**.

5. Run the two macros in **L3_T2_try1_module.xlsm**.

Try-it 2

In this try-it, you'll copy the VBA code for one macro to a new workbook.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try2_copy_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Ensure that the starter file is open.

2. Create a new macro-enabled workbook named **L3_T2_try2_copy.xlsm**.

Microsoft

3. Copy the VBA code for the **MonthsH** macro from **L3_T2_try1_copy_starter.xlsm** to **L3_T2_try2_copy.xlsm**.

4. Close **L3_T2_try2_copy_starter.xlsm**.

5. Run the **MonthsH** macro in **L3_T2_try2_copy.xlsm**.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Which of the following is a container that organizes macros in a workbook?

   Select the correct option.

   a. Blocks

   b. Modules

   c. Subs

   d. Workbooks

2. Which character indicates a comment in a macro?

   Select the correct option.

   a. Ampersand

   b. Apostrophe

   c. Comma

   d. Slash

3. How can you copy a macro from one workbook to another?

   Select all that apply.

   a. Open the **Macro** dialog box.

   b. Copy and paste the VBA code.

   c. Drag and drop in the Visual Basic Editor.

   d. Use a command on the **Developer** tab.

4. The last line of VBA code for a macro is _____.

   Fill in the blank space.

Lesson 4: Editing macros

Overview

In this lesson, you'll learn to change the name of a macro and edit macro code. The activities, discussions, and demonstrations will give you the opportunity to apply and practice the concepts that you learn.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. Where can you change the name of a macro?

   Select the correct option.

   a. From the context menu

   b. From the **Macro** dialog box

   c. In the **Visual Studio Editor**

   d. In the **Backstage** view

2. How can you change or correct a macro after you've recorded it?

   Select all that apply.

   a. By recording it again

   b. By editing the VBA code for the macro

   c. By adding it to the **Quick Access Toolbar**

   d. You cannot change a macro after it's been recorded.

3. A macro name must start with a _____.

   Fill in the blank space.

Topic 1: Name simple macros

After you've recorded a macro, you cannot change its name in Excel. However, you can change a macro name by editing the macro in the **Visual Basic Editor**.

Select the **Developer** tab on the ribbon, and then, in the **Code** group, select **Visual Basic** to open the **Visual Basic Editor**. To open the VBA code in the editor, double-click the module containing the macro, which is usually **Module1**, or select it, and then select **Enter**.

The name of the macro is part of the first line of that macro's VBA code, which begins with **Sub** and ends with **parentheses**. The following screenshot depicts the VBA code for a macro, with the name highlighted:

```
(General)                                              ∨   AddReportHeading

    Sub AddReportHeading()
    '
    ' ReportHeading Macro
    ' Adds a basic heading to the top of a new report.
    '


    '
        Range("A1").Select
        ActiveCell.FormulaR1C1 = "Munson's Pickles and Preserves Farm"
        Range("A2").Select
        ActiveCell.FormulaR1C1 = "http://www.munsonspicklesandpreservesfarm.com"
        Range("A3").Select
        ActiveCell.FormulaR1C1 = "=TODAY()"
    End Sub
```

Figure 21: The VBA code for a macro, with the name highlighted

To change the name of the macro, select the name in the editor, being careful not to select the space before the name or the parentheses following the name. Then, enter the new name for the macro. The first character of the name must be a letter, but subsequent characters can be letters, numbers, or underscore characters. You should give the macro a name that describes the task or tasks that it will record. Avoid using the same name as another macro in the workbook.

Microsoft

After entering the new name, select **Save**. The following screenshot depicts the **Visual Basic Editor**, with **Save** highlighted.
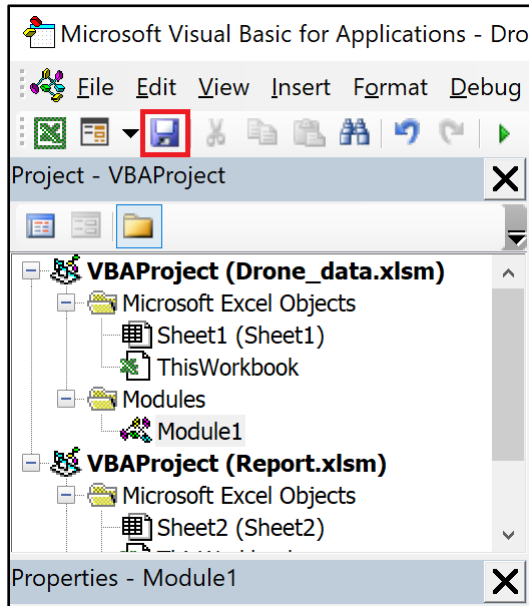

*Figure 22: The **Visual Basic Editor**, with **Save** highlighted*

Activity: Show and tell

In this activity, your teacher will discuss the importance of macro names and will demonstrate how to change the name of an existing macro.

Resources required

You'll need the following resources for this activity:

• Open **L4_T1_act_days_starter.xlsm** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following along with the teacher's demonstration. During the demonstration, ask questions about topics or tasks that you're not clear about.

Try-it: Name simple macros

In this leveled try-it, you'll access the **Visual Basic Editor**, which you'll then use to change the names of macros.

Try-it 1

In this try-it, you'll open the **Visual Basic Editor** from the ribbon or the **Macro** dialog box, and then you'll change the name of a macro.

Microsoft

Resources

You'll need the following resources for this try-it:

- Open **L4_T1_try1_months_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Use the ribbon to open the Visual Basic Editor. You can use the **Visual Basic** command or select **Macros** and, in the **Macro** dialog box, select **Edit**.

2. Rename the **MonthsH** macro to **FillMonthsHortizontal**.

3. Return to Excel and open the **Macro** dialog box to confirm your changes.

Try-it 2

In this try-it, you'll open the **Visual Basic Editor** with the keyboard shortcut, and then you'll change the name of a macro.

Resources

You'll need the following resources for this try-it:

- Open **L4_T1_try2_months_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Select Alt+F11 to open the **Visual Basic Editor**.

2. Rename the **MonthsH** macro to **FillMonthsHortizontal**.

3. Return to Excel and open the **Macro** dialog box to confirm your changes.

Topic 2: Edit simple macros

You can use the Visual Basic Editor to change any part of a macro's VBA code. Although making extensive changes or additions requires knowledge of the VBA programming language, you can add comments and make simple substitutions to the parts of the code that are easy to understand.

Consider the following VBA code:

Range("A1").Select

ActiveCell.FomulaR1C1 = "The Farm"

Range("A2").Select

ActiveCell.FormulaR1C1 = "Weekly Report"

Range("A2").Select

With Selection.Font

.Name = "Calibri"

.Size = 14

.Strikethrough = False

.Superscript = False

.Subscript = False

.OutlineFont = False

.Shadow = False

.Underline = xlUnderlineStyleNone

.ThemeColor = xlThemeColorLight1

.TintAndShade = 0

.ThemeFont = xlThemeFontMinor

End With

This macro selects **A1** and enters the text **The Farm**, and then selects **A2** and enters **Weekly Report**. After that, it selects **A2** and sets the font to **Calibri** with the font size **14**.

Microsoft

However, the user made a couple of mistakes. Instead of **The Farm**, they intended to input **Munson's Pickles and Preserves Farm**. To fix this mistake, select **The Farm** in the second line code, being careful not to select the quotation marks themselves, and then enter the correct text.

The user also intended to select **A1** instead of **A2** before setting the font properties. You can fix this by finding the second instance of the line **Range("A2").Select**, which is on the fifth line of code. Select **A2**, and then enter **A1**.

The VBA code for the macro is now as follows:

Range("A1").Select

ActiveCell.FomulaR1C1 = "Munson's Pickles and Preserves Farm"

Range("A2").Select

ActiveCell.FormulaR1C1 = "Weekly Report"

Range("A1").Select

With Selection.Font

> **.Name = "Calibri"**
>
> **.Size = 14**
>
> **.Strikethrough = False**
>
> **.Superscript = False**
>
> **.Subscript = False**
>
> **.OutlineFont = False**
>
> **.Shadow = False**
>
> **.Underline = xlUnderlineStyleNone**
>
> **.ThemeColor = xlThemeColorLight1**
>
> **.TintAndShade = 0**
>
> **.ThemeFont = xlThemeFontMinor**

End With

You can also use an apostrophe to add a comment to the code explaining the most complicated part of the macro. To do so, position the cursor at the start of the line and select **Enter** to insert a new line. Position the cursor on that new line and enter the following text:

' Change the font to Calibri size 14.

The final version of this macro is as follows:

Range("A1").Select

ActiveCell.FomulaR1C1 = "Munson's Pickles and Preserves Farm"

Range("A2").Select

ActiveCell.FormulaR1C1 = "Weekly Report"

Range("A1").Select

' Change the font to Calibri size 14.

With Selection.Font

> **.Name = "Calibri"**
>
> **.Size = 14**
>
> **.Strikethrough = False**
>
> **.Superscript = False**
>
> **.Subscript = False**
>
> **.OutlineFont = False**
>
> **.Shadow = False**
>
> **.Underline = xlUnderlineStyleNone**
>
> **.ThemeColor = xlThemeColorLight1**
>
> **.TintAndShade = 0**
>
> **.ThemeFont = xlThemeFontMinor**

End With

You can also change colors by editing the macro. The following code sets the color of the text in A1 to red:

Range("A1").Font.Color = -16776961

The macro recorder uses an unusual value to represent red: **-16776961**. However, VBA has a system for using name colors. For example, **vbRed** represents red and **vbYellow** represents yellow. To set the color to green, use the following line of VBA code:

Range("A1").Font.Color = vbGreen

Microsoft

Video

To review the video on editing a macro, go to: Edit a macro

Activity: Student-and-teacher collaboration

In this activity, the class will collaborate with the teacher to edit a macro by using the Visual Basic Editor.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by collaborating with the teacher and other students to create a macro.

Try-it: Edit simple macros

In this leveled try-it, you'll use the Visual Basic Editor to make simple changes to an existing macro.

Try-it 1

In this try-it, you'll change two formatting options in an existing macro.

Resources

You'll need the following resources for this try-it:

- Open **L4_T2_try1_months_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open the **Visual Basic Editor** to examine the macro in the starter file.

2. Find the line of VBA code that sets the font size to **16**. Change the font size to **14**.

3. Save and close the editor, and then run the macro to verify that the changed code works as expected.

Microsoft

4. Find the line of VBA code that sets the font style to **Bold Italic**. Change the font style to **Italic**.

5. Save and close the editor, and then run the macro to verify that the changed code works as expected.

Try-it 2

In this try-it, you'll change three formatting options in an existing macro.

Resources

You'll need the following resources for this try-it:

- Open **L4_T2_try2_months_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Open the **Visual Basic Editor** to examine the macro in the starter file.

2. Find the line of VBA code that sets the font size to **16**. Change the font size to **14**.

3. Save and close the editor, and then run the macro to verify that the changed code works as expected.

4. Find the line of VBA code that sets the font style to **Bold Italic**. Change the font style to **Italic**.

5. Save and close the editor, and then run the macro to verify that the changed code works as expected.

6. Find the line of VBA code that sets the color to the numeric value **192**. Change the color to **blue**.

7. Save and close the editor, and then run the macro to verify that the changed code works as expected.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Which of the following is the correct name for the color blue in VBA?

    Select the correct option.

    a. blue

    b. vbBlue

    c. vbaBlue

    d. rgbBlue

2. Which of the following are valid macro names?

    Select all that apply.

    a. ApplySettings

    b. Apply_Settings

    c. Apply-Settings

    d. 2Settings

    e. Apply2Settings

3. You can find the macro name on a line that starts with _____.

    Fill in the blank space.

Lesson 5: Understanding relative macros

Overview

In this lesson, you'll learn the difference between absolute and relative references in macros. You'll also record a relative macro. The activities, discussions, and demonstrations will give you the opportunity to practice and apply what you learn.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. Which of the following options refers to macro references that change depending on the active cell when you run a macro?

   Select the correct option.

   a. Absolute cell references

   b. Macro cell references

   c. Relative cell references

   d. VBA cell references

2. Which type of cell references should you use if you always want a macro to run on the same exact cells?

   Select the correct option.

   a. Absolute cell references

   b. Macro cell references

   c. Relative cell references

   d. VBA cell references

3. To record a relative macro, select the _____ command.

   Fill in the blank space.

Topic 1: Understand relative vs. absolute macros

The macro recorder has two different ways to manage the cells that you select while recording actions. By default, the VBA code for the macro will record the exact cells that you select during the recording. If you start the recording in **C4**, select **A1** and enter **Munson's**, and then move to **A2** and enter **Weekly Report**, the resulting VBA code would be as follows:

> **Range("A1").Select**
>
> **ActiveCell.FormulaR1C1 = "Munson's"**
>
> **Range("A2").Select**
>
> **ActiveCell.FormulaR1C1 = "Weekly Report"**

The macro will always put the text in cells **A1** and **A2**, no matter which cell you've selected when you start the macro. This is called *absolute* cell references.

If you record the same macro with *relative* cell references, the location of the text will be relative to the cell that you have selected when you begin recording. The same steps, recorded by using relative cell references beginning from **C4**, generate the following VBA code:

> **ActiveCell.Offset(-3, -2).Range("A1").Select**
>
> **ActiveCell.FormulaR1C1 = "Munson's"**
>
> **ActiveCell.Offset(1, 0).Range("A1").Select**
>
> **ActiveCell.FormulaR1C1 = "Weekly Report"**

When you select cell **A1** by using relative references, the macro recorder doesn't create code to select **A1**. Instead, it creates code to select a cell based on an offset: it moves to a cell that is three rows and two columns before the starting point and enters **Munson's**. It then moves to the next row from there and adds **Weekly Report**.

If you select cell **F13** and run the previous macro with absolute cell references, **Munson's** is added to **A1**. However, if you run the code with relative references from that location, the text will be added to **D10**, because that cell is three rows and two columns before **F13**.

Use absolute cell references when you want the steps performed in the exact same cells on the worksheet every time, regardless of which cell is active when the macro starts. For example, a macro to place heading information at the beginning of a worksheet would use absolute cell references.

Microsoft

Use relative cell references when you want the macro to perform steps on any cell, based on the selected location when it begins. An example of this would be a macro that adds the days of the week beginning in the selected cell.
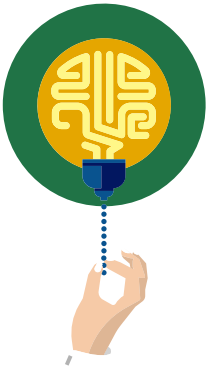
Did you know?

Relative cell references can cause problems in a macro. For example, if the macro includes instructions to move a few columns or rows before a cell, and you run it from cell **A1**, it will stop responding, because **A1** is the first cell in the worksheet.

Activity: Show and tell

In this activity, your teacher will discuss and demonstrate the difference between absolute cell references and relative cell references when recording a macro.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following along with the teacher's demonstration. During the demonstration, ask questions about topics or tasks that you're unclear about.

Try-it: Understand relative vs. absolute macros

In this standalone try-it activity, you'll create a macro by using absolute cell references.

Resources

You'll need the following resources for this try-it:

- None

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Create a new macro-enabled workbook named **L5_T1_try_my_info.xlsm**.

2. Select any cell other than **A1** before you begin recording.

3. Use the macro recorder to begin recording a macro, and:

    a. **Name** the macro **InsertMyInfo**.

    b. Assign it the shortcut keyboard combination **Ctrl+Shift+M**.

    c. For the **Description**, enter the text **Inserts a few lines of information about me, starting in cell A1**.

4. After you begin recording, enter the following information:

    a. Enter your name in cell **A1**.

    b. Enter your location (city, state, province, or similar) in cell **A2**.

    c. Enter your date of birth in cell **A3**.

5. Apply the formatting of your choice to the information that you've entered.

6. Stop recording. Clear the contents of cells **A1:A3** and run your macro to verify that it works as expected.

Topic 2: Record a relative macro

The macros that you've recorded to this point have used absolute cell references. The **Developer** tab on the ribbon includes a command to switch to relative references and back to absolute references. To record steps by using relative references, select the **Developer** tab, and then, in the **Code** group, select **Use Relative References**. To switch back to absolute references, select **Use Relative References** again. The following screenshot depicts the **Code** group with **Use Relative References** enabled and highlighted.
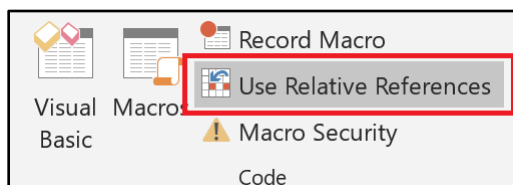
*Figure 23: The **Code** group with **Use Relative References** enabled and highlighted.*

Generally, you'll turn **Use Relative References** on or off before you select **Record Macro**, but you can use the command while you're recording.

Activity: Discuss and learn

In this activity, the teacher will lead a class discussion about the **Use Relative References** feature and will then demonstrate recording a macro with relative references.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the group discussion and ask clarifying questions about any topics that you don't fully understand.

Try-it: Record a relative macro

In this standalone try-it activity, you'll record a macro with relative references.

Resources

You'll need the following resources for this try-it:

- Open your workbook from the previous try-it activity. Alternatively, open **L5_T2_try_my_info_starter.xlsm** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Turn on the **Use Relative References** feature and record a macro named **InsertMyInfoRelative**. Assign the keyboard shortcut **Ctrl+Shift+R** and add an appropriate description.

2. After you begin recording, enter a few lines of information, as you did in the previous try-it:

   a. Enter your name in the currently selected cell.

   b. Enter your location (city, state, province, or similar) on the next row, in the same column.

   c. Enter your date of birth on the next row, in the same column.

3. Apply the formatting of your choice to the information that you've entered.

Microsoft

4. Stop recording. Select a cell in an unused area of the worksheet and run your macro to verify that it works as expected. It should add your name to the current cell and then add the additional information on the next rows.

Wrap-up

Use these questions to check what you learned in this lesson:

1. On which tab can you enable relative references?

   Select the correct option.

   a. **Home**

   b. **Insert**

   c. **Formulas**

   d. **Data**

   e. **Review**

   f. **Developer**

2. When can you enable or disable relative references?

   Select the correct option.

   a. Only before you record

   b. Only after you record

   c. Only while you record

   d. At any time

3. Use the _____ command to disable relative references.

   Fill in the blank space.

Glossary

Absolute cell references	Macro locations that do not change regardless of the active cell when you start the macro.
Developer tab	A tab on the ribbon with commands for working with macros, which is hidden by default.
Macro	A series of actions grouped together into a single command.
Macro-enabled Workbook	A workbook type that can save macros for use when you open the workbook in the future.
Macro recorder	A tool that creates a macro by capturing actions and recording them in VBA code.
Module	A container for one or more macros.
Personal Macro Workbook	A special workbook that stores macros so they are available any time you use Excel on the same computer.
Relative cell references	Macro locations that are based on the active cell when the macro is started.
VBA	Visual Basic for Applications, a programming language available in most Microsoft Office apps.
Visual Basic Editor	An environment for creating and editing VBA code and procedures.

Table 2: Glossary terms and definitions

Cornerstone

Overview

In this Cornerstone, you'll help automate a report for Munson's Pickles and Preserves Farm by managing, editing, and creating macros to format imported data. You'll copy macros between workbooks, edit macros in Visual Basic Editor, and record a macro to add information to the beginning of a workbook.

Objectives

The following table outlines the Cornerstone objectives and their corresponding Microsoft Office Specialist (MOS) exam objectives.

Enable and run a macro	• 1.1.3: Enable macros in a workbook
Copy and edit a macro with Visual Basic Editor	• 1.1.1: Copy macros between workbooks • 3.6.2: Name simple macros • 3.6.3: Edit simple names
Record a macro	• 3.6.1: Record simple macros

Table 3: Cornerstone objectives

Duration

50 minutes

Instructions

1. Complete the following tasks for each file.

2. When saving your file, add your name to the end of the filename, for example: **Cornerstone_macros_Dwayne_Espino**. Follow your teacher's directions for where to save your files.

