

BUSINESS COMPUTERS 365



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Licensing

A detailed breakdown of this resource's licensing can be found in [Back Matter/Detailed Licensing](#).

CHAPTER OVERVIEW

1: Personal Computer Basics

Learning Objectives

- Comparing and Contrasting Personal Computers
- Identifying Computer System Components
- Classifying Various Peripheral Devices
- Creating Screenshots
- File Management
- Useful Keyboard Shortcuts

Personal Computer Basics

[Comparing and Contrasting Personal Computers](#)

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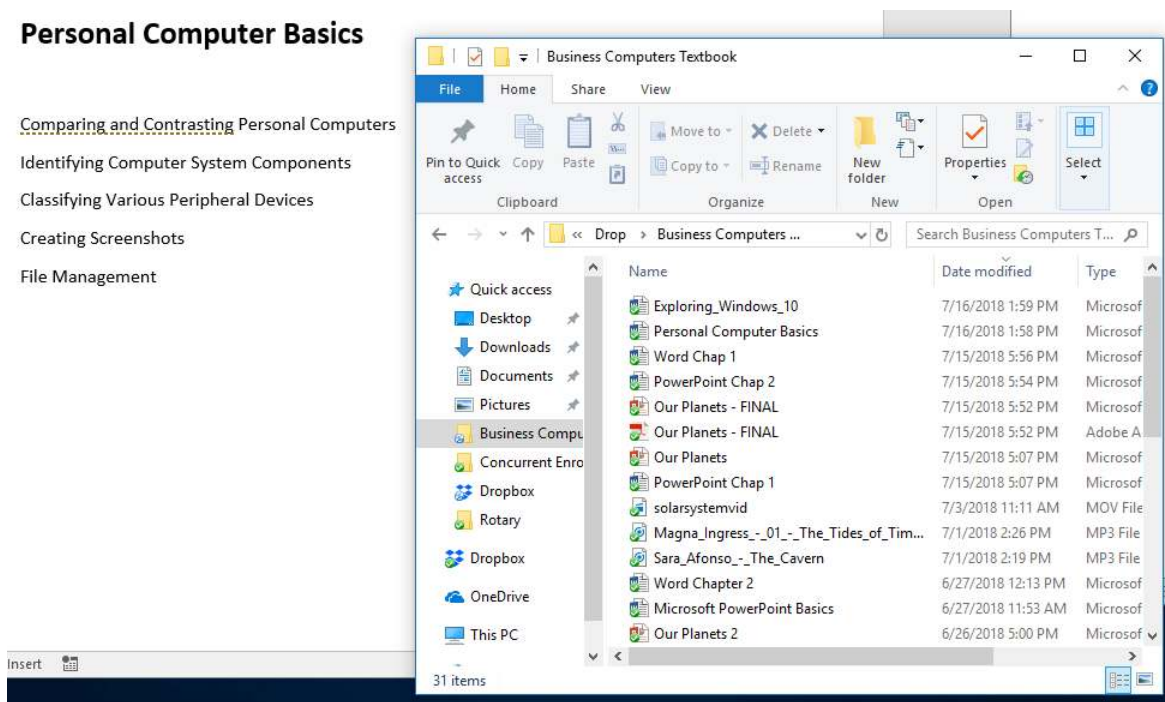


Figure 1.1: File Management

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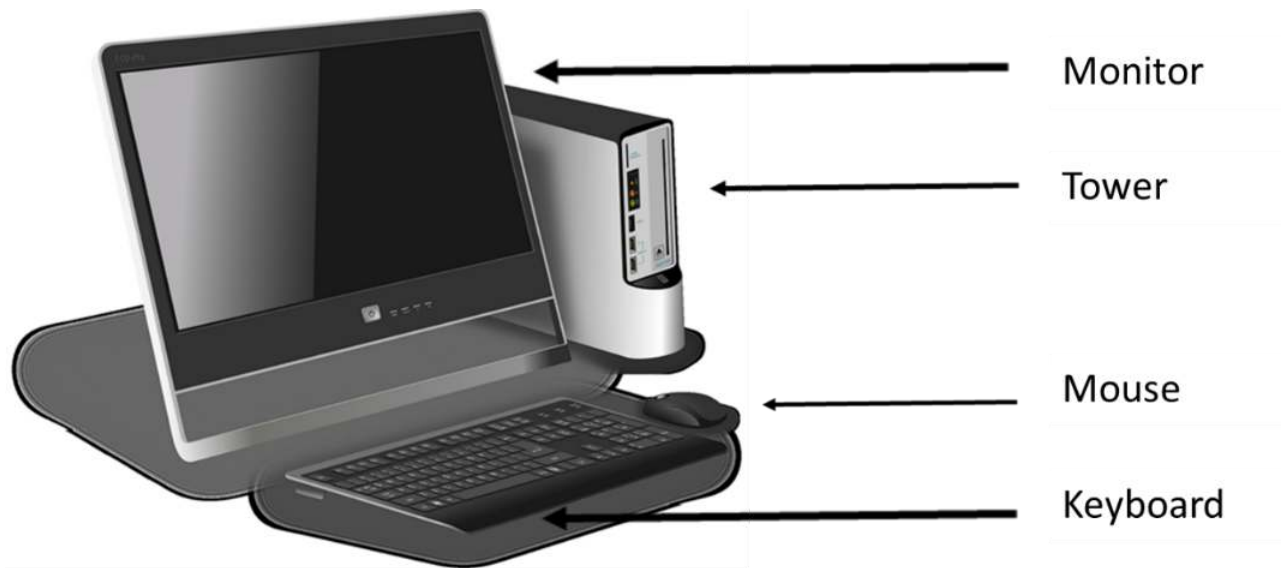
1.1: Comparing and Contrasting Personal Computers

Computers were originally created for military, scientific, government and corporations – organizations with one common characteristic – large budgets! Fortunately, since the early days of computing, computers have simultaneously become more user-friendly and affordable giving rise the era of personal computing.

In 1977 Steve Wozniak and Steve Jobs debuted the Apple-II personal computer. However, it wasn't until the early 1980's that IBM introduced their personal computer (PC), and the personal computing era really became legitimate.

Personal Computers (PCs) are best described as small, inexpensive computers designed for individual use. Each of the following are examples of personal computers:

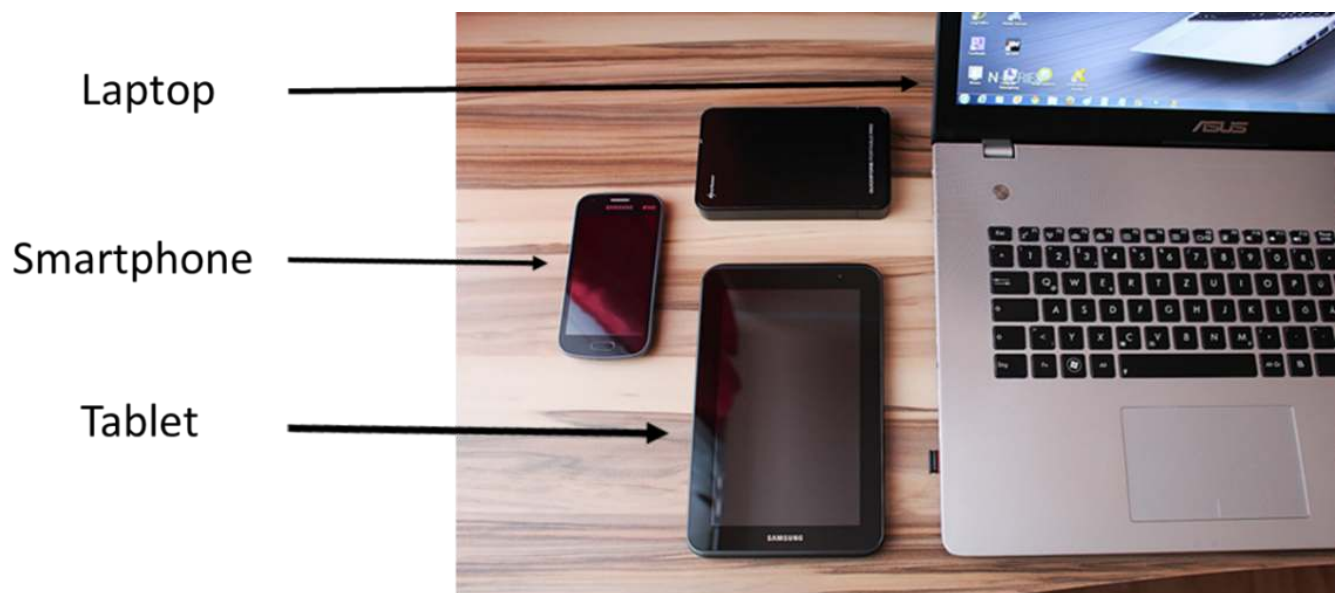
- **Desktop computers** – designed to utilize a consistent source of electric power, these computers fit on or beneath a desk, and therefore are not intended to be portable. Most desktops contain several peripheral input and output devices intended to extend the computing functionality.
- **Laptop and Notebook computers** – portable computers that utilize a battery for power. Consist of a separate display screen and keyboard in a single unit. Contains a hinged lid that closes the screen onto the keyboard for easy portability. Some screens are touch-activated displays.
- **Tablets** – thin mobile computers with touchscreen displays. Typically, larger than smartphones, tablets are ideal for reading eBooks, surfing the Web, and watching videos.
- **Smartphones** – pocket-sized mobile phones that combine voice, text, e-mail and personal computing into a single device that can access the Internet and run a variety of third-party software components, known as apps.