3. When you're done with the Cornerstone, assess your completion and enter the points that you think you earned within the following task lists. You can ask your teacher for help if required.

Tasks

You'll work with two files in this Cornerstone. The following are the tasks you must do within each file.

File 1: Cornerstone_macros_starter.xlsm

Task: Enable and run a macro (2 points)

1. Open **Cornerstone_macros_starter.xlsm** and enable macros. This worksheet is an example of the raw data that Munson's employees import when generating a report. (1 point) (Exam objective 1.1.3)

2. Run the macro named **AddHeadings** to insert column and row headings. You can use the ribbon or the keyboard shortcut combination **Ctrl+Shift+H**. (1 point)

Points scored: _____ / 2

FILE 1 TOTAL POINTS: _____/ 2

File 2: Cornerstone_report_starter.xlsm

Task: Copy and edit a macro with the Visual Basic Editor (9 points)

1. Open **Cornerstone_report_starter.xlsm** and enable macros. This worksheet is the report that you'll prepare by using macros.

2. Access the **Visual Basic Editor** and copy **Module1** from **Cornerstone_report_starter.xlsm** to **Cornerstone_macros_starter.xlsm**. This will create a new module named **Module11**. (1 point) (Exam objective 1.1.1)

3. Copy only the **AddHeadings** VBA code from **Cornerstone_macros_starter.xlsm** to **Cornerstone_report_starter.xlsm**. Place it after the **DeleteHeadings** macro already in the workbook. (2 points) (Exam objective 1.1.1)

4. Close **Cornerstone_macros_starter.xlsm**.

5. In the VBA code for **Cornerstone_report_starter.xlsm**, make the following edits to the **AddHeadings** macro:

   a. Change the font color from **vbRed** to **vbBlack**.

   b. Change the bold setting from **False** to **True**. (4 points) (Exam objective 3.6.3)

6. Change the name of the **DeleteHeadings** macro to **RemoveHeadings**. (1 point) (Exam objective 3.6.2)

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7. Close the **Visual Basic Editor** and switch back to **Cornerstone_report_starter.xlsm** in Excel.

8. Run the **AddHeadings** macro. (1 point)

Points scored: _____ / 9

Task: Record a macro (3 points)

1. Create a new macro with the following settings:

   a. Name: **AddInfo**

   b. Shortcut key: **Ctrl+Shift+I**

   c. Description: **Adds company information at the top of the current worksheet** (1 point)

2. The macro should perform the following actions:

   a. Add three blank rows before the existing row **1**.

   b. Place the text **Munson's Pickles and Preserves Farm** in **A1**. Apply the **Title** style to this text.

   c. Place the text **http://www.munsonspicklesandpreservesfarm.com** in **A2**.

   d. Place the text **Summary Report** in **A3**. (2 points) (Exam objective 3.6.1)

Points scored: _____ / 3

FILE 2 TOTAL POINTS: _____ /12
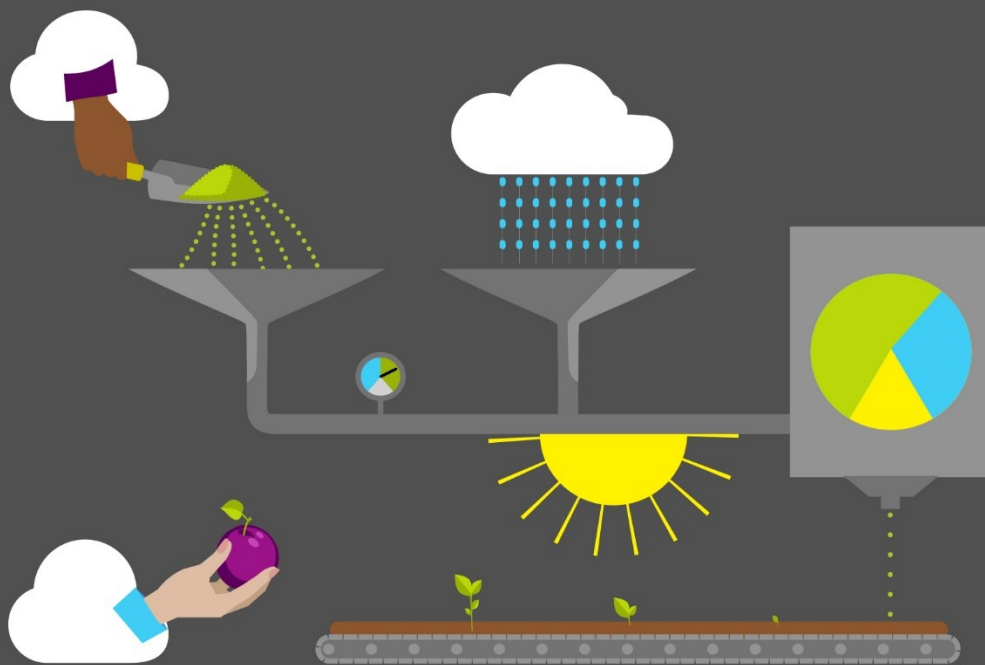
Microsoft

Student Guide

40571A
Microsoft Excel expert 2019

Module 6: Using Microsoft PivotTables and Microsoft PivotCharts

Contents

Microsoft

Microsoft

Module overview

Description

In Microsoft Excel 2019, you can use PivotTables and PivotCharts to summarize and present large amounts of data. PivotCharts and PivotTables complement each other by enabling you to present complex information in attractive and user-friendly ways. At the end of this module, you'll be able to use and manage PivotCharts and PivotTables.

Lesson	Learning objective	Exam objective(s)
Using PivotTables	Understand and create PivotTables.	• 4.2.1
Modifying PivotTables	Modify and format PivotTables and the data in them.	• 4.2.2 • 4.2.6
Performing PivotTable calculations	Create calculated fields in a PivotTable, calculate how values display in a PivotTable.	• 4.2.5 • 4.2.2
Filtering and grouping PivotTables	Filter, group, and ungroup data in a PivotTable.	• 4.2.3 • 4.2.4
Using PivotCharts: the basics	Create PivotCharts and change options that affect PivotCharts.	• 4.3.1 • 4.3.2
Using PivotCharts: beyond the basics	Format PivotCharts, and expand, collapse, and display details in a PivotChart.	• 4.3.3 • 4.3.4

Microsoft

Lesson	Learning objective	Exam objective(s)
Cornerstone: Creating a sales dashboard	• Create and format a PivotTable. • Perform PivotTable calculations. • Group and filter data. • Create and modify a PivotChart.	• 4.2.1 • 4.2.2 • 4.2.3 • 4.2.4 • 4.2.5 • 4.2.6 • 4.3.1 • 4.3.2 • 4.3.3 • 4.3.4

Table 1: Objectives by lesson

Scenario

You're approaching the end of your one-year internship at Munson's Pickles and Preserves Farm, and your team members have asked you to create a summary of the sales that Munson's generated at farmers markets, through retail and wholesale outlets, and at the farm shop. The marketing team will use the charts and tables that you create as a dashboard to present to new students in the next academic semester.

Cornerstone

This module concludes with a Cornerstone project, in which you'll create charts and tables that the sales team will use as an interactive dashboard. In the Cornerstone, you'll:

• Create a PivotTable.
• Modify and format the PivotTable.
• Perform PivotTable calculations.
• Group and filter data.
• Create and modify a PivotChart.

Lesson 1: Using PivotTables

Overview

PivotTables in Excel enable you to analyze and summarize complex data. You can use PivotTables to present a large amount of data in a concise manner, make comparisons between data, and study data trends. At the end of this lesson, you'll be able to create PivotTables in Excel.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. What can PivotTables help you do with large volumes of data?

   Select all that apply.

   a. Summarize

   b. Organize

   c. Optimize

   d. Analyze

2. To create PivotTables, you select the _____ tab.

   Fill in the blank space.

Topic 1: Use Recommended PivotTables

Did you know that when you're working with PivotTables, Excel can recommend PivotTables that suit your data? To use this option, you can select **Recommended PivotTables** in the **Tables** group.

To create a recommended PivotTable:

1. Select a cell in the data range.

2. Select the **Insert** tab.

3. Select **Recommended PivotTables** in the **Tables** group, which the following screenshot depicts.

*Figure 1: **Tables** group of the **Insert** tab*

4. Select an option in the **Recommended PivotTables** dialog box, which the following screenshot depicts.
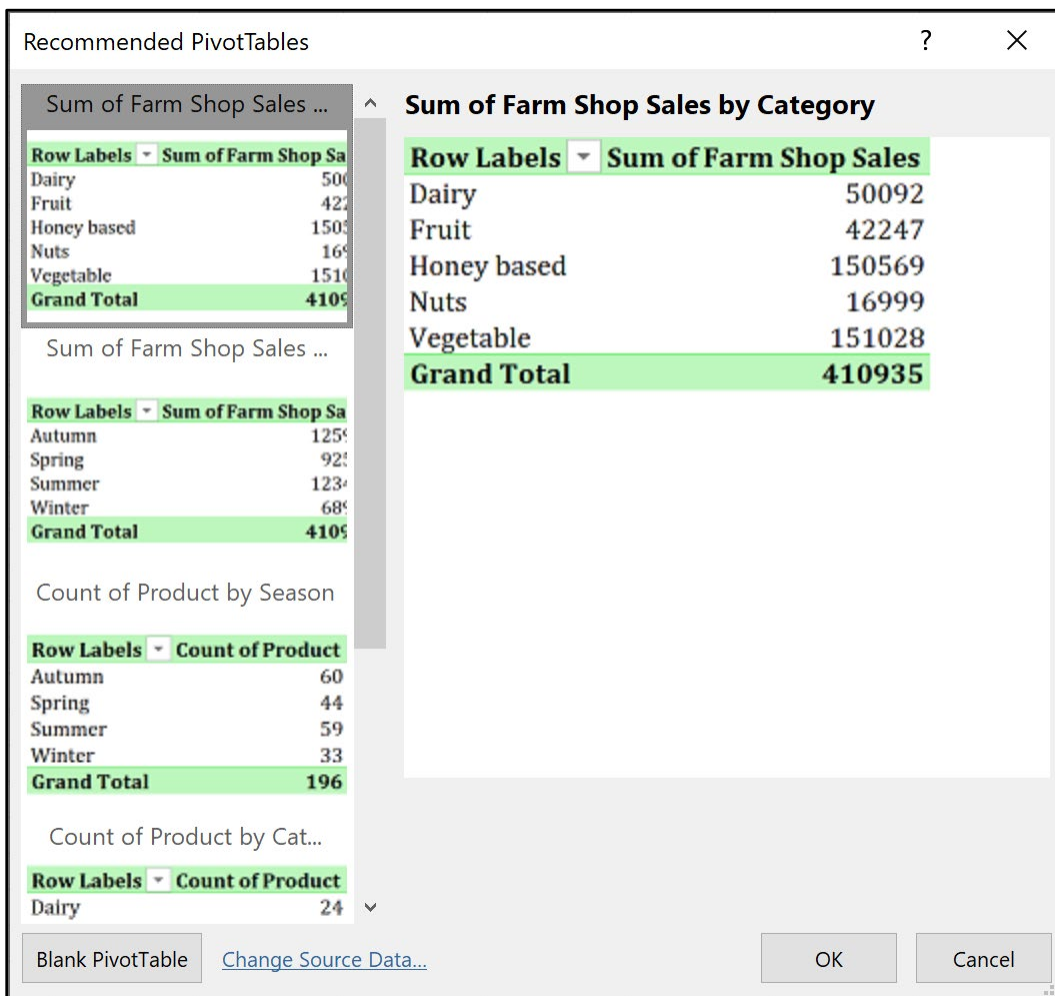

*Figure 2: **Recommended PivotTables** dialog box*

Additional information

To review the tutorial on PivotTables, go to: <u>Overview of PivotTables and PivotCharts</u>

Activity: Think-pair-share

In this activity, your teacher will demonstrate how to use **Recommended PivotTables**, and then pair you with a partner. Review the online tutorial and discuss with your partner the different ways that you might use PivotTables to analyze data.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to use recommended PivotTables.

2. Ask the teacher clarifying questions. An example is: How can I choose different PivotTables?

3. Review the online tutorial and think about how you might choose different PivotTables to determine different information, for example: sum of sales versus count of sales.

4. Discuss your idea(s) with your partner.

Try-it: Use Recommended PivotTables

In this standalone try-it activity, you'll create a recommended PivotTable with sums and also a recommended PivotTable with counts.

Resources

You'll need the following resources for this try-it:

- Open **L1_T1_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Use **Recommended PivotTables** to create a **Sum of Farm Shop Sales by Category PivotTable**.

2. Use **Recommended PivotTables** to create a **Count of Product by Category PivotTable**.

Topic 2: Create PivotTables

Using **Recommended PivotTables** is helpful when you need results fast, but there might be situations in which you need to control all the options for your PivotTable. When you're working with specific data and you want to precisely control all the options, you'll need to create a PivotTable yourself.

To create a PivotTable:

1. Select the data that you want to use for your PivotTable.

Note: Your data shouldn't have any empty rows or columns. It must have only a single-row heading.

2. Select the **Insert** tab.

3. Select **PivotTable** in the **Tables** group. The **Create PivotTable** dialog box displays, as the following screenshot depicts.
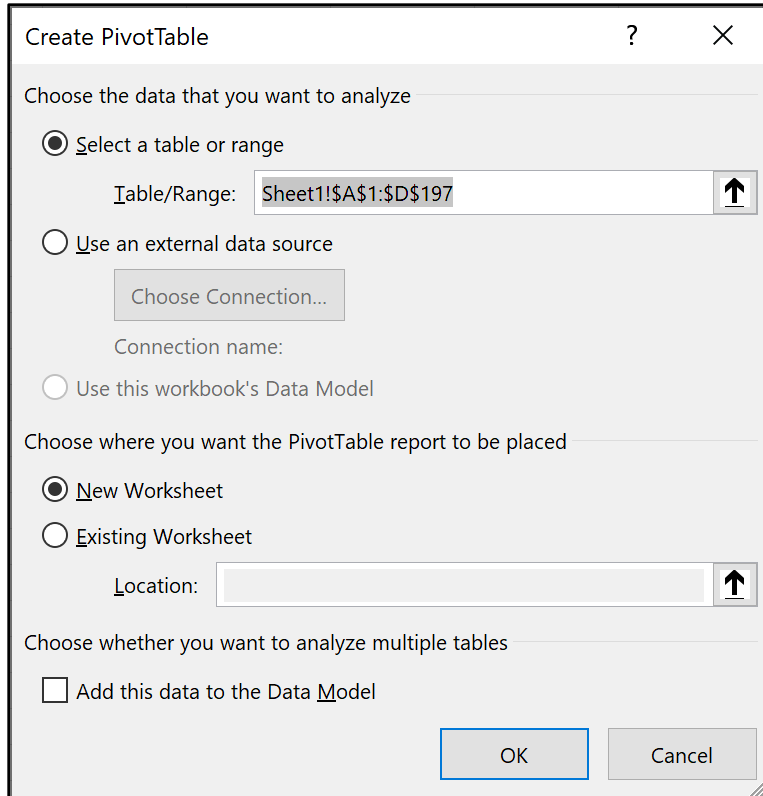
Figure 3: ***Create PivotTable*** *dialog box*

4. In the **Create PivotTable** dialog box:

    a. In the **Choose the data that you want to analyze** section, select:

        i.   **Select a table or range** to enter the **Table/Range** to use.

        ii.   **Use an external data source** to use an external data source, select **Choose Connection**, and then select a connection from the **Existing Connections** dialog box.

    b. In the **Choose where you want the PivotTable report to be placed** section, select:

        i.   **New worksheet** to place the PivotTable in a new worksheet.

        ii.   **Existing worksheet** to place the PivotTable in an existing worksheet, and then select the location where you want the PivotTable.

5. Select **OK**.

6. In the **PivotTable Fields** pane (also known as the **Field List**), select the desired fields, as the following screenshot depicts.
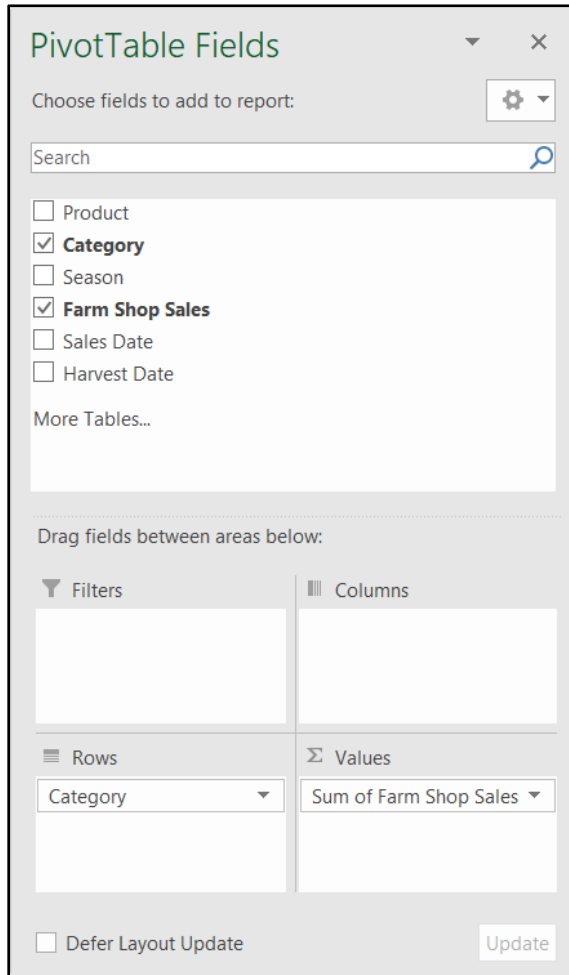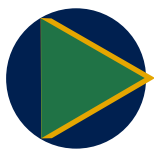

*Figure 4: **PivotTable Fields** pane*

Video

To review the video on how to create PivotTables, go to: Create a PivotTable to analyze worksheet data

Activity: Show and Tell

In this activity, your teacher will demonstrate the steps to create a PivotTable.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to create a PivotTable.

2. Ask the teacher clarifying questions. An example is: How can I put the PivotTable on the same worksheet as the data?

Try-it: Create PivotTables

In this standalone try-it activity, you'll create a PivotTable with sales by category.

Resources

You'll need the following resources for this try-it:

- Open **L1_T2_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

- Create a PivotTable by using **Category** as the row and **Farm Shop Sales** as the value.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Which feature on the **Insert** tab provides preconfigured PivotTable options?

   Select the correct option.

   a. **Preset PivotTables**

   b. **Recommended PivotTables**

   c. **PivotTable Options**

   d. **Table**

2. What are the data sources that you can use for a PivotTable?

   Select all that apply.

   a. Table

   b. Range

   c. External data source

   d. Grid

Lesson 2: Modifying PivotTables

Overview

You can modify your PivotTables by moving fields around and formatting the data to make analysis easier. At the end of this lesson, you'll be able to modify and format PivotTables.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. Which of the following characteristics can you modify in the **PivotTable Styles** group?

   Select all that apply.

   a. Color

   b. Font

   c. Layout

   d. Totals

2. Which of the following characteristics can you change in the **Layout** group for PivotTable design?

   Select all that apply.

   a. Repetition of item labels

   b. Subtotals

   c. Color

   d. Grand Totals

Topic 1: Modify field selections and options

Field placement determines the data grouping and display in a PivotTable. Typically, Excel adds non-numeric fields to the **Rows** box, numeric fields to the **Values** box, and date fields to the **Columns** box of the **PivotTable Fields** pane.

Change field selections in a PivotTable

To change the field selection in a PivotTable:

1. Select the PivotTable.

2. If the **PivotTable Fields** pane does not automatically display, select the **Analyze** tab, and then select **Field List** in the **Show** group. The following screenshot depicts the **Show** group.
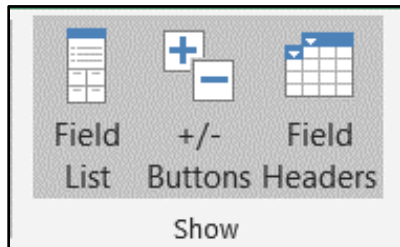

*Figure 5: **Show** group on the **Analyze** tab*

3. Select the field(s) that you would like to add or remove from the PivotTable by selecting the check boxes in the **PivotTable Fields** pane.

4. Select the field that you want to move, and then select the box that you want to move it to by using the **Field** drop-down list in the **PivotTable Fields** pane. You can also move the field before or after other fields in the same box. Alternatively, you can drag and drop the field to different boxes. The following screenshot depicts the field drop-down list.
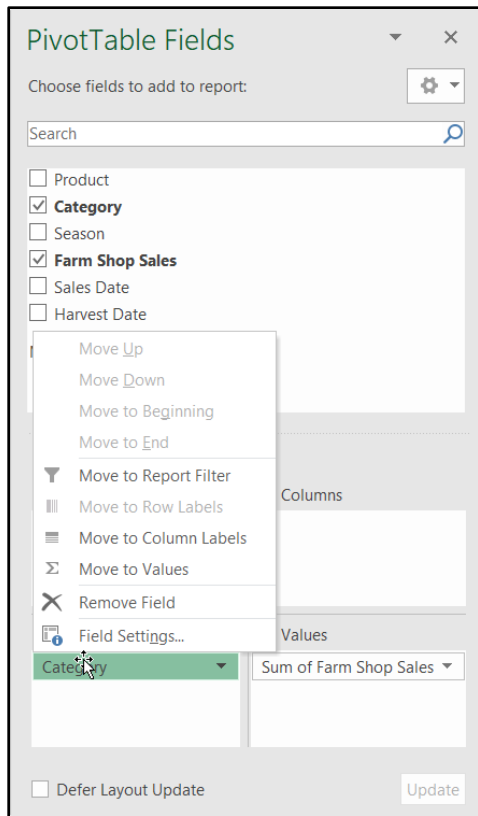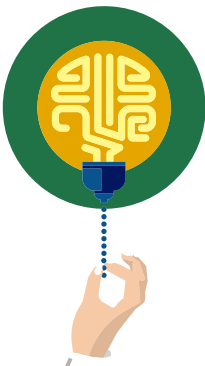
*Figure 6: Field drop-down list in the **PivotTable Fields** pane*

Did you know?

The act of moving fields around is known as *pivoting* the data, and this is how PivotTables and PivotCharts get their name.

Change PivotTable options

To change PivotTable options:

1. Select the PivotTable.

2. Select the **Analyze** tab, and then select **Options** in the **PivotTable** group.

3. Select the desired options in the **PivotTable Options** dialog box, and then select **OK**. The following screenshot depicts the **PivotTable Options** dialog box.
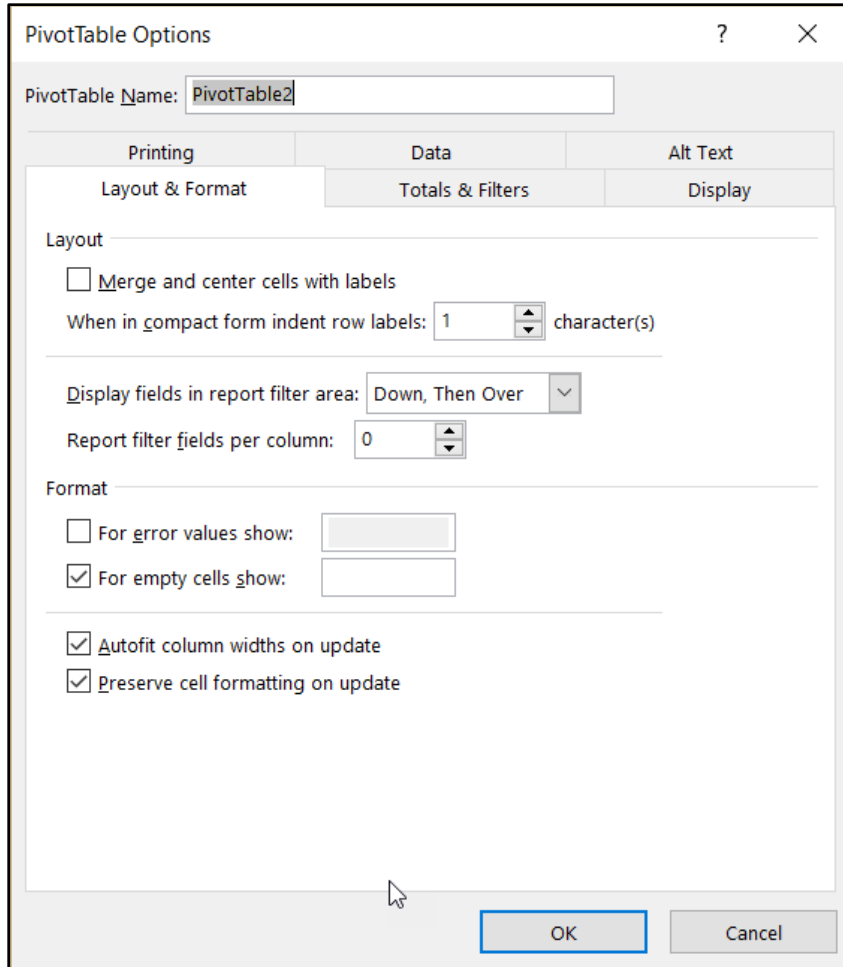
*Figure 7: **PivotTable Options** dialog box*

Note: Be sure to include alt text in the **Alt Text** tab of the **PivotTable Options** dialog box to describe your PivotTable. Alt text provides alternative, text-based descriptions of images and tables to persons who have visual or cognitive impairments and use screen readers.

Video

To review the video on modifying PivotTables, go to: Use the Field List to arrange fields in a PivotTable

Additional information

To review the tutorial on PivotTable options, go to: PivotTable options

Activity: Discuss and learn

In this activity, your teacher will demonstrate moving and changing fields by using the field list. There will also be a discussion on how this can be helpful when you're analyzing data.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to move and change fields by using the field list.

2. Ask the teacher clarifying questions. An example is: How can I move fields?

3. Think about how you might choose different field placement to determine different information; for example, filtering by season.

Try-it: Modify field selections and options

In this leveled try-it activity, you'll add a field to a PivotTable and review the impact on the PivotTable. You'll rearrange fields in the PivotTable field list and review the impact on the PivotTable.

Try-it 1

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try1_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following is the general task that you need to perform during this try-it:

- Add the **Seasons** field to the existing PivotTable.

Microsoft

Try-it 2

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try2_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Move the **Seasons** field from the **Row** box to the **Category** box.

2. Hide column grand totals.

3. Add alt text to the PivotTable.

Topic 2: Format data

How you display data in a PivotTable can help or hinder your analysis. Make sure that you use PivotTables to your best advantage and impress your audience by presenting information that is clear, concise, and easy to interpret. In this lesson, you'll learn how to change the appearance and layout of a PivotTable to maximize its use.

Change PivotTable layout

To change the layout of a PivotTable:

1. Select the PivotTable.

2. Select the **Design** tab, and then select the **Report Layout** drop-down list in the **Layout** group. The following screenshot depicts the **Report Layout** drop-down list.
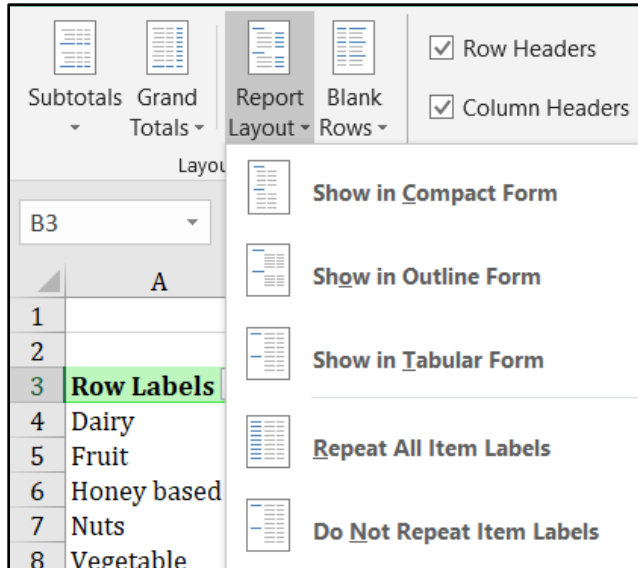
Figure 8: ***Report Layout*** *drop-down list in the* ***Layout*** *group*

3. Select the desired option.

Change PivotTable styles

To change the style of your PivotTable:

1. Select the PivotTable.

2. Select the **Design** tab, and then select the desired style in the **PivotTable Styles** group. The following screenshot depicts the options in the **PivotTable Styles** group.
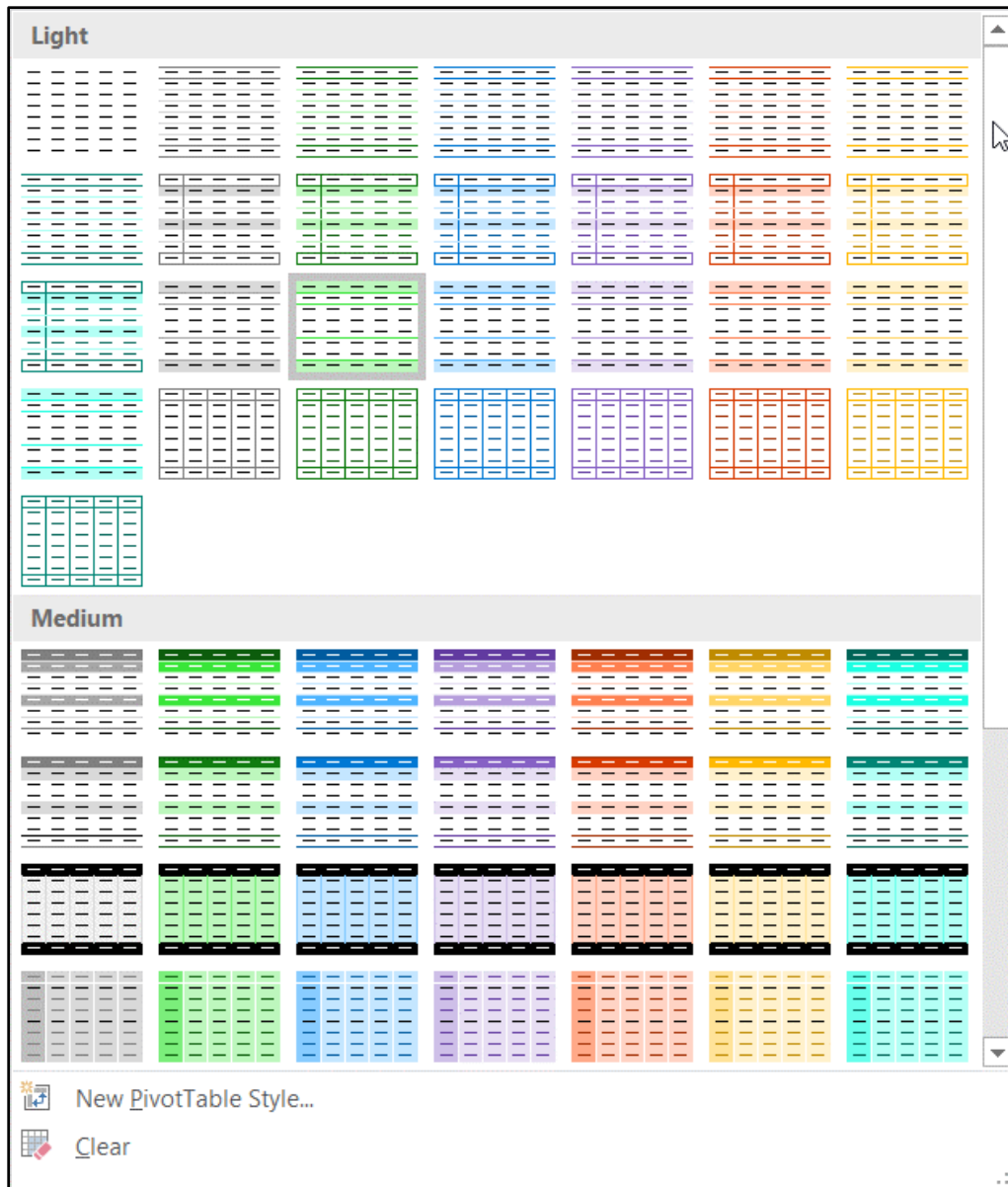
*Figure 9: **PivotTable Styles** options*

Change the number format for a field

You can also change the number format for the fields in your PivotTable. To do so:

1. Select the header cell of the **Value** field in the PivotTable; for example, **Sum of Farm Shop Sales**.

2. Select the **Analyze** tab, and then select **Field Settings** in the **Active Field** group, which the following screenshot depicts.
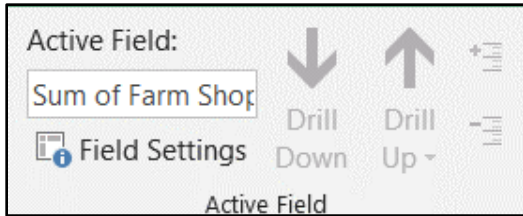
*Figure 10: **Active Field** group of the **Analyze** tab*

3. Select **Number Format** in the **Value Field Settings** dialog box, which the following screenshot depicts.
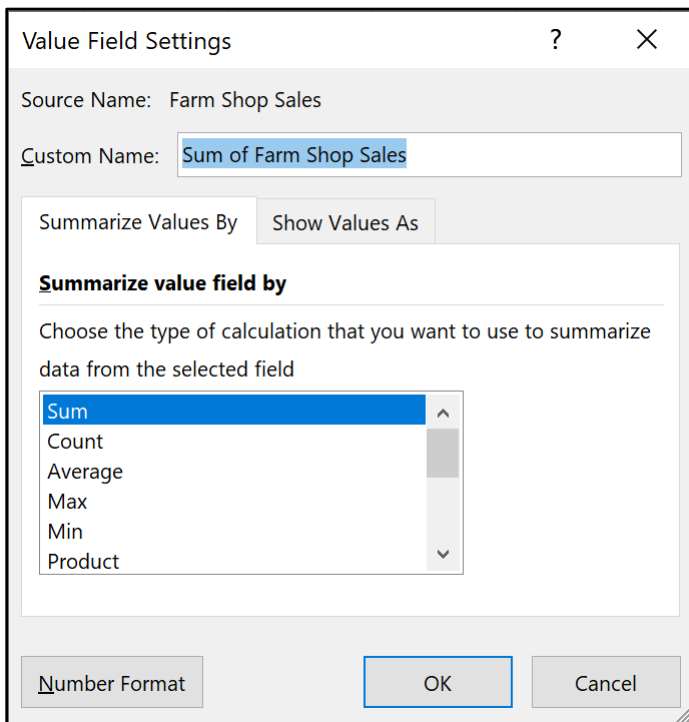

*Figure 11: **Value Field Settings** dialog box*

4. Change the number format to the desired setting in the **Format Cells** dialog box, which the following screenshot depicts. Select **OK**.
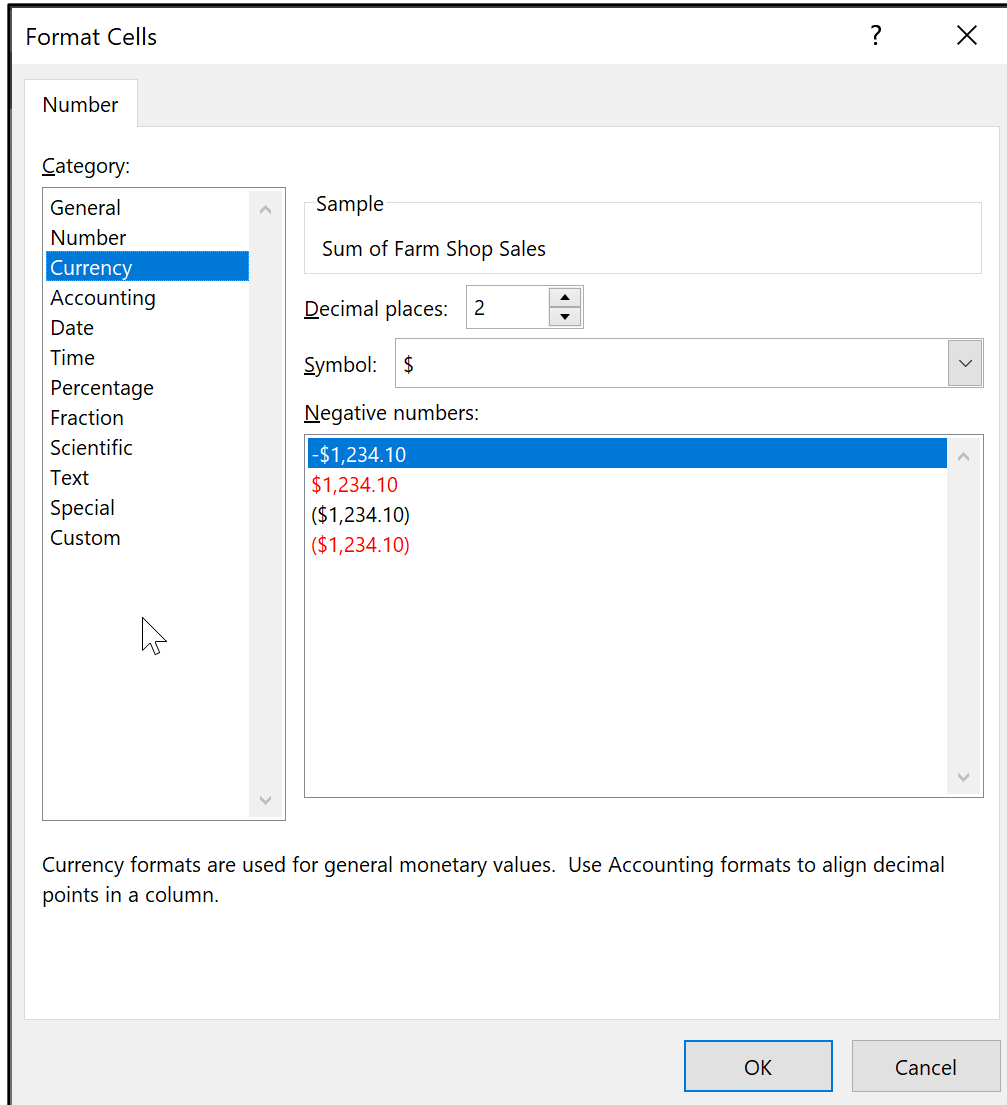
Microsoft

*Figure 12: **Format Cells** dialog box*

Additional information

To review the article on formatting a PivotTable, go to: [Design the layout and format of a PivotTable](#)

Activity: Show and tell

In this activity, your teacher will demonstrate how to change a PivotTable layout and design, and also how to format the value fields in a PivotTable.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to change a PivotTable layout and design, and how to format the value fields in a PivotTable.

2. Ask the teacher clarifying questions. An example is: How can I change the design to another color?

Try-it: Format data

In this leveled try-it activity, you'll change PivotTable layout and design, and format the sales field to display currency without decimal points.

Try-it 1

Resources

You'll need the following resources for this try-it:

- Open **L2_T2_try1_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Change **Report Layout** to tabular form.

2. Change PivotTable style to **Light**, **Row 2**, **Column 4 (Light Blue**, **Pivot Style Light 17)**.

Try-it 2

Resources

You'll need the following resources for this try-it:

- Open **L2_T2_try2_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following is the general task that you need to perform during this try-it:

- Change the number format for **Farm Shop Sales** to currency with no decimal points.

Wrap-up

Use these questions to check what you learned in this lesson:

1. What are the choices for field placement (boxes) in the **PivotTable Fields** pane?

   Select all that apply.

   a. Value

   b. Column

   c. Row

   d. Header

2. When you move a field from **Rows** to **Columns** in a PivotTable, you are _____ the data.

   Fill in the blank space.

Microsoft

Lesson 3: Performing PivotTable calculations

Overview

At the end of this lesson, you'll be able to calculate data in PivotTables. You'll create a calculated field in a PivotTable and calculate how values display in a PivotTable.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. You can summarize values in a PivotTable by:

   Select all that apply.

   a. Sum

   b. Average

   c. Dividend

   d. Count

2. Calculated fields use a _____ to create a new field in a PivotTable.

   Fill in the blank space.