Desktop Computer System

Modern desktop and laptop computers are generally either PCs, usually running a Microsoft Windows version operating system, or Apple Macintoshes, which run Apple's proprietary operating system (OS) software. Various versions of the Linux OS also represent a relevant share of desktop and laptop users on a PC platform. However, according to several industry analysts, Microsoft's Windows is the dominant OS in terms of shares of users, with estimates of more than half of all users in 2016.

The most popular mobile (tablets and smartphones) operating systems are Android (developed by Google), iOS (developed by Apple) and Windows 10 Mobile (developed by Microsoft).



Portable Computers

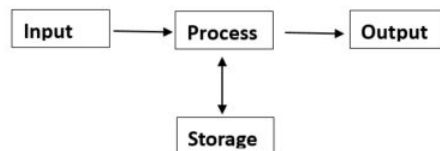
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1.2: Identifying Computer System Components

Computer systems consist of hardware and software. **Hardware** is the tangible, physical components of a computer, while software is the intangible programs that function on a computer. Basic hardware components include a hard drive for storing data, a processor for performing operations, memory for holding active data, and a motherboard to tie the parts together. Even gaming consoles are considered computer hardware. **Software** includes computer programs, libraries and data. Software can be categorized as application (most programs), system (operating, utilities and device drivers) and malicious software, or malware (undesirable programs that results in harm or disruption).

Software Examples	
Applications	Operating Systems
Microsoft Office (Word, Excel, Access, PowerPoint, Publisher)	Windows (Microsoft)
Business (QuickBooks, Auto Cad, Photoshop)	Mac O/S (Apple)
Browsers (Chrome, Firefox, Safari, Edge)	Chrome O/S (Google)
Games (Call of Duty, Madden, Solitaire)	Linux (Open-Source)

The four main components of a computer system are input devices, output devices, processing devices and the storage devices used to store data within the computer system. The flow of data through a computer system begins with either an input device that enters data into the central processing unit which then sends the data to an output device as information. Alternatively, data can be retrieved or sent to a storage device from the processor.



Computer system processes

Hardware and software work together to process data. When you open a software program, the computer reads its data from the hard drive or input device, runs the software on the computer's processor and then displays the results on your output device or saves the data to a storage device.

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1.3: Classifying Various Peripheral Devices

Hardware components that are not an integral part of the central processing unit are often referred to as peripheral devices. Peripheral devices connect with a computer through several I/O interfaces, such as communications (COM), Universal Serial Bus (USB), firewire, and serial ports. Peripherals are usually used for either input, storage or output.

Input Devices

An input device is any device that provides input to a computer. There are many **input devices**, but the two most common ones are a keyboard and mouse. Every key you press on the keyboard and every movement or click you make with the mouse sends a specific input signal to the computer. Examples of commonly used input devices include:



Wireless mouse

- **Mouse:** a small object that you can roll along a hard and flat surface which serves as pointing device to enable the user to control the movement of the cursor on a screen display. Most mice have two or more buttons which allow the user to scroll and click objects on the screen.
- **Keyboard:** desktop and laptop computers have external and built-in keyboards that resemble a traditional typewriter. Most keyboards are designed to have the QWERTY layout of keys which make keyboarding easy and consistent across various devices. Many keyboards have function keys as the top row that perform special shortcut functions.
- **Touchscreen:** the primary input device for tablets and smartphone, this technology combines the functionality of a mouse and a keyboard by allowing a finger or stylus to make gestures or select on-screen menus and keys.
- **Microphone and Camera:** used to record and capture sound and images, and to communicate with others using audio and video conferencing software. Most portable computers have these devices built-in, but external devices are typically a higher quality.

Many input devices operate without cords. **Wireless** mice and keyboards require receivers to collect the electronic signals transmitted by the input devices. **Bluetooth** devices use short-range radio waves to communicate between paired devices and computers. Other input devices include scanners, bar code readers, joy sticks, light pens, trackballs, magnetic ink character recognition (MICR) and optical character recognition (OCR) software. Warning! Excessive use of a computer can lead to repetitive motion injuries such as **carpal tunnel syndrome**, and other computer-related health problems, including **computer addiction**. Take frequent breaks, stretch properly, and utilize ergonomically designed input devices to reduce the threat of these injuries. Limit your time online, and connect face-to-face too!

Output Devices

An **output device** is any hardware peripheral that disseminates processed data. The processed data, stored in the memory of the computer is sent to the output device, which then converts it into an understandable form. Examples of commonly used output devices include:

- **Monitors:** older monitors typically contain a cathode ray tube, which result in a heavy display, which is also an inefficient use of power and your desktop footprint compared to flat screen monitors. A flat panel display uses an LCD (Liquid Crystal Display), although some use plasma technology. Screen size is measured diagonally across the screen, in inches. The entire screen area may not be usable for image display. The **resolution** of the monitor is the maximum number of pixels it can display horizontally and vertically (such as 800 x 600, or 1024 x 768, or 1600 x 1200). Most monitors can display several resolutions

below its maximum setting. **Pixels**(short for picture elements) are the small dots that make the image displayed on the screen. A **video card** is necessary for generating complex computer graphics on a monitor.



Multi-function printer

Printers: want a “hard” copy of a document versus a “soft” copy of a file? A printed output is referred to as a hard copy versus an electronic or soft copy of a file. Printers come in various formats. Popular for home computing is **ink jet** printers. These printers form the image on the page by spraying tiny droplets of ink from the print head. The printer needs several colors of ink (cyan, yellow, magenta, and black) to make color images. Some photo-quality ink jet printers have more colors of ink. Unfortunately, ink cartridges are expensive to replace, so the cheap initial cost of ink jet printers is offset by frequent printing usage. Conversely, **laser** printers utilize toner to burn tiny plastic particles of pigment onto paper. While the initial cost of laser printers can be expensive, they produce a higher quality output and are less expensive and faster than ink jet printers in the long run. Other printers include dot-matrix which use impact and inked ribbon on continuous feed paper. These are (were) popular for multi-layer forms. Lastly, multi-function printers are popular for home office/small office computing because they combine printing, faxing, copying and scanning in a single device.

- **Speakers:** Audio output requires a sound card and internal or external speakers or headphones.



Flash drive

Storage devices: While primary storage is the internal CPU’s RAM, secondary storage consists of external hardware such as CDs, DVDs, flash drives and external hard drives. Obsolete secondary storage examples include floppy disks, magnetic tape, punch cards and zip drives. A popular alternative to physical secondary storage is **cloud storage** which stores data on remote servers accessed from the Internet, or “cloud”, which is maintained by a cloud storage service provider built on virtualization techniques.



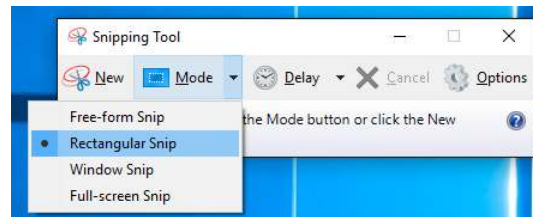
• Wearable computer device

Hybrid peripherals: Wearable computer devices, such as augmented reality goggles, smartwatches and fitness trackers can all be lumped into this auxiliary device category.