Topic 1: Add calculated fields

You can use the **Calculated Field** option to create new fields for your PivotTable that did not exist in your original data. For example, you could add a new field that depicts the amount of tax on sales.

Add a calculated field

To add a calculated field:

1. Select the PivotTable.

2. Select the **Analyze** tab, and then, select the **Fields, Items, & Sets** drop-down list in the **Calculations** group. The following screenshot depicts the **Fields, Items, & Sets** drop-down list.
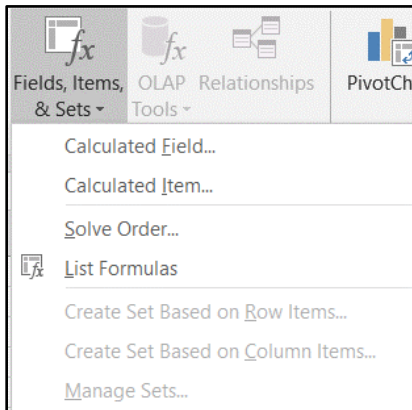

*Figure 13: **Fields, Items, & Sets** drop-down list*

3. Select **Calculated Field**.

4. In the **Insert Calculated Field** dialog box, enter a **Name** for the field and a **Formula**. The following screenshot depicts the **Insert Calculated Field** dialog box.
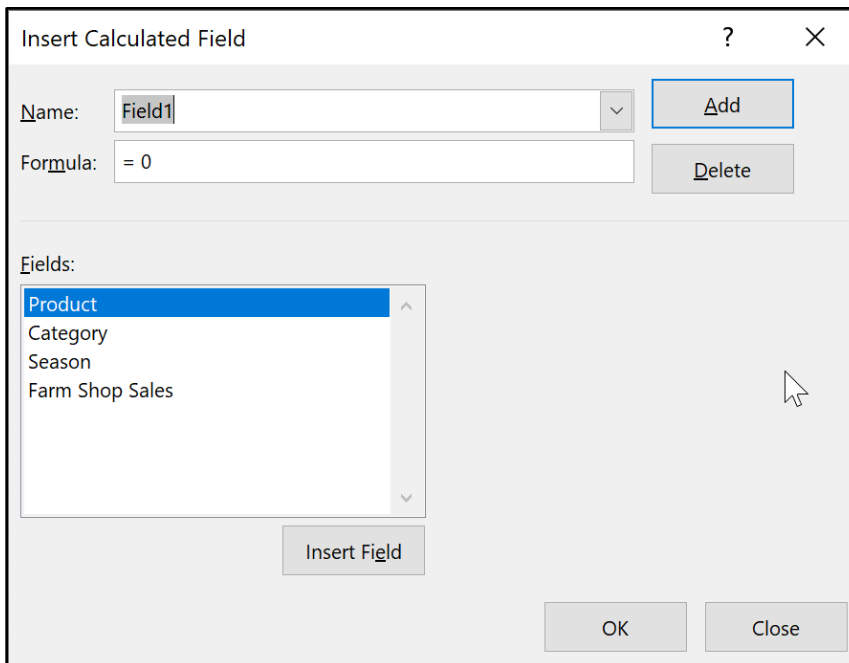

*Figure 14: **Insert Calculated Field** dialog box*

Microsoft

5. Select **OK**.

Additional information

To review the tutorial on calculated fields in PivotTables, go to:
[Calculate values in a PivotTable](#)

Activity: Show and tell

In this activity, your teacher will demonstrate how to create a calculated field of 15 percent commission on sales.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to add a calculated field.

2. Ask the teacher clarifying questions. An example is: How can I pick the field to use for my formula?

Try-it: Add calculated fields

In this standalone try-it activity, you'll create a calculated field for 10 percent sales tax on the **Farm Shop Sales** field.

Resources

You'll need the following resources for this try-it:

- Open **L3_T1_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following is the general task that you need to perform during this try-it:

- Add a calculated field with the name **Sales Tax** by using the formula **='Farm Shop Sales' * -.10**.

Topic 2: Depict values in different ways

Value field settings in Excel are useful in improving the versatility of your data presentation. You can choose from a variety of options to determine the type of calculation that you want to use to summarize data for a field. You can choose from calculations such as sums, averages, or counts. You can display values as a part of the total, as a running total, as a rank, and more.

Change PivotTable value field settings

1. Select the header cell of the **Value** field in the PivotTable; for example, **Sum of Farm Shop Sales**.

2. Select the **Analyze** tab, and then select **Field Settings** in the **Active Field** group, which the following screenshot depicts.
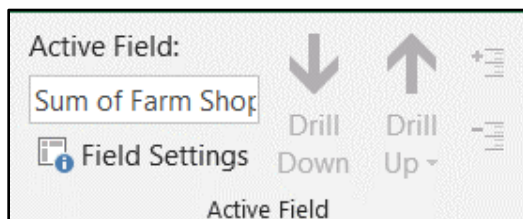

*Figure 15: **Active Field** group on the **Analyze** tab*

3. Select the desired settings in the **Value Field Settings** dialog box, which the following screenshot depicts.
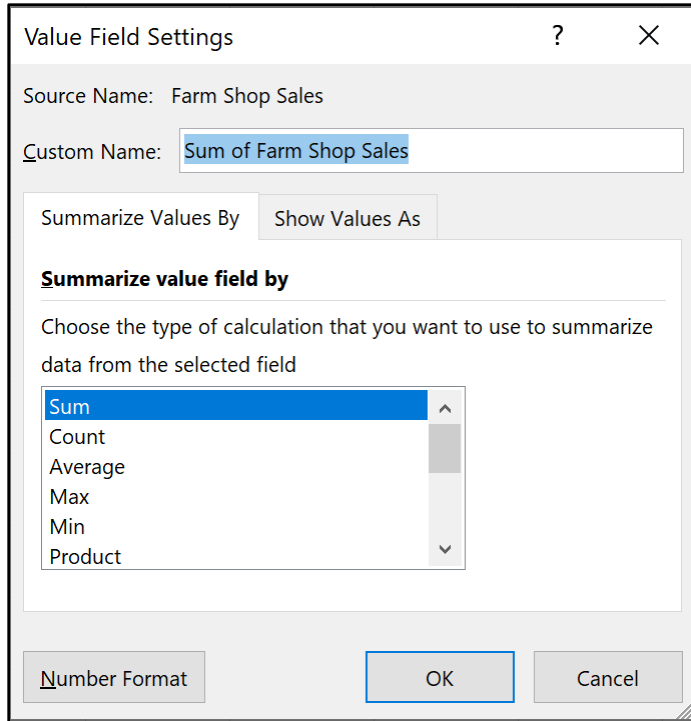
Figure 16: **Value Field Settings** *dialog box*

4. Select **OK**.

Additional information

To review the tutorial on displaying calculations in PivotTables, go to:
[Show different calculations in PivotTable value fields](#)

Activity: Think-pair-share

In this activity, your teacher will demonstrate how to change values of field settings and then pair you with a fellow student. Review the tutorial and consider how you can use the different **Show Values As** options to find out different things.

Resources required

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to change the values of field settings.

2. Ask the teacher clarifying questions. An example is: How can I display a value as part of the total?

3. Review the online tutorial and think about how you might choose from the various options to determine different information; for example, sum of sales vs. count of sales.

4. Discuss your idea(s) with your partner.

Try-it: Depict values in different ways

In this standalone try-it activity, you'll change the **Sum of Farm Shop Sales** field to display the value as a running total. You'll change the **Count of Farm Shop Sales** field to display the value as a percentage of the grand total.

Resources

You'll need the following resources for this try-it:

- Open **L3_T2_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Change the **Sum of Farm Shop Sales** field to display the value as a running total.

2. Change the **Count of Farm Shop Sales** field to display the value as a percentage of the grand total.

Wrap-up

Use these questions to check what you learned in this lesson:

1. You can display values in a PivotTable as:

   Select all that apply.

   a. % of Grand Total

   b. Dividend of a specified field

   c. Running Total in a specified field

   d. Rank smallest to largest

2. Calculated fields use formulas to calculate new _____ in a PivotTable.

   Fill in the blank space.

Lesson 4: Filtering and grouping PivotTables

Overview

At the end of this lesson, you'll be able to filter and group data in a PivotTable. You'll filter data with slicers, group and ungroup data in a PivotTable, and filter dates with a timeline.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. What is the purpose of filters in a PivotTable?

    Select the correct option.

    a. Group data

    b. Drill down into data

    c. Expand data

    d. Categorize data

2. What type of fields can be grouped?

    Select all that apply.

    a. Date

    b. Text

    c. Numeric

    d. Labels

Topic 1: Create slicers

Excel provides slicers, which you can use to filter the data in a PivotTable. When you insert a slicer into your PivotTable, a box displays that you can use to filter your PivotTable data. Slicers also indicate the filtering state in a PivotTable, so that you can understand what exactly is currently on display.

Microsoft

Creating slicers to filter data

To create a slicer to filter data:

1. Select the PivotTable.

2. Select the **Analyze** tab.

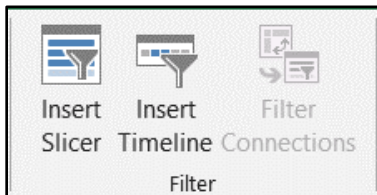3. Select **Insert Slicer** in the **Filter** group, which the following screenshot depicts.

*Figure 17: **Filter** group on the **Analyze** tab*

4. In the **Insert Slicers** dialog box, select the field(s) for the slicer.
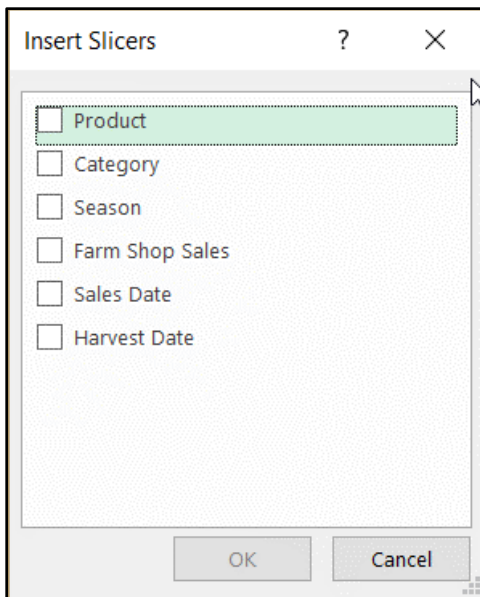

*Figure 18: **Insert Slicers** dialog box*

5. Select **OK**.

6. Make selections in the slicer filter that displays, and then filter your data. The following screenshot depicts the slicer filter.
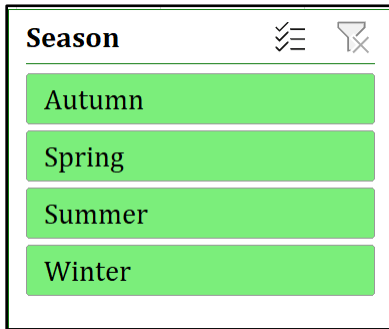
Figure 19: Slicer filter

Video

To review the video on filtering data in a PivotTable, go to: Filter data in a PivotTable

Activity: Show and tell

In this activity, your teacher will demonstrate adding and using a slicer for the season field.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to add and use a slicer in a PivotTable.

2. Ask the teacher clarifying questions. An example is: How can I pick the field(s) to use for my slicer(s)?

Try-it: Create slicers

In this standalone try-it activity, you'll add slicers for the **Category** and **Product** fields. You'll experiment with filtering the PivotTable by using your slicers.

Resources

You'll need the following resources for this try-it:

- Open **L4_T1_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Insert slicers for the **Product** and **Category** fields.

2. Move the slicers on the worksheet so that both are visible.

3. Filter the PivotTable by **Dairy**.

4. Filter the PivotTable by using two or more categories of your choice.

5. Clear the filters.

Topic 2: Group fields

You can group date fields and numeric fields to analyze the data in more manageable subsets. For example, instead of reviewing the data for every day, you can group it into months, quarters, or years. Fields must be in the row or column areas in the order in which you want to group them.

Group date or numeric fields

To group data or numeric fields:

1. Select a cell in the **Date** or **Numeric** field that you want to group.

2. Select the **Analyze** tab.
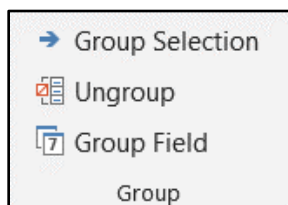
3. Select **Group Field** in the **Group** group.

*Figure 20: **Group** group on the **Analyze** tab*

Note: To group a portion of the field, select the cells that you want to group, and then select **Group Selection**.

4. Select how you want to group the field in the **Grouping** dialog box. The following screenshot depicts the **Grouping** dialog box for numeric fields.
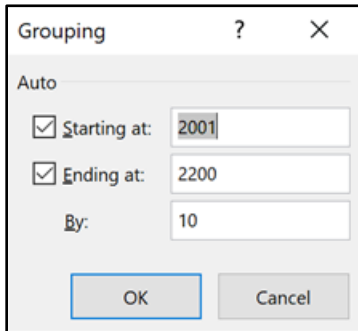

Figure 21: ***Grouping*** *dialog box for numeric fields*

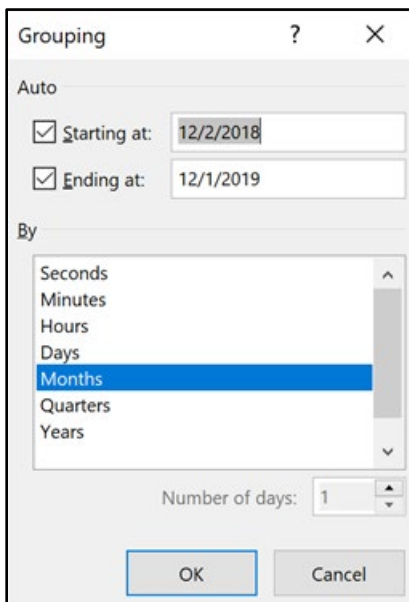The following screenshot depicts the **Grouping** dialog box for date fields.

Figure 22: ***Grouping*** *dialog box for date fields*

5. Select **OK**.

Video

To review the video on grouping or ungrouping data in a PivotTable, go to: Group or ungroup data in a PivotTable

Activity: Discuss and learn

In this activity, you'll review the video in the link above. Your teacher will demonstrate how to group and ungroup data in a PivotTable, and then discuss how you can analyze data better by grouping it.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Review the video.

2. Follow along as the teacher demonstrates how to group and ungroup data.

3. Ask the teacher clarifying questions. An example is: What types of fields can be grouped?

4. Think about how you might use grouping to analyze data and participate in the discussion.

Try-it: Group fields

In this standalone try-it activity, you'll group sales date by month and year, ungroup the sales date, and regroup the sales date by quarters. You'll group farm shop sales by hundreds.

Resources

You'll need the following resources for this try-it:

- Open **L4_T2_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Group sales date by month and year.

2. Ungroup sales date.

3. Group sales date by quarter.

4. Group farm shop sales by hundreds.

Topic 3: Create timelines

You can use timelines to easily filter dates in your data. Before you can add a timeline filter, make sure that your source data has dates in order. The **Date** field does not have to be displayed in your PivotTable. The process of adding timelines is not very complicated and is similar to adding slicers.

Add a timeline filter

To add a timeline filter to your PivotTable:

1. Select the PivotTable.

2. Select the **Analyze** tab.

3. Select **Insert Timeline** in the **Filter** group, which the following screenshot depicts.
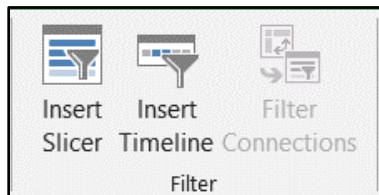
*Figure 23: **Filter** group on the **Analyze** tab*

4. Select the desired date field in the **Insert Timelines** dialog box, which the following screenshot depicts.
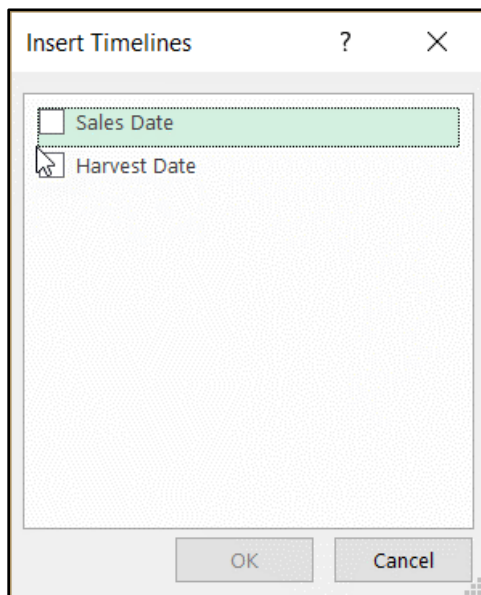

*Figure 24: **Insert Timelines** dialog box*

5. Select **OK**.

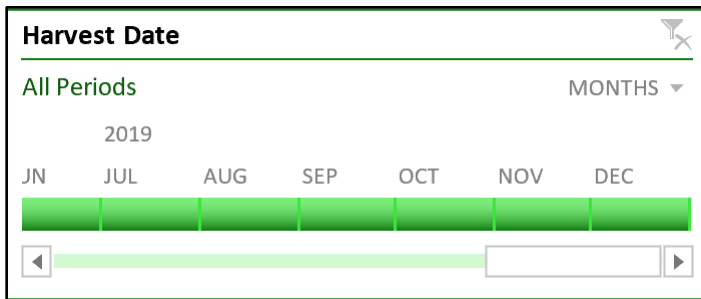6. To filter the data by date, select the desired date(s) in the timeline filter, as the following screenshot depicts.

Figure 25: Timeline filter

Additional information

To review the tutorial on creating timelines, go to: [Create a PivotTable timeline to filter dates](#)

Video

To review the video on using slicers, timelines, and PivotCharts, go to: [Use slicers, timelines and PivotCharts](#)

Activity: Each one, teach one

In this activity, your teacher will pair you with a partner and ask you to review the tutorial in the previous **Video** section. You'll then teach each other how to add timelines.

Resources required

You'll need the following resources for this activity:

- Open **L4_T3_act_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Review the tutorial with your partner.

2. The first student teaches their partner how to insert a timeline filter for **Harvest Date**.

3. The second student teaches their partner how to use the timeline filter.

Try-it: Create timelines

In this standalone try-it activity, you'll add and use a timeline filter for **Sales Date**.

Resources

You'll need the following resources for this try-it:

- Open **L4_T3_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Insert a timeline filter for **Sales Date**.

2. Filter the data to display only the data for **June**, **July**, and **August**.
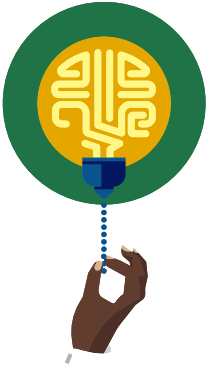
3. Clear the timeline filter.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Which areas of a PivotTable must grouped fields be in?

   Select all that apply.

   a. Filter

   b. Rows

   c. Columns

   d. Values

2. You can insert slicers and timelines from the _____ group on the **Analyze** tab.

   Fill in the blank space.

Did you know?

You can also add slicer and timeline filters to regular tables in an Excel worksheet.

Lesson 5: Using PivotCharts: the basics

Overview

PivotTables might not be the best choice for all your audiences, especially if some of them cannot understand data in a table and a visual depiction. In such situations, PivotCharts provide a great way to summarize and present your data in an appealing manner. At the end of this lesson, you'll be able to create and modify PivotCharts. You'll also be able to change the options that affect PivotCharts.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. What is the **Field List** for a PivotChart called?

   Select the correct option.

   a. **PivotTable Fields** pane

   b. **PivotChart Fields** pane

   c. **Chart Fields** pane

   d. **Chart** pane

2. What are some of the area fields of a PivotChart?

   Select all that apply.

   a. **Filter**

   b. **Legend (Series)**

   c. **Columns**

   d. **Rows**

Topic 1: Create PivotCharts

PivotTables are great for organizing and summarizing data, but sometimes it's still difficult for some people to evaluate the data in a table. PivotCharts provide visual representation of the data in a PivotTable and can make it easier for some of your audience members to analyze the data.

Creating a PivotChart

To create a PivotChart:

1. Select the PivotTable.

2. Select the **Analyze** tab.

3. Select **PivotChart** in the **Tools** group, which the following screenshot depicts.
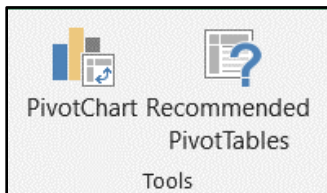
*Figure 26: **Tools** group on the **Analyze** tab*

4. Select the desired chart in the **Insert Chart** dialog box, which the following screenshot depicts.
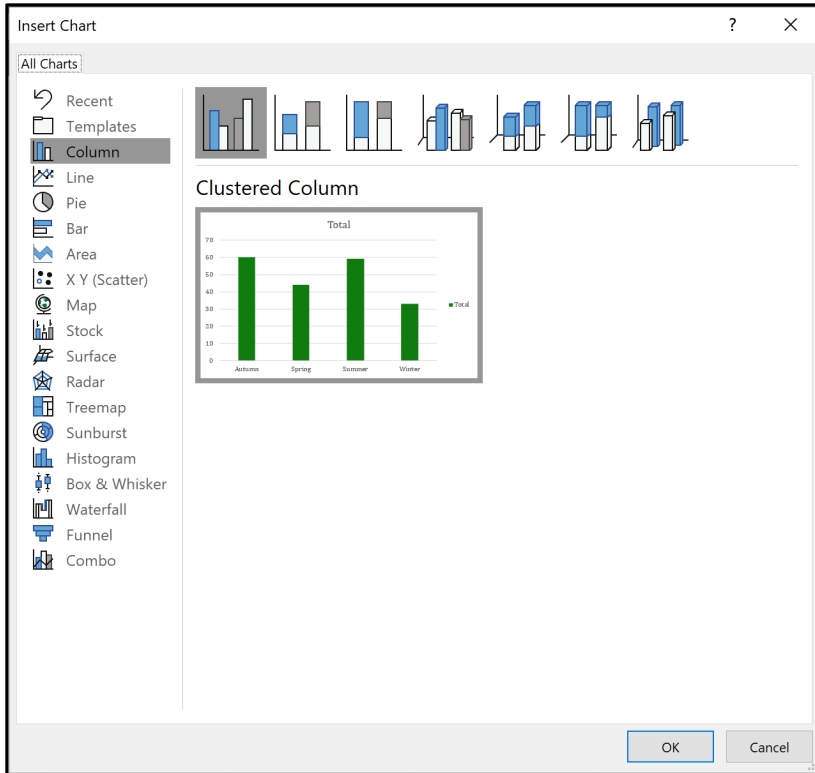
*Figure 27: **Insert Chart** dialog box*

5. Select **OK**.

Video

To review the video on creating PivotCharts, go to: Create a PivotChart

Activity: Show me how

In this activity, your teacher will demonstrate how to insert a PivotChart.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to add a PivotChart.

2. Ask the teacher clarifying questions. An example is: How can I choose a chart for my PivotTable?

Try-it: Create PivotCharts

In this standalone try-it activity, you'll create a PivotChart of sales by category and date.

Resources

You'll need the following resources for this try-it:

- Open **L5_T1_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following is the general task that you need to perform during this try-it:

- Insert a PivotChart of sales by category and date.

Topic 2: Manipulate options in existing PivotCharts

You can easily change PivotChart options by using the **PivotChart Fields** pane. This pane has four boxes in which you can place PivotChart fields—**Filter**, **Axis**, **Legend**, and **Value**. How you place fields in these boxes can have a dramatic impact on your PivotChart. You can also make changes to PivotCharts by using the same options that you use in regular charts. For example, you can change the chart type or add data labels, among other tasks.

Microsoft

Change fields in existing PivotCharts

To change the fields in an existing PivotChart:

1. Select the PivotChart.

2. If the **PivotChart Fields** pane does not automatically display on the right, select the **Analyze** tab, and then select **Field List** in the **Show/Hide** group. The following screenshot depicts the **Show/Hide** group.
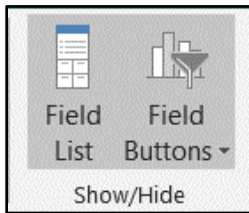

*Figure 28: **Show/Hide** group on the **Analyze** tab*

3. In the **PivotChart Fields** pane, which the following screenshot displays, place fields in the desired areas.
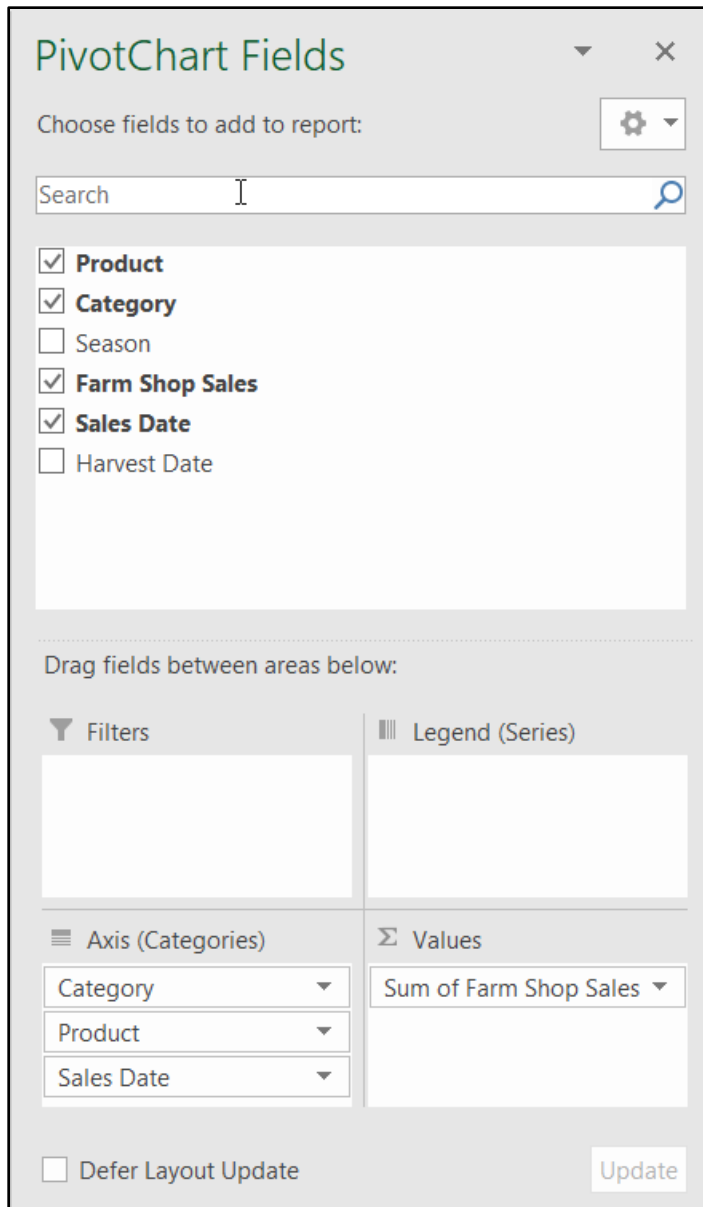
Figure 29: **PivotChart Fields** *pane*

Change elements in an existing PivotChart

To change the elements in an existing PivotChart:

1. Select the PivotChart.

2. Select the **Design** tab.

3. Select **Add Chart Element** in the **Chart Layouts** group, which the following screenshot depicts.
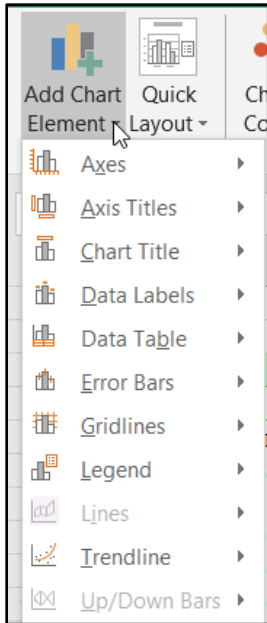
*Figure 30: **Add Chart Element** drop-down list in the **Chart Layouts** group*

4. Add or change chart elements as you require.

Change the chart type of an existing PivotChart

To change the chart type of an existing PivotChart:

1. Select the PivotChart.

2. Select the **Design** tab.

3. Select **Change Chart Type** in the **Type** group, which the following screenshot displays.
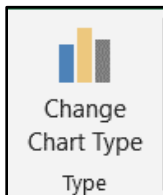

*Figure 31: **Change Chart Type** in the **Type** group*

4. Select the desired chart type in the **Change Chart Type** dialog box, which the
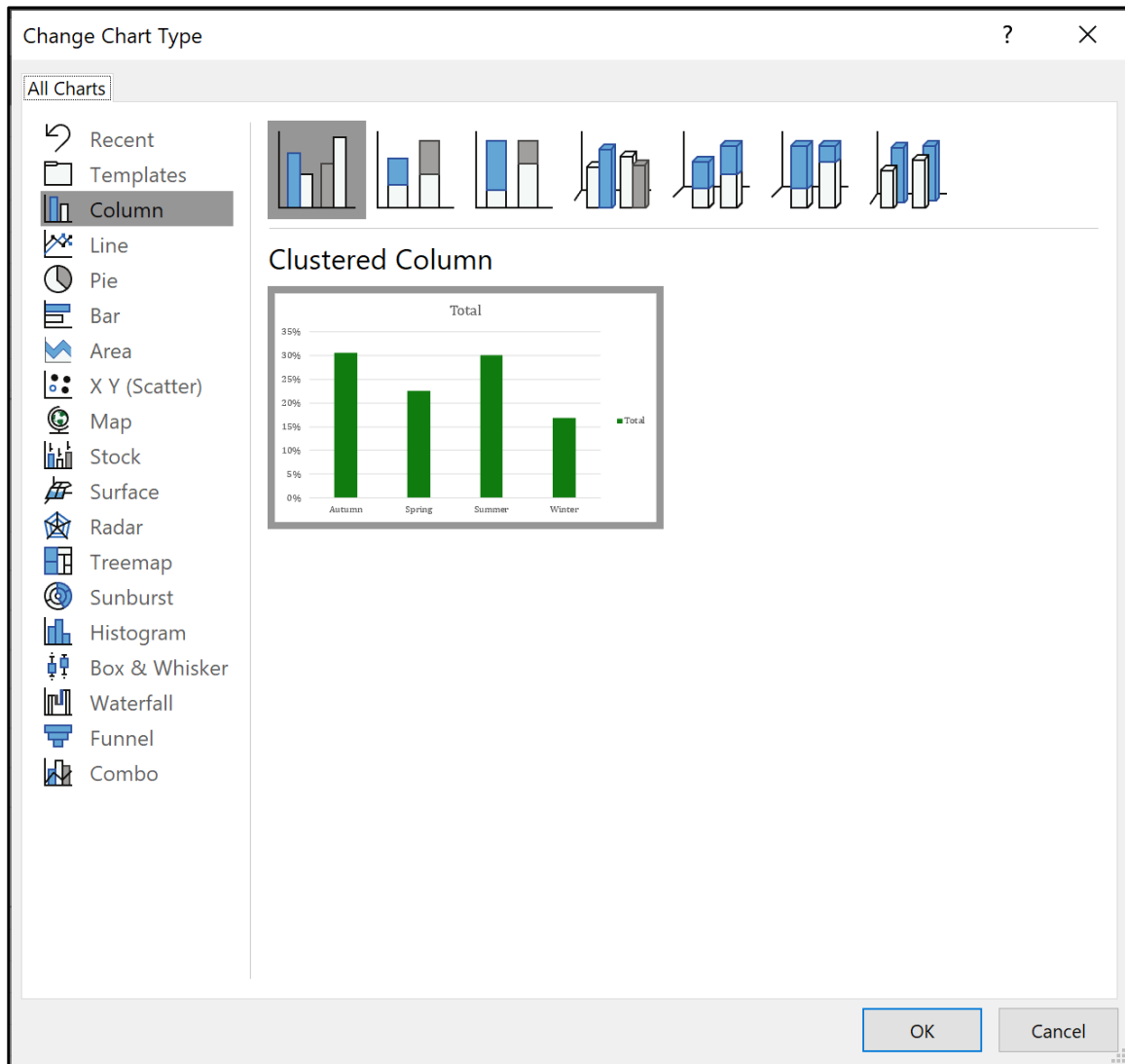   following screenshot displays.

*Figure 32: **Change Chart Type** dialog box*

Activity: Four corners

In this activity, your teacher will demonstrate how to manipulate the options in existing
PivotCharts. Your teacher will then divide the class into four groups. Each group will go
to a corner of the classroom. The teacher will assign a field box in the **PivotChart Fields**
pane to the students in each corner, so that the four corners will be **Filter**, **Legend**, **Axis**,
and **Value**. Each group will work together to create a scenario for using that option.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to manipulate options in a PivotChart.

2. Ask the teacher clarifying questions. An example is: How can I change the fields in my PivotChart?

3. Participate with your team in the four-corners activity to create a scenario for your team's designated field area.

Try-it: Manipulate options in existing PivotCharts

In this standalone activity, you'll pivot the fields in a PivotChart and review the impact of your selections on the PivotChart. You'll change the chart elements and chart type to accommodate the field changes you made.

Resources

You'll need the following resources for this try-it:

- Open **L5_T2_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Move **Category** to **Axis (Categories)** field.

2. Remove the legend and chart title.

3. Change the chart to a bar chart.

4. Change the chart height to **5.5"**.

Wrap-up

Use these questions to check what you learned in this lesson:

1. What tabs are available in the **PivotChart Tools** tab?

   Select all that apply.

   a. **Analyze**

   b. **Insert**

   c. **Design**

   d. **Format**

2. When you move a PivotChart field from **Legend** to **Axis**, you are _____ the chart.

   Fill in the blank space.

Lesson 6: Using PivotCharts: beyond the basics

Overview

This lesson explains how to perform more advanced tasks in a PivotChart. You'll learn how to format, expand, collapse, and display details in a PivotChart. You'll also be able to format a PivotChart and change chart styles.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. You can find **Chart Styles** on the _____ tab of **PivotChart Tools**.

    Select the correct option.

    a. **Insert**

    b. **Design**

    c. **Format**

    d. **Analyze**

2. If you want to expand a PivotChart, you require two or more fields in the _____ field box.

    Select the correct option.

    a. **Filter**

    b. **Legend (Series)**

    c. **Axis (Categories)**

    d. **Values**

Topic 1: Apply styles to PivotCharts

You can modify the style of your PivotCharts to make them more attractive to your audience. You can also change the style to modify the formatting of multiple PivotChart elements in one step.

Apply chart styles

To change the style for a PivotChart:

1. Select the PivotChart.

2. Select the **Design** tab.

3. Select a style from the **Chart Styles** gallery in the **Chart Styles** group. Alternatively, select **Chart Styles** (the paintbrush icon) next to the PivotChart on your worksheet, and select a style there. The following screenshot depicts the **Chart Styles** group.

*Figure 33: **Chart Styles** gallery*

4. To change chart colors, select **Change Colors** in the **Chart Styles** group.

Activity: Show me how

In this activity, your teacher will demonstrate how to apply chart styles to a PivotChart.

Resources required

You'll need the following resources for this activity:

*   None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates how to add a chart style to a PivotChart.

2. Ask the teacher clarifying questions. An example is: How can I change PivotChart colors?

Try-it: Apply styles to PivotCharts

In this standalone activity, you'll apply different styles to PivotChart and review the effect on your PivotChart.

Microsoft

Resources

You'll need the following resources for this try-it:

- Open **L6_T1_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Apply **Style 12** to the PivotChart.

2. Optionally, change the chart colors.

Topic 2: Drill down into PivotChart details

When a PivotChart has two or more fields in the **Axis (Categories)** box, you can expand or collapse the information to display more or fewer details. You can use the field buttons to filter the PivotChart data. You can also place a field in the **Filter** box to create an additional filter in the chart. Using these features can help you display the data more clearly in your PivotChart.

Expand or collapse PivotChart details

To expand or collapse PivotChart details:

1. Select the **Expand Entire Field** (plus (**+**) sign) in the PivotChart to expand the PivotChart details.

2. Select the **Collapse Entire Field** (minus (**-**) sign) in the PivotChart to collapse the PivotChart details.

Alternatively, you can select the field in the PivotTable and use the **Expand** and **Collapse** buttons in the **Active Field** group of the **Analyze** tab. The following screenshot depicts the **Active Field** group of the **Analyze** tab.
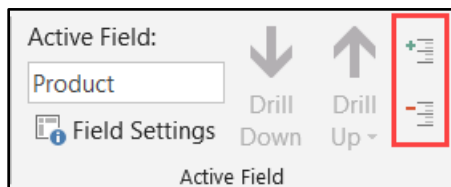

*Figure 34: **Expand/Collapse** buttons*

Microsoft

Display or hide field buttons

To display or hide field buttons:

1. Select the PivotChart.

2. Select the **Analyze** tab.

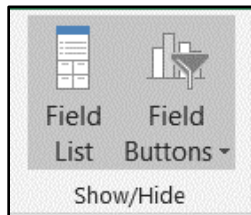3. Select **Field Buttons** in the **Show/Hide** group.

*Figure 35: **Show/Hide** group on the **Analyze** tab*

4. Choose the desired field buttons to display or hide.

Filter PivotChart data

To filter PivotChart data, select a field drop-down box in the PivotChart on your worksheet. Select the check boxes for the fields that you want to filter, and then select **OK**. The following screenshot depicts a field drop-down box.
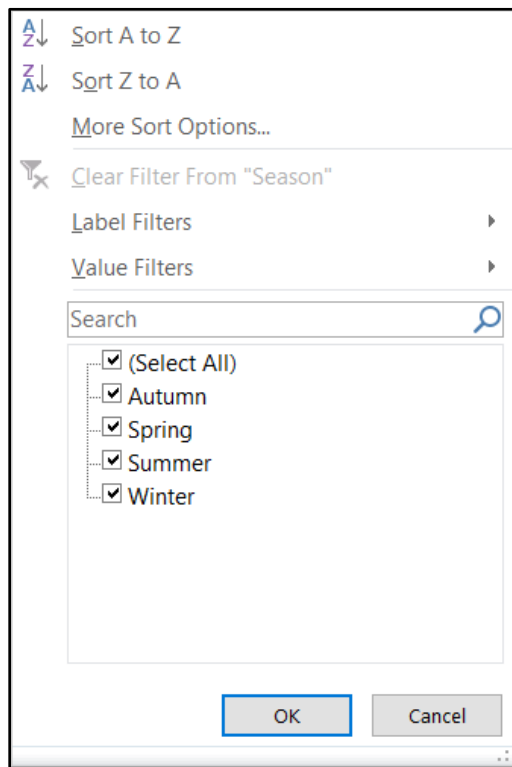
Figure 36: Filter list

Additional information

To review the tutorial on expanding, collapsing, or displaying details in a PivotTable or PivotChart, go to: Expand, collapse, or show details in a PivotTable or PivotChart

Activity: Show me how

In this activity, your teacher will demonstrate how to expand and collapse PivotChart details. The teacher will also demonstrate how to use field drop-down boxes to filter the data in a PivotChart.

Resources required

You'll need the following resources for this activity:

- None

Activity instructions

Participate in the activity by following these instructions:

1. Follow along as the teacher demonstrates expand, collapse, and filter a PivotChart.

2. Ask the teacher clarifying questions. An example is: How can I hide field buttons?

Try-it: Drill down into PivotChart details

In this standalone try-it activity, you'll expand and collapse a PivotChart. You'll filter the PivotChart by using field drop-down boxes.

Resources

You'll need the following resources for this try-it:

- Open **L6_T2_try_farm_shop_sales_starter.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Expand the PivotChart to display **Quarters**.