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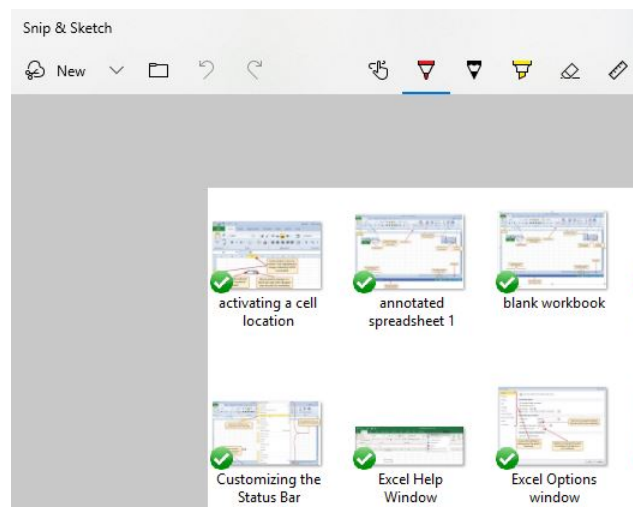
1.4: Creating Screenshots

One of the first steps to securing assistance with computer-related issues requires sharing the error or screen output with a teacher or technical support staff. Often, these support resources are not available to view the screen in-person. Therefore, capturing the screen output is a vital skill to help resolve computer issues. Screenshots, also known as screen captures, screen grabs, or print screens, are the technical terminology assigned to this piece of data. A **screenshot** is a digital image of what appears on a computer or television screen. Producing a screenshot can be a confusing task, which should be broken down into two parts. The first part is the capturing of the screen image, while the second part is the process of pasting the capture into a storable file. There are numerous methods of capturing a screenshot, and they vary from one computer device to another due to operating system versions and keyboard differences.



Snipping Tool

The most consistent method for Windows users to create screenshots is by utilizing the Windows Snipping Tool. As of late 2018, the new tool is called Snip & Sketch. Most images in this documentation have been generated with the help of these tools. To open the Snip & Sketch tool, select the Start button, type “snip” in the search box on the taskbar, and then select the



Snip & Sketch

Snip & Sketch app from the list of results. In addition to capturing a full-screen snip, the Snip & Sketch Tool provides the convenience of capturing a more specific “snip” of data by using the mouse to draw a rectangular or free-form block of specific data to be captured. This allows for more focused data to be collected versus an entire screen of potentially competing images. Once the drawing is selected, the screenshot should automatically open in a new window. You can modify the screenshot by cropping, highlighting annotating or drawing on the image. This image can then be pasted into a new program (similar to how the above image was added to this document) or saved as a separate file to be stored on a permanent or cloud storage device. The Snip & Sketch tool also be set to a timer to take a screenshot in three or ten seconds. To take a screenshot with Snip & Sketch, just press PrtScn. Screenshots will be quite useful for providing feedback or asking questions to/from students/teachers, particularly in distance education environments.

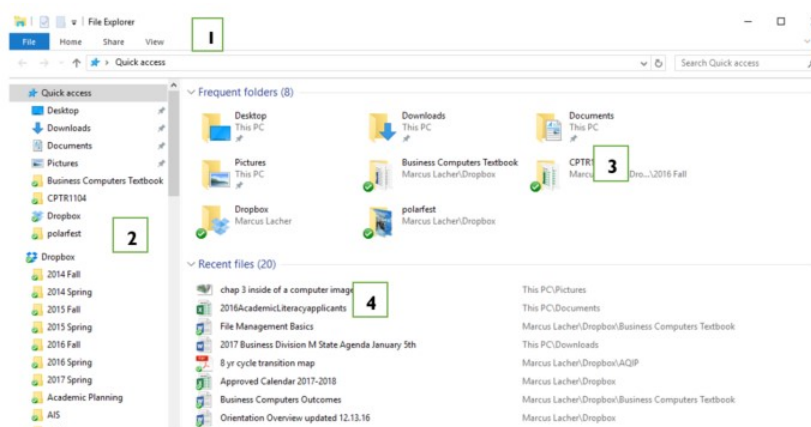
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1.5: File Management

One of the many attributes of being a successful college student is evidence of time management, communication, and organization skills. Managing the files on a computer is essential to excel at all of these skills. Almost all courses require a computer to access and communicate information. The inability to locate a file on a computer or course management system (like Brightspace D2L or Blackboard) could result in a late or missing assignment, missed conversations with an instructor or classmate, and/or tremendous stress. The primary solution to enhanced computer organization skills is through increased knowledge of Windows' File Explorer tool (formerly known as Windows Explorer).

File Explorer displays the hierarchical structure of files, folders, and drives on your computer. All data, including applications, program files, etc. is stored on the computer's disk (also known as disk drive). The primary internal hard drive is known as the C: drive. The contents of a disk are organized into individual files within individual folders. The Document folder is a general storage location for files created in programs like Microsoft Office, whereas photos downloaded from the Internet or a camera are typically stored in the Pictures folder. The Quick Access section displays frequently used folders and files, whereas the This PC view displays information regarding the computer's storage capacity, and attached storage devices, including optical media.

To access the computer's files, click *Start > File Explorer* or select the File Explorer icon located in the taskbar. Upon launching File Explorer in Windows 10, the *Quick access* window will open. Previously known as "Favorites" in previous versions of Windows; this is where users will see their most frequently accessed folders and files that have been created.



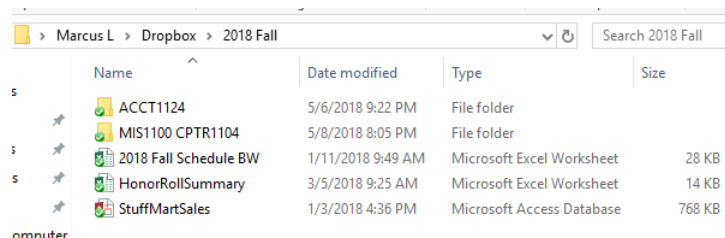
File Explorer

The File Explorer window can be broken into the following sections:

1. **File Explorer ribbon.** This is similar to the ribbon you will find in most Microsoft Office applications. The ribbon contains buttons for common tasks to perform on your files and folders, such as copying, pasting, moving and renaming files and folders. A recommended feature is the View menu which allows you to view your files via icons, tiles, a list or the underappreciated Details view.
2. **Navigation Pane.** Vertically scroll through this pane to access commonly used drives and folders. You can also access your Downloaded files, Documents, and external storage devices, as well as other libraries, such as pictures and music.
3. **Frequent folders.** This displays the folders you've worked with recently to allow for quick access.
4. **Recent files section.** Similar to the Frequent folders section, this area displays the files and documents that you've recently opened.

The Search box is an underappreciated tool to help find files that can't be found in their presumed location. Use the asterisk (*) wildcard character to expand the search results. i.e. Plane* will find files with the words plane or planet, and more. The File Explorer contains an array of tools which can help manage files and stay organized!

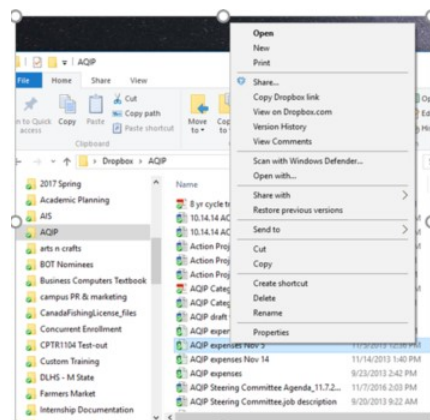
Creating a custom hierarchical structure of folders for each semester and each course is considered a best practice for organizing college data. For example, create a folder with the name of the current semester, i.e. 2018 Fall. Within this folder, create subfolders for each course, i.e. MIS1100. Descriptive folders and file names also diminish confusion when trying to find files on a computer disk.



Name	Date modified	Type	Size
ACCT1124	5/6/2018 9:22 PM	File folder	
MIS1100 CPTR1104	5/8/2018 8:05 PM	File folder	
2018 Fall Schedule BW	1/11/2018 9:49 AM	Microsoft Excel Worksheet	28 KB
HonorRollSummary	3/5/2018 9:25 AM	Microsoft Excel Worksheet	14 KB
StuffMartSales	1/3/2018 4:36 PM	Microsoft Access Database	768 KB

Folder Hierarchy

File Explorer is the primary tool for copying, moving, renaming and searching for files and folders. The View tab provides display and sorting options for files and folders. Viewing files using the Details layout allows for quick sorting by simply clicking a column header to toggle between ascending and descending order. The sort order in the above illustration is sorted by Name in ascending order. Clicking the File name extensions checkbox helps identify the source program for each file, particularly if the Type column is not displayed. Perhaps the most useful column is Size, which can be helpful to determine if a file is too large for distribution via e-mail or portable storage methods.



Shortcut menu

One of the most common operations for users is copying files, which creates a replica of an original file. To copy a file, select the file you want to copy and click Copy under the Home tab. Moving a file necessitates substituting the Copy button with the Cut button. Moving a file saves hard drive space by not creating a duplicate file. To add a new folder, right click and choose New > Folder from the Shortcut menu. Conversely, to delete a file or folder, right-click the object and choose Delete from the shortcut menu.

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1.6: Useful Keyboard Shortcuts

- **Windows key + E** – open a new instance of File Explorer from anywhere in Windows.
 - **Alt + P** – show or hide the Preview pane.
 - **Alt + Shift + P** – show or hide the Details pane.
 - **Alt + left arrow key** – go back one folder in your history.
 - **Alt + up arrow key** – go up one folder in the folder tree.
 - **Ctrl + N** – open a new File Explorer window.
 - **Ctrl + E** – activate the Search bar.
 - **Ctrl + Shift + N** – create a new folder in the current folder.
 - **Ctrl + mouse wheel up or down** – increase or decrease the size of icons and thumbnails.
-

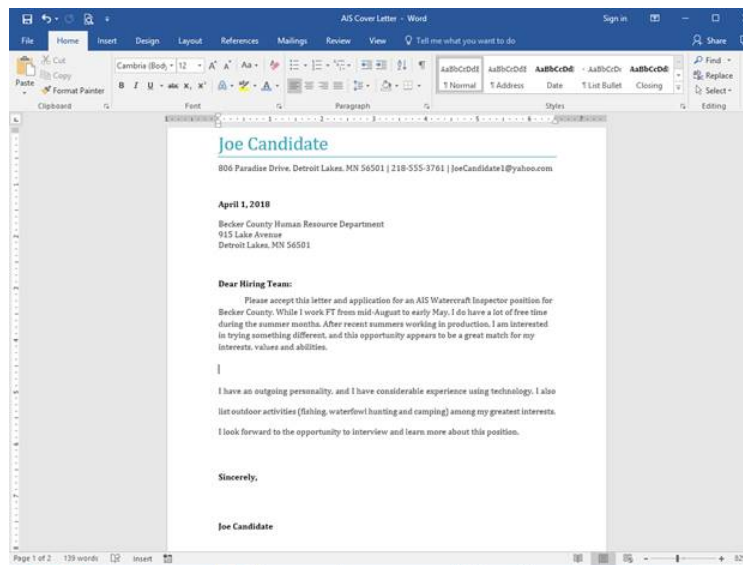
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CHAPTER OVERVIEW

2: Word Chapter I - Developing Documents

Learning Objectives

- Exploring the Word Window
- Entering and editing text
 - Paragraph and line spacing
 - Automatic features
- Spelling and grammar checking
- Selecting text
- Cut, copy and paste
- Finding and replacing text
- Creating bulleted and numbered lists
- Inserting symbols
- Inserting and modifying graphics
- Utilizing WordArt and SmartArt
- Inserting and modifying hyperlinks



- 2.1: Exploring the Word Window
- 2.2: Entering and Editing Text
- 2.3: Spelling and Grammar
- 2.4: Selecting Text
- 2.5: Cut, Copy and Paste
- 2.6: Saving Files
- 2.7: Finding and Replacing Text
- 2.8: Creating Bulleted and Numbered Lists
- 2.9: Inserting Symbols
- 2.10: Inserting and Modifying Graphics

[2.11: Utilizing WordArt and SmartArt](#)

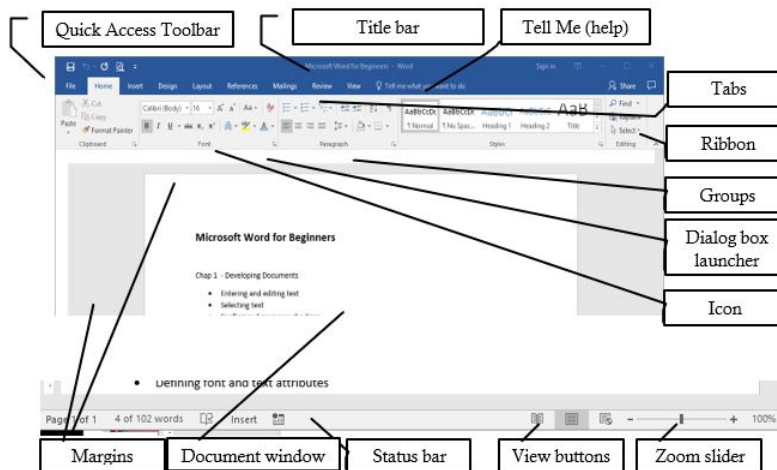
[2.12: Inserting and Modifying Hyperlinks](#)

[2.13: Borders and Shading](#)

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2.1: Exploring the Word Window

Get to know the elements of the Microsoft Word window!



Microsoft Word illustrated

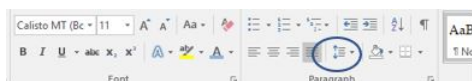
- The **Quick Access toolbar** contains one-click buttons for saving, undoing, redoing, and print previewing a document. You can easily modify this toolbar to add your most frequently used commands. Just click the down-arrow on the right edge to customize this toolbar!
- The **title bar** displays the name of current document, and the program. A new document will default with a temporary file name, such as Document1 until you save the file with a different name. The Minimize, Maximize and Exit buttons appear on the right edge of the title bar.
- The **Tell Me** tool is a new way to get assistance with specific tasks in Word. When the user starts typing, Word suggests commands that are related to your keyword(s). The tool is context sensitive, and integrated into your current document versus opening a separate window. Therefore, if you type *insert picture* into the field, and click the resulting command, Word will open the Insert Picture dialog window without explaining the navigation instructions.
- The **Ribbon** interface is a set of toolbars at the top of the window in Office programs designed to help you quickly find the commands that you need to complete a task. The ribbon displays a combination of **icons** and **tabs**. Commands are **grouped** under multiple tabs. Some commands are so extensive that they need additional windows to display their entire functionality. The dialog box launcher icon will open these windows. Contextual tabs will appear only when the user needs them, such as when a picture is selected, or a table is inserted.

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2.2: Entering and Editing Text

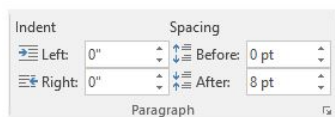
Microsoft Word is a word processor software application used to create, modify, and share documents. When Word is started, the user has the option of modifying a pre-developed template or creating a blank document. Users begin by entering data at the existing insertion point identified by the I-beam pointer (cursor). As the user types text into the document, Word will **word-wrap** the data when encountering the right margin, and continue the text on the following line. The user only needs to press [Enter] when it is desired to start a new paragraph or insert a blank line.

Line spacing is the space between each line in a paragraph. By default, the **line spacing** within a paragraph in Word is 1.15 lines, and the end of a paragraph is followed by a blank line. While the default spacing may be appropriate for some documents, other situations might require different settings. For example, this paragraph is using 1.5 line spacing, which can be adjusted by clicking the option encircled below in the Paragraph group from the Home tab. Other popular line spacing options include double and triple-spacing.



Line Spacing

Line spacing is a popular option to adjust for various documents. However, **paragraph spacing** is less well-known.



Paragraph spacing

Adjusting the spacing before and after paragraphs creates necessary white space to the document more readable. Go to **Page Layout** and under **Spacing**, click the up or down arrows to adjust the distance before or after the paragraph. Spacing is measured in points. You can also type a number directly. This document is currently using 8pt of paragraph spacing After each paragraph.

While entering text, users encounter many automatic features as they type, which include:

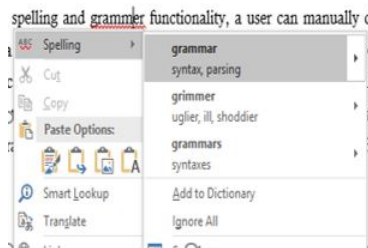
Feature	How to Use
AutoComplete	A ScreenTip appears you type. Pressing [Enter] inserts the suggested text. Continue typing to reject the suggestion.
AutoCorrect	Commonly misspelled words and capitalization mistakes are fixed based from Word's dictionary.
Word Count	Continually recalculates the total count in the Status bar.
Spelling and Grammar	Right-click red- or green-underlined text to reveal a shortcut menu of correction options. Click an option to accept and fix the text.

Auto Type features

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2.3: Spelling and Grammar

In addition to the automatic **spelling and grammar** functionality, a user can manually check their document, and utilize extra functionality. To manually check the document for spelling and grammatical errors, the user can use the commands found under the Review tab.



Spelling & Grammar

The keyboard shortcut to invoke this command is the **[F7]** key. In addition to the Spelling & Grammar check, the user can also utilize the **Thesaurus** and **Word Count** features to improve readability and accuracy. The thesaurus offers a collection of synonyms that can replace words that are used too often. It is a great tool for solving crossword puzzles! The Word Count is also automatically updated on the status bar.