2. Expand the PivotChart to display **Months**.

3. Filter the PivotChart to display only **2019** data.

4. Collapse the PivotChart from **Months** to **Quarters**.

Wrap-up

Use these questions to check what you learned in this lesson:

1. You can apply chart styles from the **Design** tab and the _____ next to the PivotChart.

   Select the correct option.

   a. **Chart Elements** (the plus sign (**+**))

   b. **Chart Styles** (the paintbrush icon)

   c. **Format** pane

   d. **Table**

2. You can use _____ inside a PivotChart to filter data.

   Select the correct option.

   a. A slicer

   b. A timetable

   c. Field drop-down boxes

   d. A filter

Glossary

Calculated field	A data field created with a formula.
Pivot	To move a data field from a row to a column or vice versa.
PivotChart	A chart that uses a PivotTable as its source of data.
PivotTable	A table that you can use to summarize, analyze, explore, and present data.
Slicer	A stylized filter for a PivotTable.
Timeline	A stylized date filter for a PivotTable.

Table #: Glossary terms and definitions

Cornerstone

Overview

In this Cornerstone, you'll use Munson's sales data to make, modify, and format a PivotTable. You'll also create calculated fields, filter data with slicers, and group data. You'll then create and format a PivotChart and drill down into PivotChart details.

Objectives

The following table outlines the Cornerstone objectives and their corresponding Microsoft Office Specialist (MOS) objectives.

Understand and create PivotTables	• 4.2.1: Create PivotTables
Change and format PivotTables and the data in them	• 4.2.2: Modify field selections and options • 4.2.6: Format data
Create a calculated field in a PivotTable	• 4.2.5: Add calculated fields
Filter data with slicers and group and ungroup data in a PivotTable	• 4.2.3: Create slicers • 4.2.4: Group PivotTable data
Create PivotCharts and change options that effect PivotCharts	• 4.3.1: Create PivotCharts • 4.3.2: Manipulate options in existing PivotCharts

Microsoft

| Format PivotCharts and expand, collapse, or display details in a PivotChart | • 4.3.3: Apply styles to PivotCharts
• 4.3.4: Drill down into PivotChart details |

Table 2: Cornerstone objectives

Duration

60 minutes

Instructions

1. Complete the tasks below for each file.

2. When saving your file, add your name to the end of the filename, for example: **You-Pick_Day_Dwayne_Espino**. Follow your teacher's directions for where to save your files.

3. When you're done with the Cornerstone, assess your completion and enter the points you think you earned within the task lists below. You can ask your teacher for help if required.

Tasks

You'll work with one file in this Cornerstone. The following are the tasks that you need to do within the file.

File 1: Cornerstone_product_sales_2019_starter.xlsx

Task: Create a PivotTable (20 points)

• Create a PivotTable displaying **Sum of Wholesale**, **Sum of Markets**, and **Sum of Farm Shop by Category**. (20 points) (Exam objective 4.2.1)

Points scored: _____ /20

Task: Modify and format the PivotTable (20 points)

1. Add the **Date** field to **Rows** in the PivotTable. (5 points) (Exam objective 4.2.2)

2. Move the **Date** and **Months** fields before the **Category** field in the **Rows** box of the PivotTable. (5 points) (Exam objective 4.2.2)

3. Change the PivotTable style to **Light Blue**, **Pivot Style Medium 10**. (5 points) (Exam objective 4.2.2)

4. Format values in the PivotTable to display as currency with no decimal points. (5 points) (Exam objective 4.2.6)

Points scored: _____ / 20

Task: Perform PivotTable calculations (20 points)

*   Add the **Commission** field **-15%** of **Markets** to the PivotTable. (20 points) (Exam objective 4.2.5)

Points scored: _____ / 20

Task: Group and filter data (20 points)

1. Ungroup the **Date** field in the PivotTable. (5 points) (Exam objective 4.2.4)

2. Group the **Date** field in the PivotTable as **Qtrs**. (5 points) (Exam objective 4.2.4)

3. Add a **Product** slicer filter to the PivotTable. (10 points) (Exam objective 4.2.3)

Points scored: _____ / 20

Task: Create and modify a PivotChart (20 points)

1. Create a stacked column chart using the PivotTable (5 points) (Exam objective 4.3.1)

2. Remove the **Commission** field from the PivotChart. (5 points) (Exam objective 4.3.2)

3. Apply **Style 9** to the PivotChart. (5 points) (Exam objective 4.3.3)

4. Collapse the PivotChart to **Qtrs**. (5 points) (Exam objective 4.3.4)

Points scored: _____ / 20

FILE 1 TOTAL POINTS: _____/100

Student Guide

40571A
Microsoft Excel expert 2019

Module 7: Collaborating with other people

Contents

Microsoft

Microsoft

Module overview

Description

After you've created your workbook, you can maintain and share it by using the options that Microsoft Excel 2019 provides. There might be times when you need to review a previous version of your work, for example. Or you might need to protect your workbook from changes that others make or collaborate with individuals on your work. At the end of this module, you'll be able to revert to older workbook versions, set AutoRecover feature options, protect a workbook's structure and content, and manage comments.

The following table outlines the lessons in this module and their corresponding learning objectives.

Lesson	Learning objective	Exam objective(s)
Managing workbooks	Manage a workbook's version so that you can revert to an older version if necessary and set AutoRecover feature options.	• 1.1.4
Helping protect workbooks and managing comments	Help protect a workbook's content and structure and restrict editing. Manage comments in a workbook.	• 1.2.1 • 1.2.2 • 1.2.3 • 1.2.5
Cornerstone: Sharing data for a social-media campaign	Set AutoRecover options, protect a workbook's structure and content, and manage comments.	• 1.1.4 • 1.2.1 • 1.2.2 • 1.2.3 • 1.2.5

Table 1: Objectives by lesson

Scenario

Munson's Pickles and Preserves Farm has asked you to provide data to the marketing department. This data must be real-time data, but the marketing department shouldn't be able to change the data that you provide. Your task is to set up the data file for sharing, with restricted access to editing the file.

Cornerstone

After all the work you completed in Module 3 for the Community Supported Agriculture (CSA) team, you need to share data with the marketing team for their use in creating a social-media campaign for the farm's new CSA program. The data will be constantly updated so that the marketing team has the latest information to share on social media. They'll need to have ongoing access to the Excel workbook. To protect the data, you need to restrict their ability to make changes and allow them only to copy data for their use and add comments.

Lesson 1: Managing workbooks

Overview

In this lesson, you'll learn how to manage a workbook's version history so that you can revert it to an older version if necessary. You'll also set AutoRecover options to prevent loss of work during unforeseen circumstances such as a power failure.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. You were working on a large Excel workbook that you haven't saved, and your device just stopped responding. How can you get your work back?

   Select the correct option.

   a. Use the **Print** command to print the workbook.

   b. Reopen Excel, and then use the AutoRecover task pane.

   c. Use the **Info** tab and inspect the workbook.

   d. You can't get your worksheet back. It is gone.

2. Which of the following is a true statement about version history?

   Select the correct option.

   a. You can only view the current version.

   b. Version history only stays in memory for 24 hours.

   c. You can only maintain version history by saving multiple copies of a file.

   d. You can restore an older version of a file.

3. Someone has altered the work in your workbook. If you use the _____ option, you can restore your original work.

   Fill in the blank space.

Topic 1: Manage workbook versions

When you're working with a file that multiple people are constantly updating, you might need to review previous versions of the workbook. For example, if someone updates the information within the workbook and makes an error, it might be necessary to return to an earlier version to correct the error.

You must ensure that **AutoSave** is turned on each time a file is opened if you want to save the document's version history.

Turn on version history

To utilize the version history, you'll need to save your files to the cloud by using Microsoft OneDrive, which is a file hosting service that you can use with Office apps.

1. Select the **File** tab to open the **Backstage** view.

2. Select **Save As**.
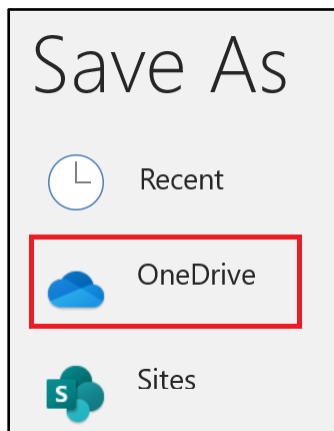
3. Double-select the **OneDrive** option.

*Figure 1: **OneDrive** option*

4. In the **Save As** dialog box, enter a name for the file in the **File name** area.
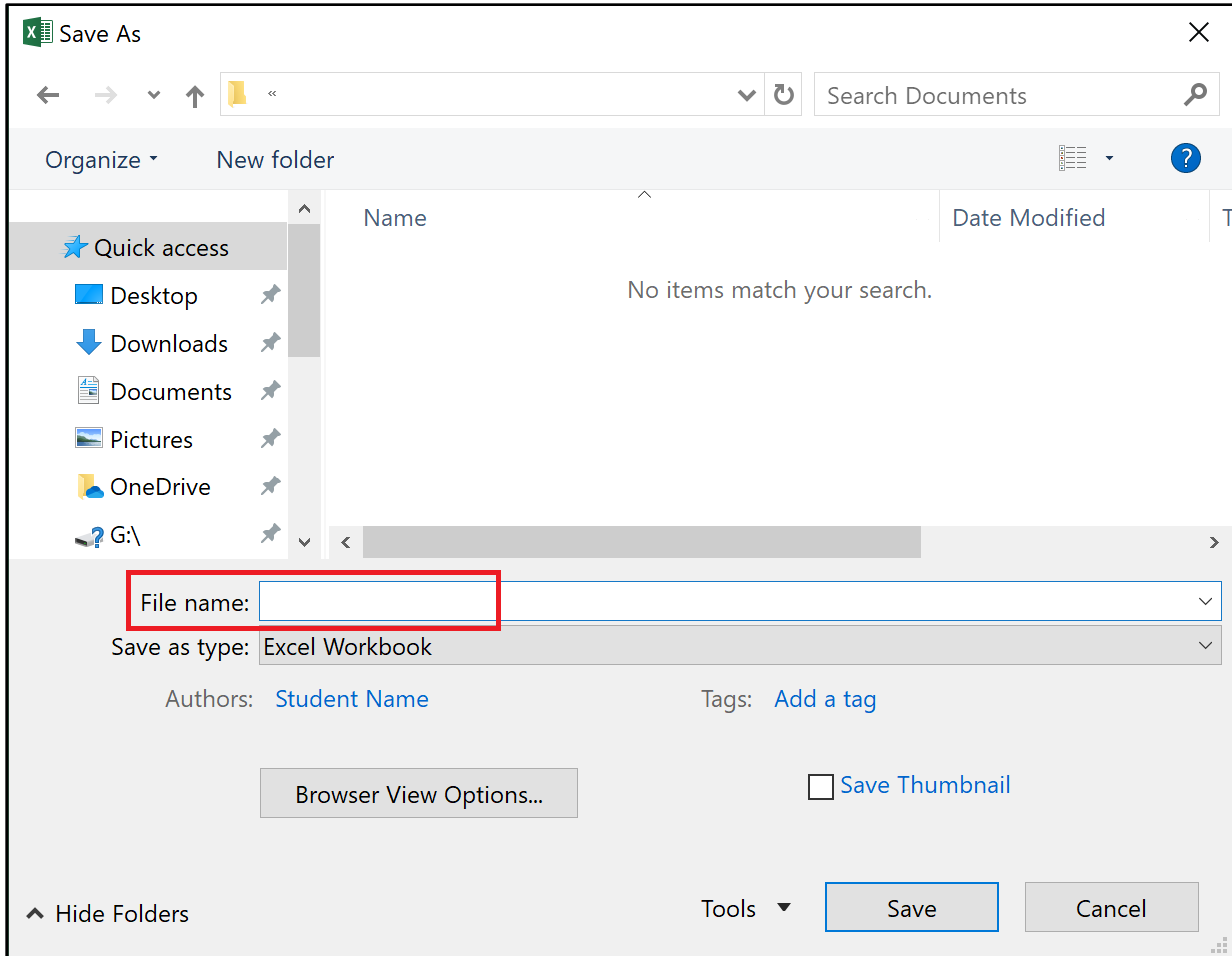
*Figure 2: **Save As** dialog box*

5. Select **Save**. You'll be returned to your worksheet.

6. Select the **File** tab, and then select **History**.

7. The **History** task pane will now show in the workbook view and will list the saved history of the file.
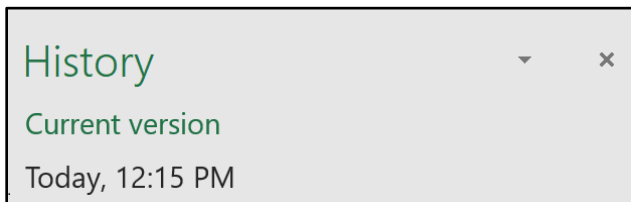

*Figure 3: **History** task pane*

Viewing previous versions

1. To view a previous version of a workbook file, select the **File** tab.

2. Select **History**.

3. The **History** task pane appears on the right side of the workbook screen, listing the saved versions.

4. Selecting one of the listed versions, and open that version in a separate window.

Additional information

To review information on restoring previous versions, go to: [View previous versions of Office files](#)

Activity: Show and tell

In this activity, you'll watch as your teacher demonstrates how to access the version history.

Resources required

Your teacher will use the following resources for this activity:

- **L1_T1_act_solar_data.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Follow along as your teacher demonstrates these instructions:

1. Select the **File** tab.

2. Set the file to save to **OneDrive**.

3. Select the **File** tab, and then select **History**.

4. The **Version History** task pane is displayed.

5. Select one of the listed versions to open in a separate window.

Topic 2: Use the AutoRecover feature

The AutoRecover feature saves a copy of your work at set intervals even if you don't save the work on your own. If your device stops responding or there is a loss of power, AutoRecover provides a version containing most of your work, depending on how often you set the AutoRecover option to save. When you reopen Excel after your system stops

responding or after a power loss, the AutoRecover task pane will appear and the most recently saved version will be reinstated.

Change AutoRecover settings

1. Select the **File** tab, and then select **Options**.

2. In the **Options** dialog box, select the **Save** tab.

3. In the **Save workbooks** section, locate the **Save** AutoRecover **information every** option.
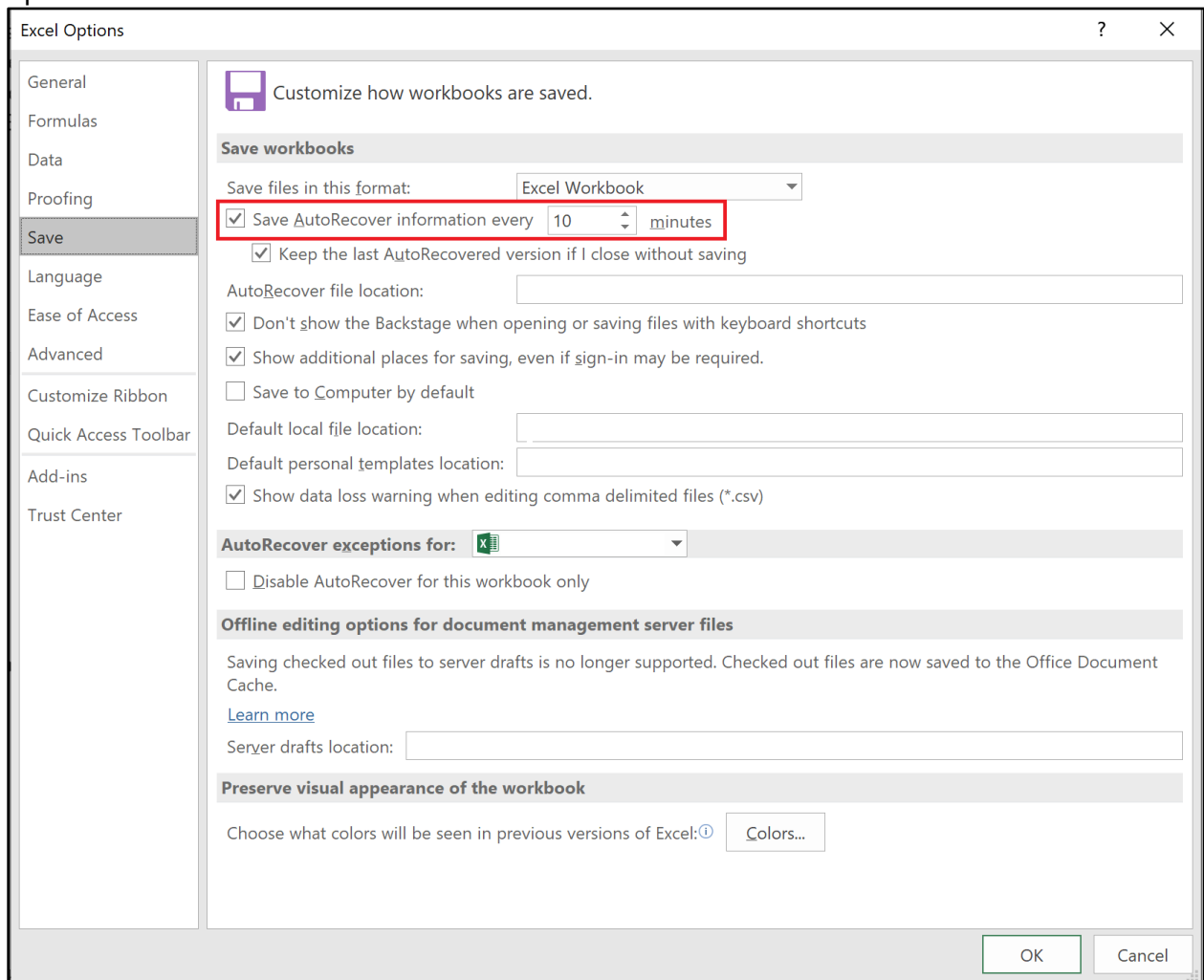

*Figure 4: The **Excel Options** dialog box*

4. Use the scroll box to enter a frequency in minutes that you wish to have your work recovered automatically.

Activity: Student show and tell

In this activity, a volunteer will attempt to demonstrate how to change the interval setting for AutoRecover. Follow along as your classmate demonstrates.

Resources required

You'll need the following resources for this activity:

- Open a blank workbook or any previously used Excel file found in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these questions as your teacher leads a classmate in the demonstration:

- Which tab do you think you would use to find the AutoRecover option? Explain your choice.
- Within your tab choice, which area do you think would be the best option to proceed? Explain your choice.
- What does the AutoRecover feature do? Does defining AutoRecover help to guide you in finding the option?
- What is the default interval that Excel sets for AutoRecover?
- What interval do you plan to set AutoRecover? Why did you choose that interval?
- What other options do you notice within the same area where you set options for AutoRecover? Do you find options for AutoRecover location or exceptions?

Try-it: Use the AutoRecover feature

This leveled try-it activity focuses on changing the AutoRecover option within a file.

Try-it 1

Resources

You'll need the following resources for this try-it:

- Open **L1_T2_try1_solar_data_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Set the AutoRecover option to a 15-minute interval.

2. Save your work.

Try-it 2

Resources

You'll need the following resources for this try-it:

- Open **L1_T2_try2_solar_data_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Set the AutoRecover option to a 5-minute interval.

2. Disable AutoRecover for this workbook only.

3. Save your work.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Which of the following can you change within AutoRecover?

    Select all that apply.

    a. Location where the autorecovered workbook is saved

    b. The type of file format that the workbook is saved in

    c. The time interval defining how often the workbook is saved

    d. Disabling AutoRecover for a workbook

2. List the following steps in the appropriate order for creating an AutoRecover setting.

    Indicate the correct sequence by adding numbers 1-4 next to the following items.

    a. Select **Options**. _____

    b. Set the time interval. _____

    c. Select **Save**. _____

    d. Select the **File** tab. _____

3. Correctly categorize the processes listed below into one of the following two categories:

    o   Version history
    o   AutoRecover

    Categorize the following items by adding the appropriate group name next to each item.

    a. Happens at a user-set time _____

    b. Is created each time a workbook is saved _____

    c. Prompts the recovery of unsaved work when a device stops responding or there is a power outage _____

    d. Can be used to compare versions _____

Microsoft

Lesson 2: Helping protect workbooks and managing comments

Overview

In this lesson, you'll learn how to share workbooks and restrict editing by applying password protection. You'll also learn how to protect workbook structures and cell ranges.