Status bar

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2.4: Selecting Text

Aside from entering text, selecting text is probably the most common task for most Word users. Almost every task begins by selecting something. Perhaps that's why there are so many ways to select text? The following list is not comprehensive.

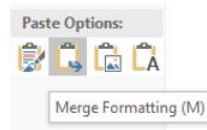
Feature	How to Use
[Ctrl] + A	Selects all text in the document or all files in File Explorer.
Click & Drag	A very common, yet easily error-prone way, by holding down the left mouse key and dragging to select multiple characters, words, or rows of text.
[Shift] + Arrow	Position the cursor, and then click the [Shift] key and use the arrows to select one character at a time.
[Shift] + [Home] or [End]	Position the cursor, and then click the [Shift] key and the [Home] key to select everything from the cursor to the left margin. Conversely, the [End] instead of the [Home] key will select everything from the cursor to the right margin.
Double-click	Selects the current word.
Triple-click	Selects the entire paragraph.
Margin + click	Selects an entire line of text.
Margin + click & drag	Selects multiple lines of text.
Margin + double-click	Selects an entire paragraph.
Margin + triple-click	Selects the entire document.
Selection + [Ctrl]+Selection	Selects two non-contiguous blocks of text. Select the first range of text, then hold down the [Ctrl] key, and select another range of text.

Selecting Text

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2.5: Cut, Copy and Paste

Editing a document often requires moving and duplicating text from one location to another. The process of moving text is commonly referred to as **cut and paste**. When data (text, files, graphics, etc.) is cut, it is removed from the document and placed into temporary memory in the Clipboard. The Cut process can be performed via the scissors icon on the ribbon, using the right-click shortcut menu or using the keyboard equivalent [Ctrl] + X. To paste the recently cut data, position the cursor in the desired location, and then choose **Paste** from the ribbon, shortcut menu, Paste Options screen tip, or the [Ctrl] + V keyboard shortcut.



Paste Options

The **Copy** process can be performed to create duplicate data via the Copy icon on the ribbon, using the right-click shortcut menu or using the keyboard equivalent [Ctrl] + C. The paste process is the same regardless if the prior process is the Cut or Copy option. The paste process offers the paste options menu to allow the user to Keep the Source formatting, Merge the formatting from the source into current document, Keep the Text Only, or paste a picture of the selected data, instead of text. Data can be copied or moved within a document, between multiple documents or between multiple programs. This is a great example of how Microsoft Office is a suite of software applications that use common features to integrate data from one software application to another.

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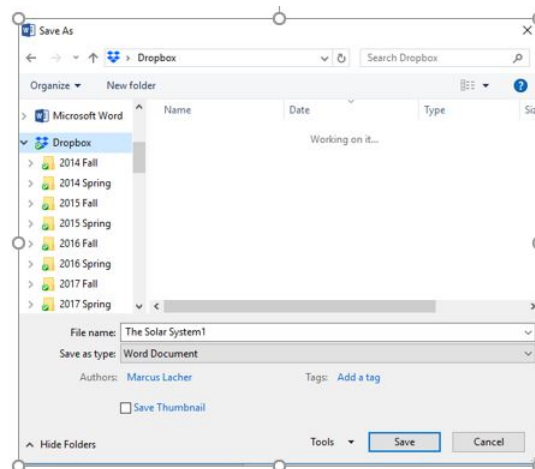
2.6: Saving Files

Once a document has been created, it should be saved as a file for future retrieval. The process of saving a Word document requires two essential elements: giving the document a filename, and defining the location where the file will be stored. The save process can be initiated by clicking the Save icon on the Quick Access toolbar, choosing **Save** or **Save As** from the File menu or using the keyboard equivalents, [Ctrl + S] for Save or [F12] for Save As. The filename should be a unique, yet identifiable description of the file's contents. The filename extension (.docx) is automatically added to filenames in Word. Once saved, the title bar will update with the new file name. The location of the file should also be given careful consideration. The user will likely choose between saving the file to the hard drive of the computer they are using, or using cloud-storage to make the file more easily accessible from multiple devices. The Save command < will overwrite the existing file, while the Save As command will allow the user to change the filename or file location.

Practice 1: The Solar System – Part 1

1. Open the data file *The Solar System.docx* from the course data files.
2. Correct the spelling errors by using the Spelling & Grammar tool from the Review tab. (Word should find four errors that need fixing)
3. Select the two paragraphs of text at the top of page 2 starting with The Asteroid Belt and concluding with ice and metal.
4. Choose the Cut command using the shortcut menu (right-click).
5. Move the cursor to the blank paragraph before the paragraph starting with the text: The Outer Planets.
6. Paste the data using the keyboard equivalent. [Ctrl] + V

Use the [F12] keyboard equivalent to save the file with a new name (add the digit 1 after System) to your computer's hard drive.



Save As dialog

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2.7: Finding and Replacing Text

A document can be automatically searched for a specific character, word or phrase. Choosing the **Find** command on the Home tab will open the Navigation pane where search text can be entered. Matches will be displayed in the pane and highlighted in the document.

Similarly, the **Find and Replace** feature allows users to make mass edits to a document. For example, a user might want to substitute the words teacher with trainer throughout a long document. Using the Replace command found in the Editing group of the Home tab, a user can choose to find and review or replace each occurrence individually or replace all occurrences in one step.

The Advanced Find features are similar to the Find and Replace Search Options. To make the search more specific, Word allows users to define criteria, such as Match case or Find whole words only. These options will narrow the scope of returned results. For example, with the Match case check box selected, the text Mark will not be found if the word mark is entered as the search criteria. Conversely, the use of Wildcard characters will increase the search results. An asterisk character will allow any characters to be substituted. Therefore, check* will find checks, checked or checking.

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2.8: Creating Bulleted and Numbered Lists

Formatting a list with bullets or numbers can help to organize the logic of a document. In a **bulleted list**, each item is a separate paragraph formatted with a hanging indent, a bullet (•), and a tab. The bullet character can be formatted to represent other symbols, such as check marks, squares or other symbols from the bullet library or custom-defined new bullets. Formatting a list with bullets adds emphasis, but not priority. Each bulleted item is considered of equal importance, such as a grocery list. Conversely, a **numbered list** shows a priority or sequence. A typical recipe helps illustrate this difference:



Bullets and Numbered Lists

The ingredients and supplies are listed using bullets, because there is no distinction in their priority. However, the instructions utilize a numbered list, because the sequence is crucial to the process.



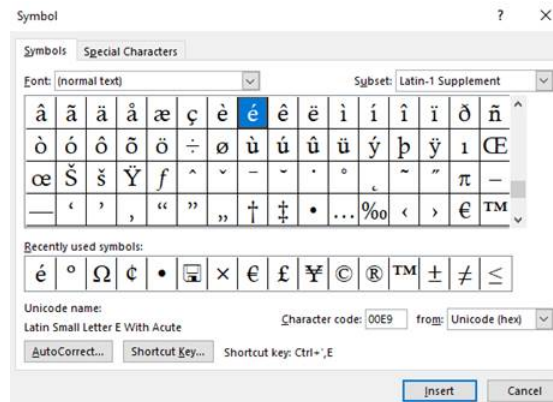
Bullets & Numbering ribbon

To create a bulleted or numbered list, first select the paragraphs of text, and then select the appropriate option from the Home tab on the ribbon. Click the Increase Indent or Decrease Indent commands from the Home tab to format the list appropriately. To remove the bullets or numbering, place your cursor in the list and re-click the Bullets or Numbering command.

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2.9: Inserting Symbols

Unique characters that don't exist on your computer keyboard can be inserted into your document by selecting the **Ω Symbol** option from the Insert ribbon. Special characters such as the degree (°) or trademark (™) symbols can easily be inserted from the Symbol dialog window. Other popular symbols include graphics, shapes, and foreign language characters, such as the (é) used in the word résumé, which is a different word than resume.



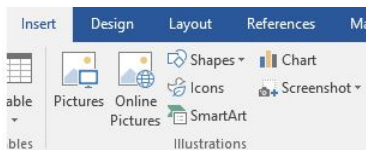
Symbol dialog

In the Symbol dialog window, different sets of symbols will appear when different Fonts or Subsets are selected from their respective list arrows. The Webdings or Wingdings fonts offer a variety of graphics that can be inserted into paragraphs or as bullet shapes.

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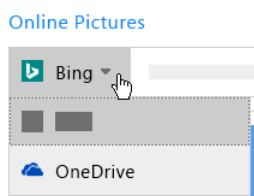
2.10: Inserting and Modifying Graphics

It is said that a picture is worth a thousand words. This could be because graphic images make a document more interesting. You can insert photos from your computer or the web, edit them, compress them, resize and re-position them. Word offers a variety of graphics (from the Illustrations group of the Insert ribbon) that can be inserted into documents to add pizzazz to an otherwise dry document.



Illustrations group

A word-processing application differs from a text editor in part due to its ability to perform basic graphic design functionality. As shown in this textbook, the author has inserted graphic screenshots via the Pictures button on the Insert tab. **Pictures** and **Online Pictures** only differ by where the source files reside. The Pictures option will allow you to insert local pictures that reside on your local device. Conversely, Online Pictures allows the user to insert images from the Internet using Microsoft's Bing search engine or OneDrive, provided you have a OneDrive account set up.



Online Pictures

When inserting graphics obtained from the Internet, keep in mind that using someone else's work without their permission is not only wrong but also may be illegal. US Copyright laws control how a copyrighted work can be used. Consider either using public domain images, which are free to use, or images distributed under a Creative Commons license, which generally are free, as long as you provide attribution to the owner.

Common Graphic File Formats

GIF (pronounced either "giff" with a hard g or "jiff")
 JPG (pronounced "jay-peg")
 PNG (pronounced "ping")

Common graphic file formats

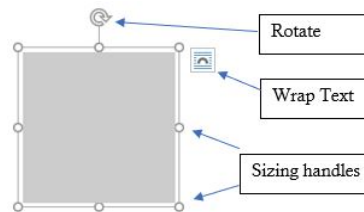
Most of the images inserted via the Pictures and Online Pictures features are likely to be photos. Nonetheless, other common graphics include clip art, scanned artwork, and shapes. Clip art differs from photos when the images consist of simple illustrations. This results in flexible file formats and small file sizes, which explained the appeal to early desktop publishers. However, increased computing resources have marginalized the benefits of clip art, and the rich quality of photos have diminished their demand.



Clip art example

The once popular clip art option is hidden behind the Online Pictures feature. The keyword that is entered into the search box will, by default, retrieve photos, clip art, and other images. However, the filter  option, which appears once the original results appear, can further restrict the results to only clip art images, or other image types, specific sizes, layouts or colors.

A complete array of built-in **shapes** can be inserted to complement existing graphics. Popular shapes include lines, rectangles and flow chart symbols. Once a shape is selected, the user needs to draw it on a blank area of the document. Once inserted, the shape, like any other graphic object, can be resized and re-positioned. To move the image, hover the mouse over the image until the pointer is the four arrows, then click and drag to your desired position. To resize a graphic, select the image and drag a corner **sizing handle** to resize it proportionately. The top/bottom or side handles allow the user to resize the graphic disproportionately. The rotate icon allows the user to rotate the object up to $\pm 360^\circ$.

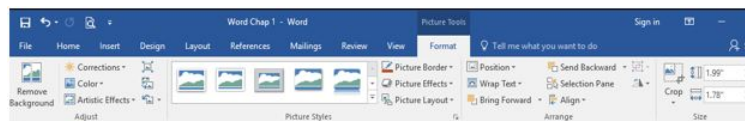


Graphic Editor

Tip

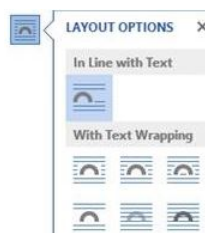
A real useful picture to create is an image of your signature. Use a scanner or take a digital photo of your autograph and save your signature as an image file on your computer. Then insert the file below your typed name in professional correspondence.

Once the graphic is selected, a new contextual tab called the Picture Tools tab will appear on the ribbon. This tab will allow the user to make a plethora of corrections and adjustments to the graphic. Picture styles, effects, layouts, and the image size are common edits to the defaulting graphic. To **resize an image** disproportionately, click the launcher icon in the bottom right corner of the Size group to open the Layout dialog window. Now unmark the Lock Aspect Ratio checkbox.



Resize image

Perhaps the most common feature used in document layout considerations is the **Wrap Text** feature. By default, when pictures are inserted into a document, their layout is set to In Line with Text. This leaves a lot of unnecessary white space to the right of the image. To wrap text around a picture, select the picture, and then select a wrapping option (as shown in the image to the right of this paragraph). Popular options include Tight or Square.

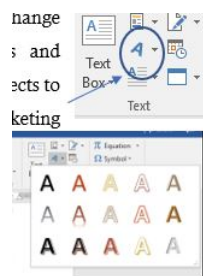


Text Wrap

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2.11: Utilizing WordArt and SmartArt

Another desktop publishing tool that adds pizzazz to a drab document is the use of WordArt or SmartArt.



WordArt styles

WordArt styles

WordArt is a drawing object with special effects that change the appearance of text by formatting special shapes, patterns and orientations. WordArt can be used to add color, outlines and 3-D effects to regular text. Common usage is titles for papers, posters or other marketing materials. Click the WordArt button in the Text group of the Insert tab. After selecting an initial WordArt style, a placeholder box will appear and await your input of text.



WordArt placeholder textbox

WordArt placeholder textbox

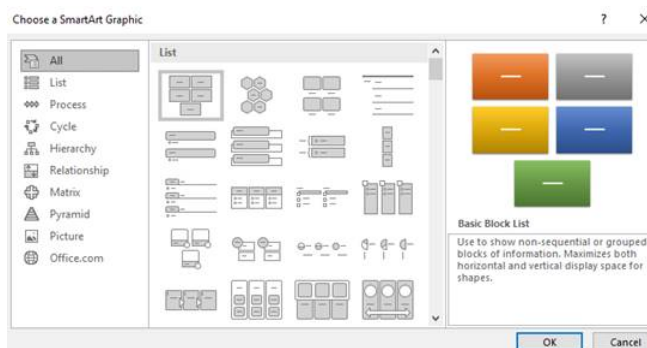
Once inserted, a contextual tab offers numerous to change the effects of the WordArt object. Additional formatting options available include change the text fill, outline or text effects of the WordArt object. The Text Effects offer some exciting ways to rotate and transform the text. The best way to learn about these features is to experiment with them!



Text Effects

SmartArt are diagrams that illustrate concepts and show relationships between elements. Think of SmartArt as pre-made drawing canvases that you can insert into your document and then customize as you see fit. There are a variety of styles to choose from, which you can use to illustrate many different types of ideas. Simply pick an arrangement, such as a list, process, cycle, etc. Insert the SmartArt via the Illustrations group on the Insert tab, which opens the SmartArt dialog window.

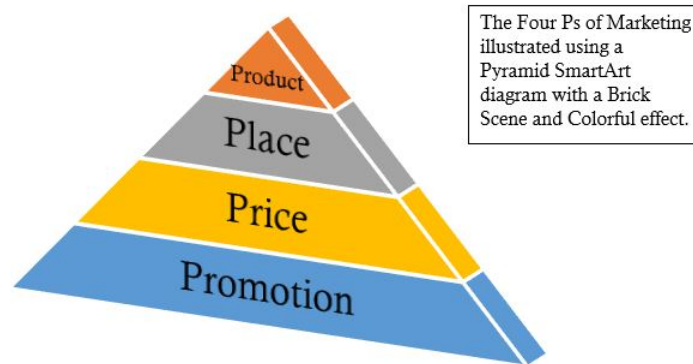
After choosing a layout, a SmartArt placeholder will appear. In a SmartArt graphic, elements are represented by shapes. Each shape can have text applied, be resized and re-positioned. You can even add, delete, promote and demote shapes via the text pane or the contextual tab.



SmartArt dialog

A SmartArt graphic can be formatted and edited using options on the contextual SmartArt Tools Design and Format tabs. The Design tab allows the user to pick from numerous layouts, styles and colors. The Format tab provides choices for shape styles and

WordArt options. SmartArt can be utilized throughout the Microsoft Office suite of applications. Again, the best way to learn about these options is to experiment!