Warm-up

Use these questions to find out what you already know about this lesson's topics:

1. Which of the following can you prevent by protecting a worksheet's structure?

   Select the correct option.

   a. Editing data within the worksheet

   b. Adding rows and columns to the worksheet

   c. Adding, deleting, or moving worksheets

   d. Opening the worksheet requires a password

2. Which of the following can you complete with a comment?

   Select the correct option.

   a. Post a response to a comment.

   b. Resolve a comment.

   c. Users can make their own comments.

   d. All of the above.

3. Which of the following methods can you use to create a comment?

   Select all that apply.

   a. The context menu

   b. The **Insert** tab

   c. The **Review** tab

   d. The **Data** tab

4. Which of the following statements are true when protecting a worksheet?

   Select all that apply.

   a. You can specify the areas of the worksheet that users can access.

   b. Once a worksheet is protected, you cannot unprotect it.

   c. You can create a password to access the worksheet.

   d. You can only protect a worksheet with a password.

5. To share a worksheet with another user, you'll need to know the other person's _____.

   Fill in the blank space.

Topic 1: Restrict editing

Often, when you create a workbook, you might want to permit other users to edit some areas, while protecting other areas from changes. In this topic, you'll learn how to restrict access to and editing in your workbook.

Share a workbook

To share a workbook, perform the following steps:

1. Select the **Share** option on the top-right corner of the Excel window. You could also select **File** and then select **Share**.

2. Enter the email addresses of the people with whom you wish to share the workbook.

3. Add a message if necessary.

4. Select **Send**.

5. Owners of the email addresses will receive a copy of your file and will be able to open and edit it.

Microsoft

Apply a password to protect a workbook

Another method to share a workbook is to share a file by using a shared drive or other method such as a flash drive. When you share a workbook by using this method, you can assign a password so that only those with the password can open the workbook.

1. Select the **File** tab, select **Info**, and then select **Protect Workbook**.

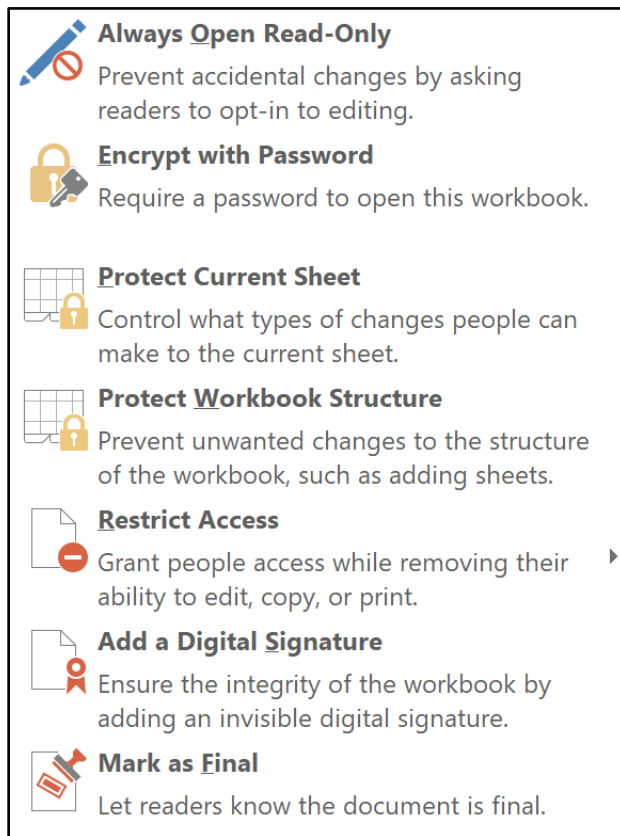2. The **Protect Workbook** menu appears, as depicted in the following screenshot.

*Figure 5: **Protect Workbook** menu options*

3. Select one of the following sharing options within the **Protect Workbook** menu:

    o **Always Open Read-Only**. Anyone can display the workbook, but no one can make changes to it.

    o **Encrypt with Password**. Only those with a password can open the workbook.

    o **Protect Current Sheet**. The sheet within the workbook that is currently open is protected.

    o **Protect Workbook Structure**. Others can display the workbook, but cannot add, delete, move, or display hidden sheets.

    o **Restrict Access**. Others can access the workbook but have restricted access.

Collaborating with other people

Collaborating with other people

- o **Add a Digital Signature**. The creator can add an invisible signature to the workbook.
- o **Mark as Final**. Anyone displaying the workbook knows that this is the final version.

4. Enter a password in the **Encrypt Document** dialog box and confirm the password.

5. To protect a worksheet, select **Protect Current Sheet**.

6. In the **Protect Sheet** dialog box, select the items that you wish to permit all users of this worksheet to be able to do from those listed.

7. Enter a password in the **Password to unprotect sheet** box, as the following screenshot depicts.
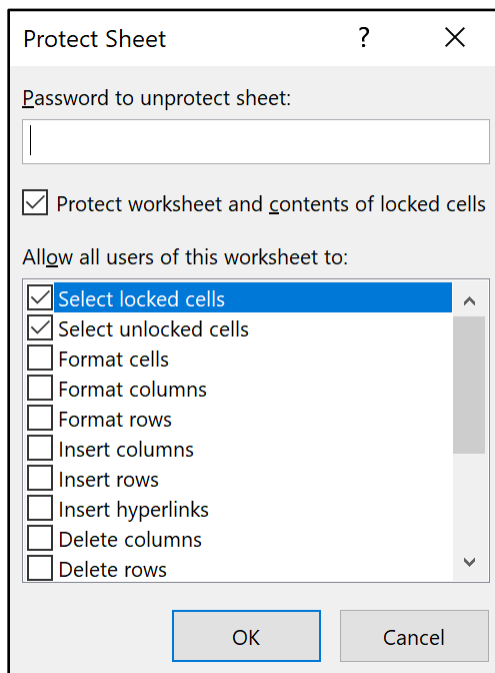
*Figure 6: **Protect Sheet** dialog box*

Microsoft   17

8. Confirm the entered password in the **Confirm Password** dialog box, as the following screenshot depicts.
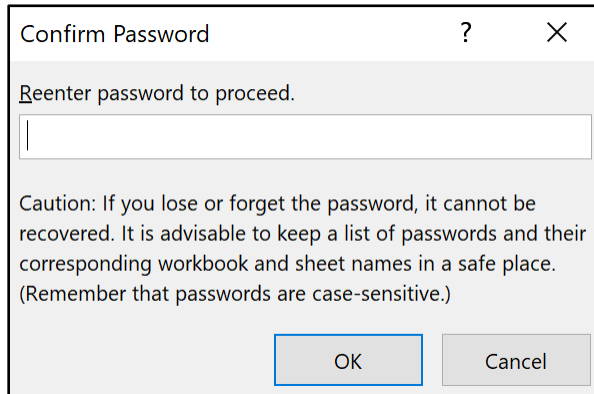

*Figure 7: **Confirm Password** dialog box*

9. Select **OK**.

The worksheet is now protected with the password. Users can only edit it if you remove protection by using the entered password.

Unprotect a worksheet

1. Open the worksheet to unprotect.

2. Select **File**, and then select **Info**.

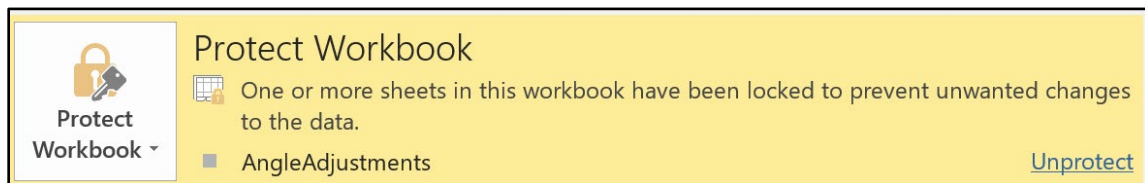3. In the **Protect Workbook** area that the following screenshot depicts, select **Unprotect**.

*Figure 8: **Protect Workbook** area*

4. In the **Unprotect Sheet** dialog box, enter the password that you used to protect the worksheet, as the following screenshot depicts.
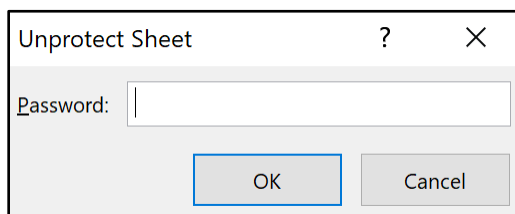

*Figure 9: **Unprotect Sheet** password dialog box*

Microsoft

The worksheet is now unprotected, and anyone can edit the file.

Additional information

To review a video on sharing your Excel workbook, go to: [Share your Excel workbook with others](#)

Additional information

For more information on protecting worksheet, go to: [Protect a worksheet](#)

Activity: Discuss and learn

You can restrict the editing of a workbook in two ways. The first way is to share the workbook with specific people who can display and edit the file. The second way is to assign the workbook a password and share that password with others to access the workbook on a shared directory. This activity will focus on creating a password to share your workbook.

Resources required

Your teacher will use the following resource for this activity:

- **L2_T1_act_solar_data_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Follow along as your teacher completes the activity by following these instructions:

1. Use the **Share** option to share the workbook with a classmate.

2. Password protect the workbook by using the password **Fl0w3r721**.

Compare the options for restricting the editing of a workbook to using a password to protect a workbook. Can you name a scenario in which you might use each option?

Try-it: Restrict editing

In this standalone try-it activity, you'll restrict the editing of a worksheet by applying a password.

Try-it

Resources

You'll need the following resources for this try-it:

- Open **L2_T1_try_solar_data_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Protect the worksheet from editing by using the password **mUn50n57211**.

2. Save your work.

3. Share your work with a classmate.

4. Open the file shared with you by your classmate and use the password to access the file.

Topic 2: Help protect worksheets and cell ranges

There will be times when you might want a user to be able to edit portions of a workbook but not the entire workbook. You might want the user to enter their own information into specific cells and that information can then determine other protected data within the workbook.

Unlock cells

The first step in the process of restricting access to specific cells within a workbook is to determine which cells you want to preserve. Often, cells containing a formula calculation are important and need to be preserved from edits by others.

Identify those cells that you want to allow others to edit within your workbook. This might seem counterproductive, but you need to identify those cells that can be edited prior to locking the rest of the workbook.
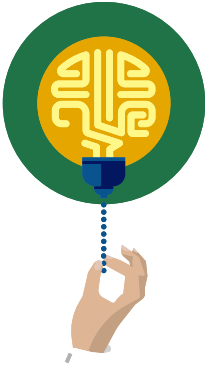
Did you know?

You can select multiple noncontiguous cells (cells that aren't adjacent to each other) by holding down the Ctrl key and then selecting those cells.

1. Select the cells that you want to allow the user to edit.

2. Right-click or access the context menu anywhere within the worksheet, and then select **Format Cells**, as depicted in the following screenshot.
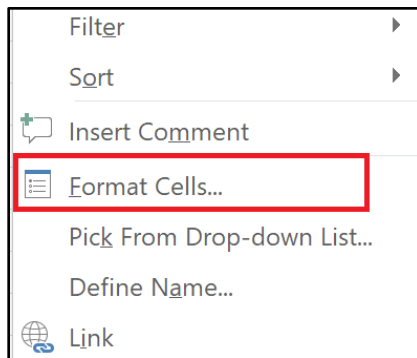
Figure 10: **Format Cells** option

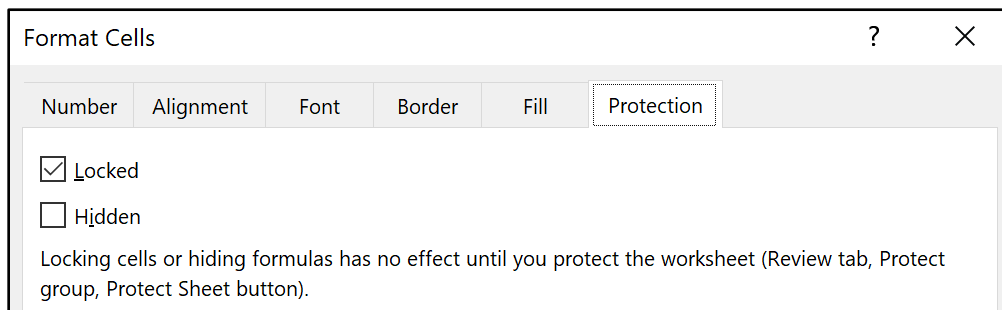3. In the **Format Cells** dialog box, select the **Protection** tab, as the following screenshot depicts.

Figure 11: **Format Cells** dialog box with the **Protection** tab selected

4. Clear the **Locked** check box.

5. Select **OK**.

This process will unlock the selected cells when the worksheet is protected or locked.

Microsoft

Lock cells

1. Select the **Review** tab.

2. In the **Protect** group, select **Protect Sheet**, as the following screenshot depicts.
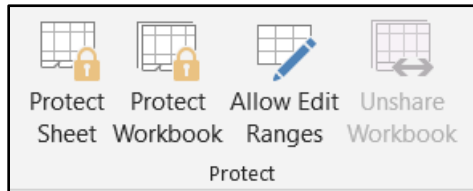

*Figure 12: **Protect Sheet** in the **Review** tab*

3. In the **Protect Sheet** dialog box, you can select areas of the worksheet that you want users to be able to change. The **Select unlocked cells** option is selected by default, as the following screenshot depicts. Therefore, users will be able to edit the cells that you unlock.
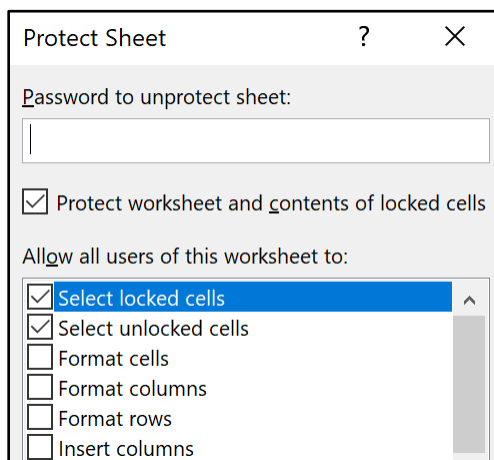

*Figure 13: **Protect Sheet** dialog box*

4. You can choose to enter a password to access any locked areas if you wish. Entering a password prevents others from unlocking the cells that you have locked.

5. After making your choices, select **OK**.

Allow edit ranges

In Excel, you can identify a range of cells that users can edit by using a password. To do so, perform the following steps:

1. Select the range of cells that you want users to be able to edit by using a password.

2. On the **Review** tab, in the **Protect** group, select **Allow Edit Ranges**, as the following screenshot depicts.
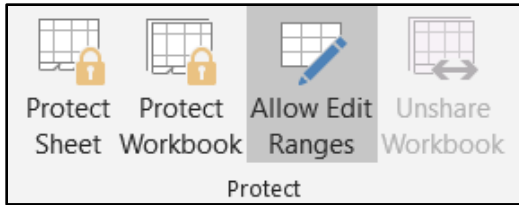
Microsoft

22

*Figure 14: **Allow Edit Ranges** option*

3. In the **Allow Users to Edit Ranges** dialog box, select **New**, as the following screenshot depicts.
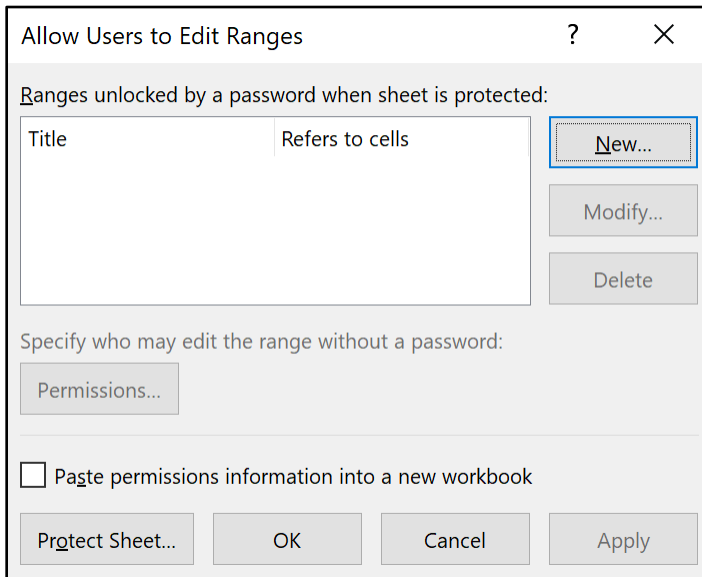

*Figure 15: **Allow Users to Edit Ranges** dialog box.*

4. In the **New Range** dialog box, enter a name for the range of selected cells in the **Title** box, as the following screenshot depicts.
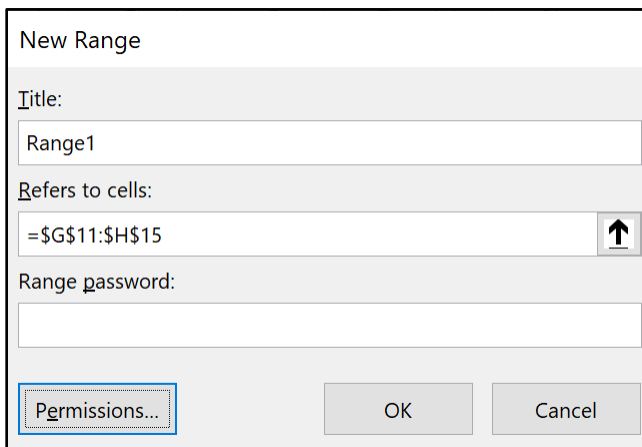

*Figure 16: **New Range** dialog box*

5. Enter a password in the **Range password** box, and then select **OK**.

6. Confirm the password in the **Confirm Password** dialog box.

7. Select **OK**.

8. In the **Allows User to Edit Ranges** dialog box, select **Protect Sheet**.

9. In the **Protect Sheet** dialog box, enter a password.

10. Confirm the password.

Unprotect a worksheet

Use the following procedure to unprotect a worksheet.

1. On the **Review** tab, in the **Protect** group, select **Unprotect Sheet**, as the following screenshot depicts.
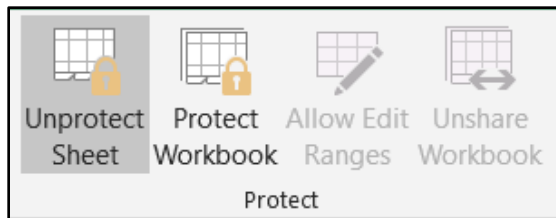

Figure 17: ***Unprotect Sheet***

2. Enter the password to unprotect the sheet.

Help protect workbook structure

Protecting the structure of a workbook means that users won't be able to move, add, delete, or rename worksheets without first unprotecting the workbook or providing a password.