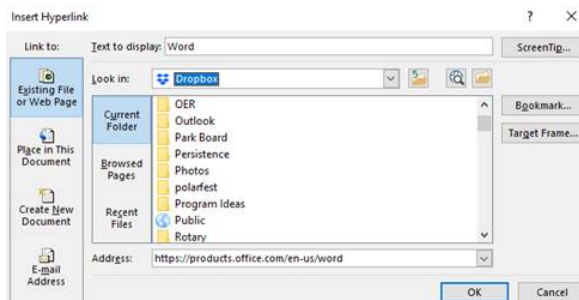


SmartArt pyramid

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2.12: Inserting and Modifying Hyperlinks

A hyperlink, often referred to simply as a link, is text or a graphic that, once clicked, “jumps” to a different location in the file or to a different software program. Software programs include e-mail applications, web pages or an external file, often created in Microsoft Office programs like Excel or PowerPoint. There are a few ways to insert a link into your document. Depending on how you want the link to appear, you can use Word’s automatic link formatting or convert the text or graphic into a link. The fastest way to create a link in a document is to press ENTER or the SPACEBAR after you type the address of an existing webpage, such as www.minnesota.edu. Word automatically converts the address into a link. The same result occurs if the user were to enter an e-mail address, such as marcus.lacher@minnesota.edu. Hyperlinks have two parts: the address (URL) of the web page and the display text. In the two previous examples, the URL matches the display text, however it is possible to create a link to any word, combination of words, or an object, such as a picture or shape.



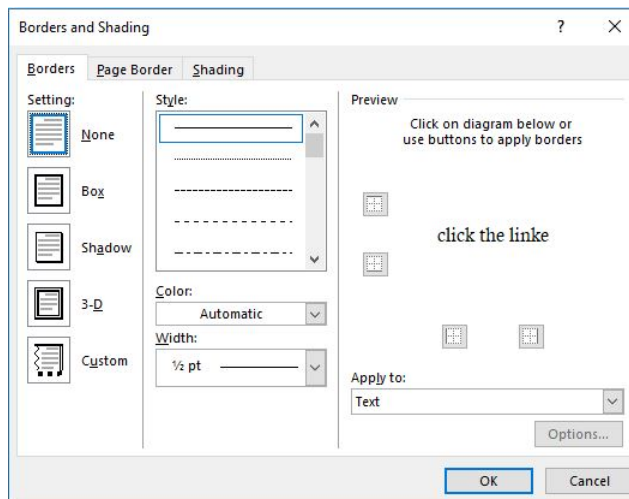
Insert Hyperlink

To create a link on a specific word or object to a web page, start by selecting the word(s) or object, and then click the Link button in the Links group of the Insert tab to open the Insert Hyperlink window. In the illustration below, a link is being defined to go to Microsoft’s website for the Word program. The text “Word” appears as the Text to display so that once the link is created, this text will appear with the hyperlink attributes, which are typically blue and underlined. The Address field contains the URL to the specific web page destination that will open in the current device’s default browser application. The Insert Hyperlink window fields will change significantly if the Link to: open on the left side is changed from Existing File or Web Page to another option. To follow a hyperlink in Word, hold the **Ctrl** key and click the linked text or object.

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2.13: Borders and Shading

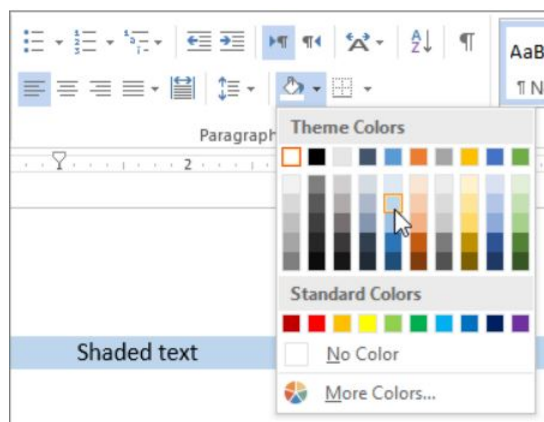
Borders add interest and emphasis to your document. Borders make attractive frames for text, pictures, tables, or entire pages. You can customize borders to complement your document by experimenting with Word's built-in styles. To add a border to text, select the text. On the **Home** tab, click the small down arrow next to the **Borders** button, and choose an option OR choose the Borders and Shading option to open the Borders and Shading dialog window.



Borders and Shading

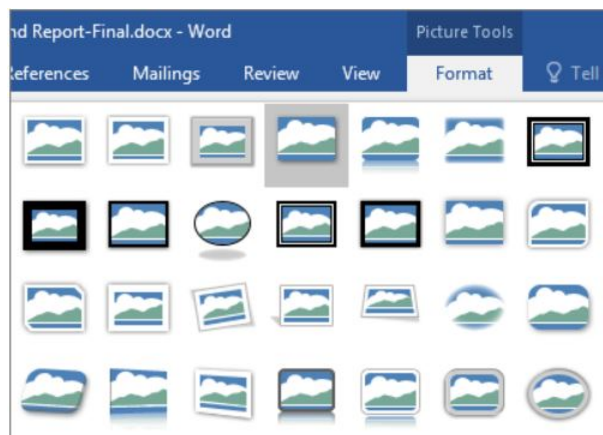
Make sure the Apply to box is set to Text, which adds a border around lines of text, or Paragraph, which creates a border that outlines the paragraph. Also make sure that a choice, like Box, is selected under the Setting option.

Shading is the color or artistic design you use as background for a paragraph. By shading words or paragraphs in Word, you can create visual interest in a document. The **Highlight** command offers a more limited color selection, which you can use when you review or edit a document to highlight specific text. The shading fill, style, and color can be defined from the Shading tab of the Borders and Shading window. To apply shading to a part of a document, select the data, then click the arrow next to Shading, and under Theme Colors, click the color you want to shade your selection.



Shading palette

Borders can also be added to pictures. Just select the picture, then choose a pre-formatted border from the Picture Styles gallery off of the Picture Tools Format tab.



Picture styles gallery

To remove the paragraph borders and/or shading, choose the None option in the Borders and Shading window. In the Shading tab choose the No Color item in the Fill section, and choose the Clear style in the Patterns section.

Practice 2: The Solar System – Part 2

1. Open the recently edited data file *The Solar System1.docx* from your data files.
2. Find and Replace all occurrences of the word “mainly” with the word “primarily”. (Word should find three results that need changing)
3. Select the four paragraphs of text starting with Mercury and concluding with Mars. Create a bulleted list. Repeat these steps using the paragraphs starting with Jupiter through Neptune.
4. In the paragraph following The Sun, replace 9000 degrees with 9000° using the symbol. (Character code 00B0) Repeat this step in the Venus paragraph by replacing 465 degrees with 465°.



The Sun

5. Insert an Online Picture of the sun in the blank paragraph above The Inner Planets. Resize the photo to be 1” x 2”. (Don’t forget to unmark the Lock Aspect Ratio checkbox in the Layout window)
6. Apply the Square Wrap Text format to the picture, and position the image to the right margin.
7. Apply WordArt to the text “The Solar System” using the Orange, Accent 2 fill. Apply the Top and Bottom Wrap Text format to the WordArt.
8. Apply a hyperlink to the text Mars to a web page using the URL: <http://nineplanets.org/mars>
9. Use the [F12] keyboard equivalent to save the file with a new name (add the digit 2 after System) to your computer’s hard drive.

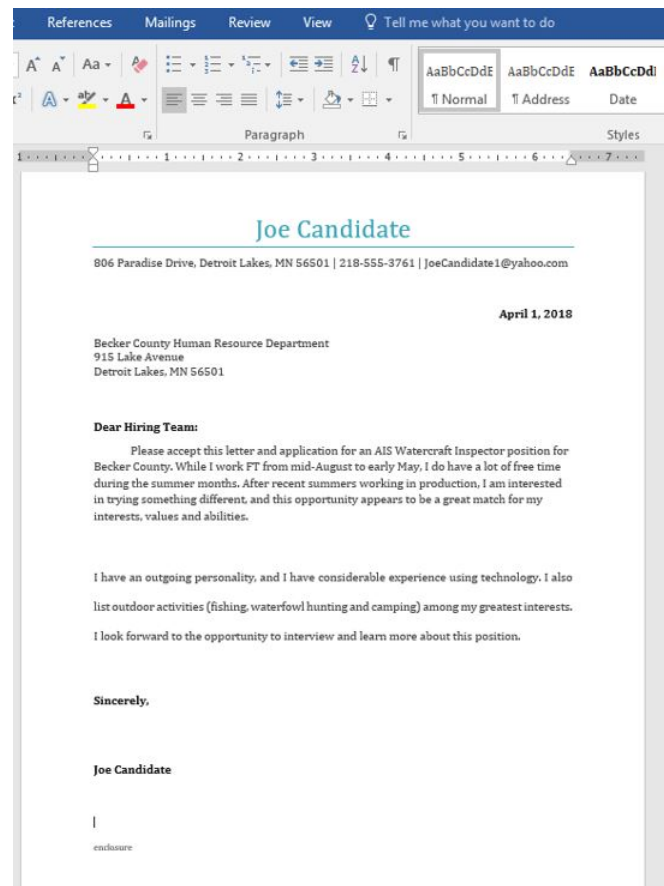
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CHAPTER OVERVIEW