1. On the **Review** tab, in the **Protect** group, select **Protect Workbook**, as the following screenshot depicts.
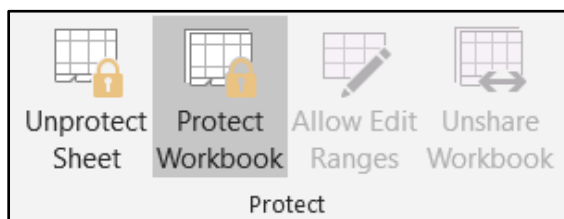

Figure 18: ***Protect Workbook*** *options*

2. In the **Protect Structure and Windows** dialog box, enter a password if you want to password-protect the workbook structure, and then select **OK**, as the following screenshot depicts.
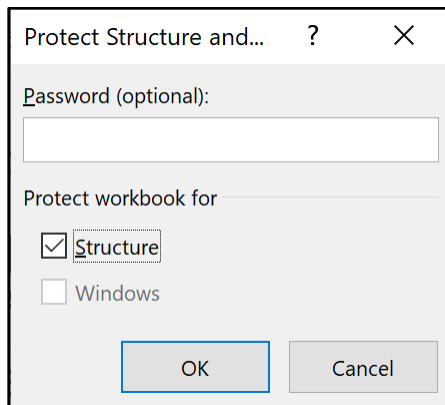

*Figure 19: **Protect Structure** dialog box*

3. Reenter the password in the **Confirm Password** dialog box, as the following screenshot depicts, and then select **OK**.
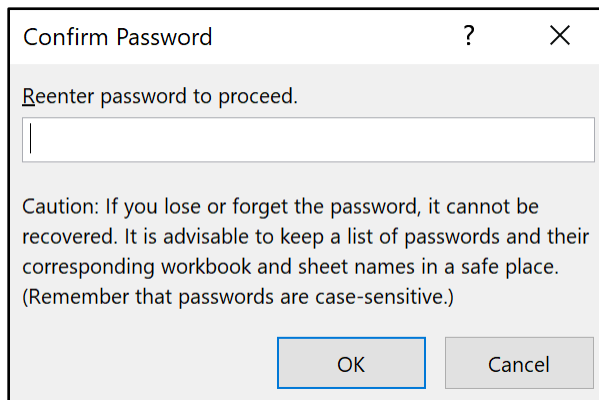

*Figure 20: **Confirm Password** dialog box*

Name a cell or cell range

Naming a cell or a range of cells can make it easier to remember and refer to than referring to the cell or cell range by the cell reference (example, the cell reference C5: C32 versus the named range Income).

To name a cell or cell range, perform the following steps:

1. Select the cell or cell range that you want to name.

2. In the **Name box** above the spreadsheet, enter a name for the cell or cell range, as the following screenshot depicts. **Note**: You cannot include spaces in the name. An underscore can replace the space.
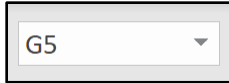
*Figure 21: **Name box***

3. Select the Enter key to save the name for the cell or cell range.

Additional information

For more information on protecting worksheets, go to: Protect a worksheet

For more information on protection and security in Excel, go to: Protection and security in Excel

Activity: Discuss and learn

When protecting a worksheet, you might want to allow the user to modify portions of the worksheet. It is important to identify these portions to help ensure that the user can enter information in those, while also maintaining protection for other portions of the worksheet. This activity will focus on identifying those areas as well as naming them.

Resources required

You'll need the following resource for this activity:

- Open **L2_T2_act_time_sheet.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

With the **Time Sheet** tab open, answer the following questions:

- Are there cells that you might want to protect from editing? Which cells are those?
- Are there cells that you would want users to edit? Which cells should users be able to edit?
- Why did you make each of these decisions?
- Which type of protection would serve best to provide protection for this workbook?
- How would you name or label each area that you would want to protect?

Try-it: Help protect worksheets and cell ranges

 In this leveled try-it activity, you will restrict the editing of different components within a workbook.

Microsoft

Try-it 1

Resources
You'll need the following resources for this try-it:

- Open **L2_T2_try1_time_sheet_starter.xlsx** in this lesson's Learning Activity Resources.
- Locate the **L2_T1_try_solar_data_starter.xlsx** file you password-protected in the previous try-it.

Instructions
The following are the general tasks that you must perform during this try-it:

1. In **L2_T2_try1_time_sheet_starter.xlsx**, allow a user to edit the **Employee Name** area (**C3**) and the cells containing **Hours Worked (C5:C11)**.

2. Save your work.

3. Unprotect **L2_T1_try_solar_data_starter.xlsx** by using the password **mUn50n57211**.

Try-it 2

Resources
You'll need the following resources for this try-it:

- Open **L2_T2_try2_price_list_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions
The following are the general tasks that you must perform during this try-it:

1. Name the cell containing the text **Customer Name** (**C3**), **Customer_Name**.

2. Name the cell range containing the **Quantity Ordered (D5:D11)**, **Quantity_Ordered**.

3. Allow a user to edit the cells containing the **Customer Name** (**C3**) and the **Quantity Ordered (D5:D11)**.

4. Protect the worksheet.

5. Save your work and close the workbook.

6. Reopen **L2_T2_try2_price_list.xlsx** and try editing different areas of the workbook.

7. Unprotect the worksheet by using the password that you assigned.

8. Save your work.

Microsoft

Try-it 3

Resources

You will need the following resources for this try-it:

- Open **L2_T2_try3_price_list_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you need to perform during this try-it:

1. Unprotect the cells containing the **Customer Name** (**C3**) and the **Quantity Ordered (D5:D11**).

2. Protect the workbook structure.

3. Save your work.

Topic 3: Manage comments

You can use comments to participate in a conversation between team members. After a user makes an initial comment, others can respond to the comment, make their own comment, or mark a comment as resolved.

Add comments

There are two ways to add comments within a worksheet—the context menu and the **Review** tab. To add a comment in a worksheet by using the context menu, perform the following steps:

1. Select the cell in which you want to add a comment.

2. Right-click or access the context menu, and then select **Insert Comment**, as the following screenshot depicts.
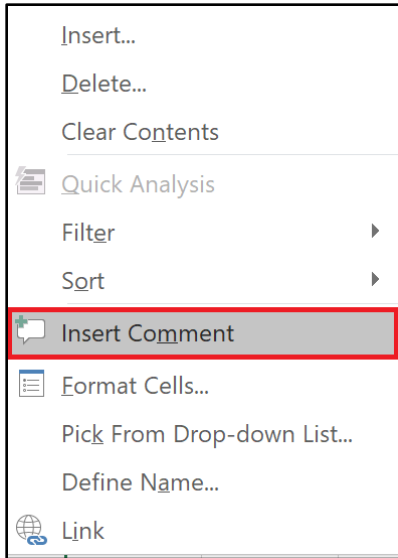
*Figure 22: **New Comment** option on the context menu*

3. Enter your comment in the **Comment** box as the following screenshot depicts.
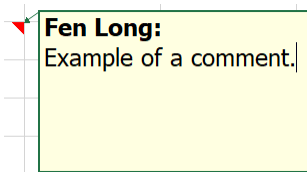

*Figure 23: **Comment** box*

To add a comment by using the **Review** tab, perform the following steps:

1. Select the cell in which you want to add a comment.

2. On the **Review** tab, in the **Comments** group, select **New Comment**. The following screenshot depicts the **Comments** group.
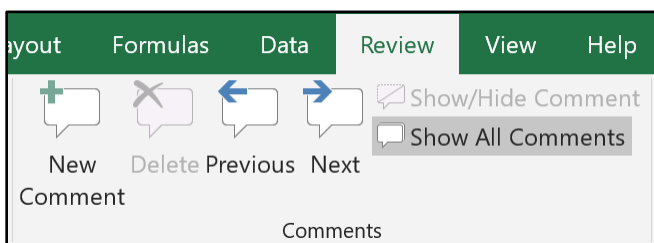

*Figure 24: The **Comments** group*

3. Enter your comment in the **Comment** box.

Delete comments

You can delete comments within a worksheet by using the context menu or the **Review** tab. To delete a comment by using the context menu, perform the following steps:

1. Right-click or access the context menu for the cell from which you want to delete a comment.

2. Select **Delete Comment**, as the following screenshot depicts.
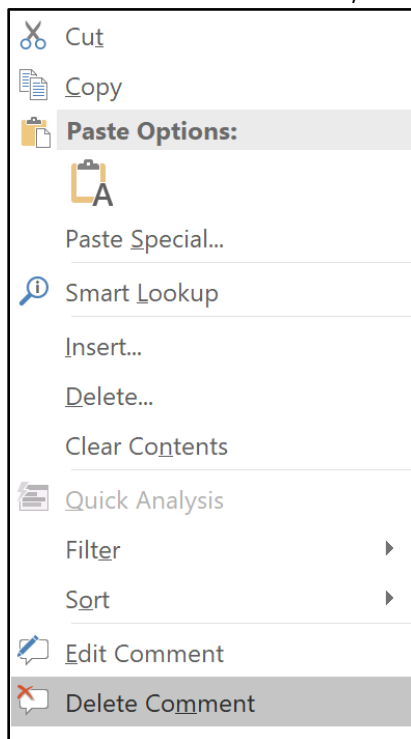

*Figure 25: **Delete Comment** option on the context menu*

To delete a comment by using the **Review** tab, perform the following steps:

1. In the **Comments** task pane, select the comment that you want to delete.

2. On the **Review** tab, in the **Comments** group, select **Delete**, as the following screenshot depicts.
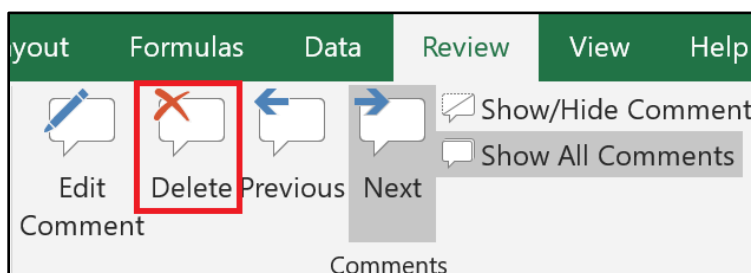

*Figure 26: **Delete comment** option*

Microsoft

Edit comments

You can edit any comment by performing the following steps:

1. Access the cell containing the comment that you wish to edit, and then select **Edit Comment** within the **Comments** area.
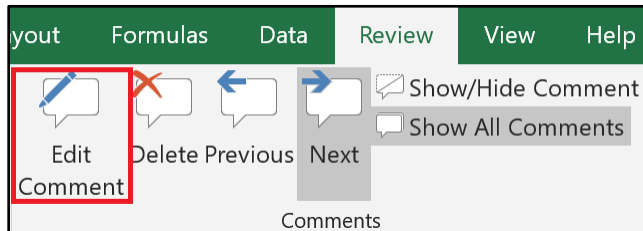

*Figure 27: **Edit Comment** option*

2. Select within the comment and edit the comment as needed.

Print comments

You can print comments by performing the following steps:

1. On the **Page Layout** tab, in the **Page Setup** group, select the dialog box launcher that the following screenshot highlights. This opens the **Page Setup** dialog box.
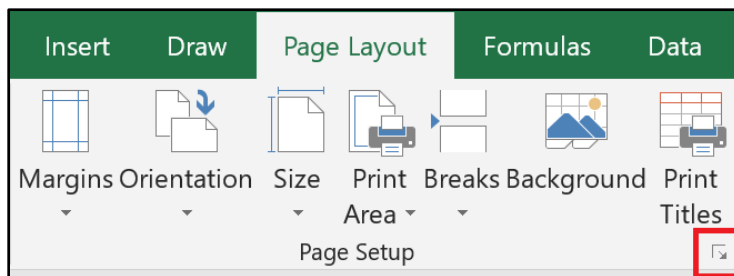

*Figure 28: **Page Setup** dialog box launcher*

2. In the **Page Setup** dialog box, select the **Sheet** tab, and then locate the **Comments** drop-down box that the following screenshot highlights.

Microsoft
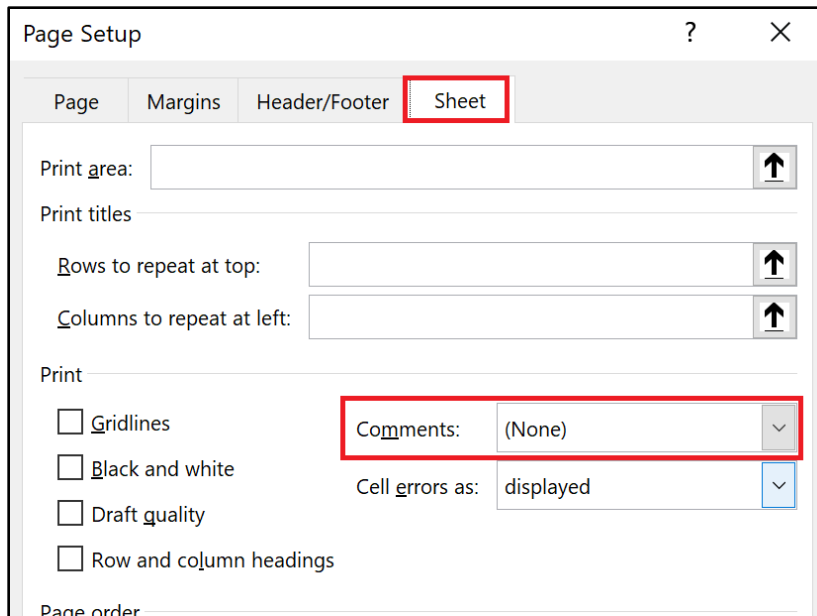
*Figure 29: **Sheet** tab and **Comments** drop-down box*

3. Select **At end of sheet** as the following screenshot depicts, and then select **OK**.
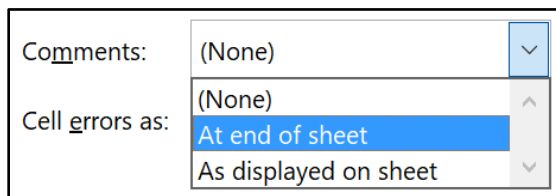
*Figure 30: **At end of sheet** selected for comment printing*

Change the display name for comments

When you leave comments, it is helpful to attach your name to the comment. You can easily change the name that displays with the comment. To do so, perform the following steps:

1. Select the **File** tab, and then select **Options**.

2. In the **Personalize your copy of Microsoft Office** dialog box, in the **User name** box, verify or change the username to your name, as the following screenshot depicts.

Figure 31: Change username

3. Select **OK**.

Additional information

To obtain information about formatting a comment, go to: [Format worksheet comments](#)

Activity: Pose a question

Comments are a great way for you to add notes for yourself or others about the data and information within a worksheet. This activity will focus on the management of comments within a worksheet.
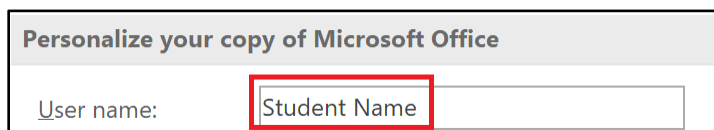
Resources required

You'll need the following resources for this activity:

- Open **L2_T3_act_solar_array_starter.xlsx** in this lesson's Learning Activity Resources.

Activity instructions

Participate in the activity by following these instructions:

1. Delete the comment in cell **B8**.

2. Verify or change the name that is associated with the comments. Make sure that your name appears with the comments that you make.

3. Add a comment to cell **A6** with the text **Why is the data for Wednesdays missing?**.

4. Edit the comment in cell **B3** with the text **Can anyone provide an explanation why production was so low during Week 1?**.

5. Set the comments to print at the end of the worksheet.

Try-it: Manage comments

In this leveled try-it activity, you'll add, delete, and edit the comments in the worksheet.

Try-it 1

Resources

You'll need the following resources for this try-it:

- Open **L2_T3_try1_price_list_starter.xlsx** in this lesson's Learning Activity Resources.

Microsoft

Instructions

The following are the general tasks that you must perform during this try-it:

1. Delete the comment in cell **A5**.

2. Save your work.

Try-it 2

Resources

You'll need the following resources for this try-it:

- Open **L2_T3_try2_price_list_starter.xlsx** in this lesson's Learning Activity Resources.

Instructions

The following are the general tasks that you must perform during this try-it:

1. Edit the comment in cell **F4** with the text **Will the sales tax rate be changing next month?**.

2. Set the document so that the comments will print at the end of the worksheet.

3. Follow your teacher's directions on whether to print the worksheet.

4. Save your work.

Wrap-up

Use these questions to check what you learned in this lesson:

1. Which of the following can you protect by using Excel?

   Select the correct option.

   a. An entire workbook

   b. A worksheet

   c. A range of cells except for those identified as editable

   d. All the above

2. Which of the following are ways to control the sharing of your worksheet?

    Select all that apply.

    a. Control access to the worksheet by using a password.

    b. Protect the worksheet as a read-only copy.

    c. Protect the worksheet by using a function.

    d. Use the **Share** option to share your work with others by using their email addresses.

3. Which of the following can you use comments for in Excel?

    Select the correct option.

    a. To edit the data contained within a cell

    b. To protect the contents of a cell

    c. To start a conversation about data within a cell

    d. To add information to data contained within a cell

4. Place the following steps in the correct order to help protect specific areas of a worksheet.

    Indicate the correct sequence by adding numbers 1-4 next to the following items.

    a. Select the **Format Cells** option. _____

    b. Select cells to allow users to edit. _____

    c. Select the **Protection** tab. _____

    d. Right-click or access the context menu. _____

    e. Clear the **Locked** check box. _____

5. Place the following steps in the correct order to protect a worksheet.

    Indicate the correct sequence by adding numbers 1-4 next to the following items.

    a. Select **Protect Workbook**. _____

    b. Select **Encrypt with Password**. _____

    c. Select **Info**. _____

    d. Select the **File** tab. _____

Glossary

AutoRecover	A feature that helps recover unsaved work after your system stops responding or a power failure.
Cell range	A group of cells, either contiguous or noncontiguous, that have been identified for a specific process.
Cloud storage service	A service provided by a company such as Microsoft that allows users to store, access, sync and share files using the Internet.
Comments	A mode of discussion between users in Excel. One person posts an initial comment and others can respond.
Contiguous	Cells within a worksheet that are adjacent or next to each other.
History	Listing of saved versions of a workbook.
Noncontiguous	Cells within a worksheet that are not adjacent or next to each other.
Notes	A mode of adding annotations or details about the data within a cell to be created.

Table 2: Glossary terms and definitions

Microsoft

Cornerstone

Overview

After all the work you completed in Module 3 for the Community Supported Agriculture (CSA) team, you need to share data with the Munson's Marketing Team for their use in creating a social-media campaign for the farm's new CSA program. The data will be constantly updated so that the marketing team has the latest information to share on social media. They'll need to have ongoing access to the workbook. To protect the data, you must restrict their ability to make changes and allow them only to copy data for their use and add comments.

Objectives

The following table outlines the Cornerstone objectives and their corresponding Microsoft Office Specialist (MOS) exam objectives.

Manage workbooks	• 1.1.4: Manage workbook versions
Workbook protection	• 1.2.1: Restrict editing
	• 1.2.2: Protect worksheet and cell ranges
	• 1.2.3: Protect workbook structure
	• 1.2.5: Manage comments

Table 3: Cornerstone objectives mapped to MOS exam objectives

Duration

50 minutes

Instructions

1. Complete the tasks below for each file.

2. When saving your file, add your name to the end of the filename, for example: **<"You-Pick_Day_Dwayne_Espino">**. Follow your teacher's directions for where to save your files.

3. When you're done with the Cornerstone, assess your completion and enter the points you think you earned within the task lists below. You can take the help of your teacher if required.

Tasks

You'll work with one Excel file with two worksheets in this Cornerstone. The following are the tasks that you must do within each sheet.

File 1: Cornerstone_CSA_program_starter.xlsx

Task: Manage workbook versions (4 points)

1. Turn on version history for the workbook. (2 points) (Exam object 1.1.4)

2. Set the workbook to AutoRecover every 10 minutes. (2 points) (Exam objective 1.1.4)

Points scored: _____ / 4

Task: Workbook protection and comments (16 points)

1. Change the username to your name. (1 point) (Exam objective 1.2.5)

2. On the **3rd Quarter** worksheet, delete the comment from **B6**. (1 point) (Exam objective 1.2.5)

3. In the **July** worksheet, place a comment in **C17** with the text **Will we be able to offer apples in larger quantities? We've had customers ask for larger quantities**. (2 points) (Exam objective 1.2.5)

4. In the **July** worksheet, place a comment in **G5** with the text **What profit margin are we hoping to receive from the sales of our product each month?**. (2 points) (Exam objective 1.2.5)

5. Protect the **3rd Quarter** worksheet by using the password **CaPsT0n3**. (3 points) (Exam objective 1.2.1)

6. In the **July** worksheet, set the cell range **D6:D18** to be unlocked. (2 points) (Exam objective 1.2.2)

7. Protect the **July** worksheet, while allowing the cell range **D6:D18** to be unlocked, by using the password **CaPsT0n3**. (3 points) (Exam objective 1.2.2)

8. Protect the workbook structure by using the password **CaPsT0n3**. (2 points) (Exam objective 1.2.3)

Points scored: _____ / 16

TOTAL POINTS: _____ / 20