3: Word Chapter II - Formatting Documents

Learning Objectives

- Defining font and text attributes
- Setting paragraph alignment and hyphenation
- Utilizing the Format Painter
- Indenting paragraphs
- Setting tabs and tab stops
- Creating and formatting tables
- Inserting headers and footers
- Setting page orientation and margins
- Creating and inserting citations and bibliographies
- Printing and saving files in alternative file formats



3.1: Defining Font and Text Attributes

3.2: Setting Paragraph Alignment and Hyphenation

3.3: Utilizing the Format Painter

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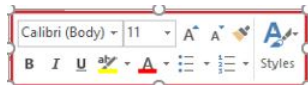
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3.1: Defining Font and Text Attributes

The way text appears on the screen or a page is referred to its format. Formatting text can enhance the appearance of a document, create visual impact, and help illustrate a document's structure. Font, size, and style define a character's format. A **font** is a complete set of characters with the same typeface or design. Dozens of fonts are available in the Font drop down list. Users can easily format text with fonts, colors, styles, and other formats by selecting the text and clicking various commands in the Font or



Paragraph group on the Home tab. The Mini toolbar, appears faintly above text when you first select it, and includes the most commonly used formatting commands. The table below describes the functions of each button on the mini toolbar.

Button	How to Use
Calibri (Body) ▾	Change the font of the selected text. The default font is Calibri.
11 ▾	Change the font size of selected text. Size is measured in points.
A ⁺	Increase the size of selected text.
A ⁻	Decrease the size of selected text.
	Format Painter. Copies the formatting of selected text to apply to other text.
	Apply a style to selected text.
B	Apply bold to selected text.
<i>I</i>	Apply italics to selected text.
<u>U</u>	Underline selected text.
	Apply colored highlighting to selected text.
	Change the color of selected text.
	Format the selected paragraphs as a bulleted list.
	Format the selected paragraphs as a numbered list.
Other Formatting Options from the Font Group not found on the Mini Toolbar	
	Applies a strikethrough line to the selected text. Tells the reader to omit the text.
	Converts the selected text into subscript font, which lowers the position and reduces the size of the text.
	Converts the selected text into superscript font, which raises the position and reduces the size of the text.
	Text Effects and Topography tool changes the look of text by changing its fill, its outline, or adding effects, such as shadows, reflections, or glows.
	Clears the formatting of the selected text.

Many of these commands have keyboard equivalents to improve productivity!

Formatting buttons

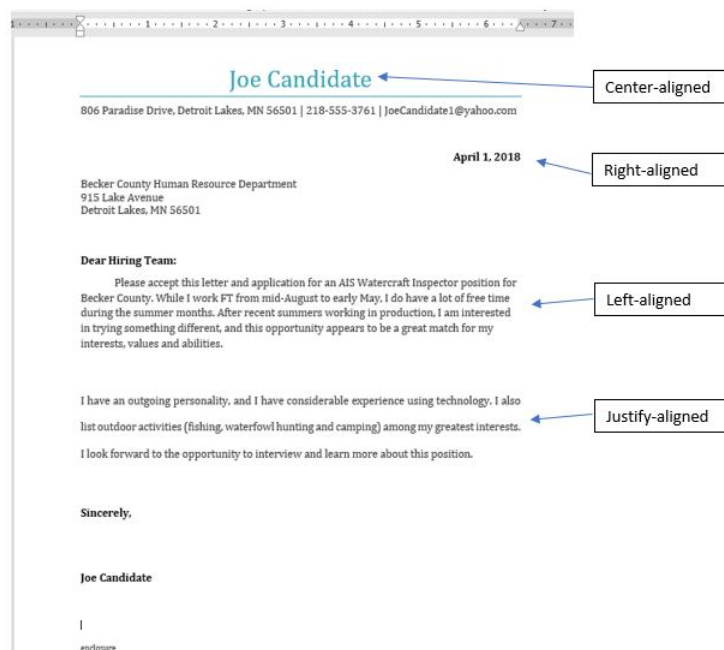
Here are a couple of best practices when utilizing fonts. First, avoid using too many fonts in the same document. More than two or three fonts in the same document becomes distracting. Secondly, legibility and readability should be primary considerations. This should factor in the reader's characteristics, and the purpose of the document. For example, while the default size for a font is 11pt, a larger size font (i.e. 14pt) might be more appropriate for an older aged reader. A pt (or **point**) is the equal to 1/72 of an inch. Headings and titles deserve larger font sizes. However, it is also good practice to limit the quantity of font sizes used in a single document. Lastly, consider using common fonts for professional and business documents. Calibri, Arial, Verdana and Times New Roman are ranked highly by Monster.com as preferable fonts for résumés, whereas Comic Sans is not recommended. Note that Calibri is only available on Windows operating systems, whereas Arial, Verdana and Times New Roman are some of the cross-platform available fonts.

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3.2: Setting Paragraph Alignment and Hyphenation

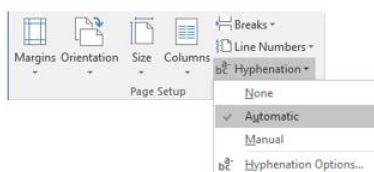
Paragraph alignment determines how the edges of each paragraph aligns with the left and right margins. Alignment settings apply to all text within a paragraph. Remember that a paragraph is created each time the user presses the Enter key. To display the hidden characters, including paragraph marks, press the ¶ symbol in the Paragraph group of the Home tab. Press the button again to hide the formatting marks.

- Left-aligned text is the default paragraph format. The left edge of the paragraph is flush, and the right edge is jagged. This option is typical for letters and reports.
- Centered text is equally distant from the left and right margins. Common uses are titles and headings.
- Right-aligned text is flush with the right edge, and the left edge is jagged. Typical uses are dates or headers and footers.
- Justified-aligned text spreads the text evenly between the left and right margins, leaving both edges flush, unless the final line has limited characters. This option is common for newspaper columns and textbooks.



Paragraph alignments

Hyphenation can improve the overall readability of certain documents. Hyphenation is the process of adding hyphens to words at the beginning of lines so the hyphenated part will fit at the end of the previous line. The hyphens are inserted between syllables in a word. Word can automatically hyphenate your document for you, or you can use the hyphenation tool to manually hyphenate your document.



Hyphenation Options

Users can customize their hyphenation settings via the Hyphenation Options dialog window. Use caution when manually inserting hyphens, because the hyphen will always remain even if editing moves the word to the middle of a line, and results in the word no longer needing hyphenating.

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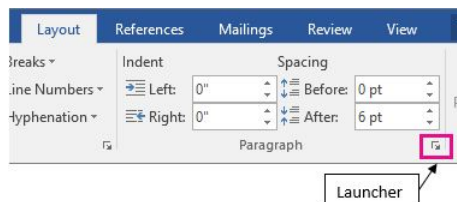
3.3: Utilizing the Format Painter

The **Format Painter** tool allows the user to copy a format from selected text and apply the format to other selections. For example, if you have inserted text in Word, and have it formatted using a specific font type, color, and font size, you could copy that formatting to another section of text by using the Format Painter tool. Select the text or place your cursor in the paragraph that contains your source formatting, then click the Format Painter tool  from the Home tab's Clipboard group. The cursor will change to include a paintbrush  , which indicates that the user can now select the destination text that should receive the source formatting. If multiple areas of text need the same formatting, the user should double-click the Format Painter tool to be able to apply the formatting to multiple selections, until the user presses the Esc key. The Format Painter tool works similarly in Excel and PowerPoint too.

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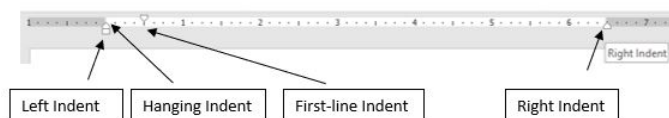
3.4: Indenting Paragraphs

Indenting a paragraph results in moving the editable insertion point from the left or right margins. Users can indent the left or right edge of a paragraph, just the first line, or all lines except the first line. Paragraphs are indented relative to the page's margins, and indenting a paragraph doesn't affect the paragraph's alignment. The default indents are 0 inches, meaning that lines of text extend from the left margin to the right margin. Indenting paragraphs can be performed by pressing the Decrease Indent or Increase Indent buttons on the Paragraph tab of the Home tab. Alternatively, to make precise changes to the Left and/or Right Indents or Paragraph Before/After Spacing, utilize the Paragraph group of the Layout tab. Indents are measured in inches and Spacing is measured in point, much like font sizes.



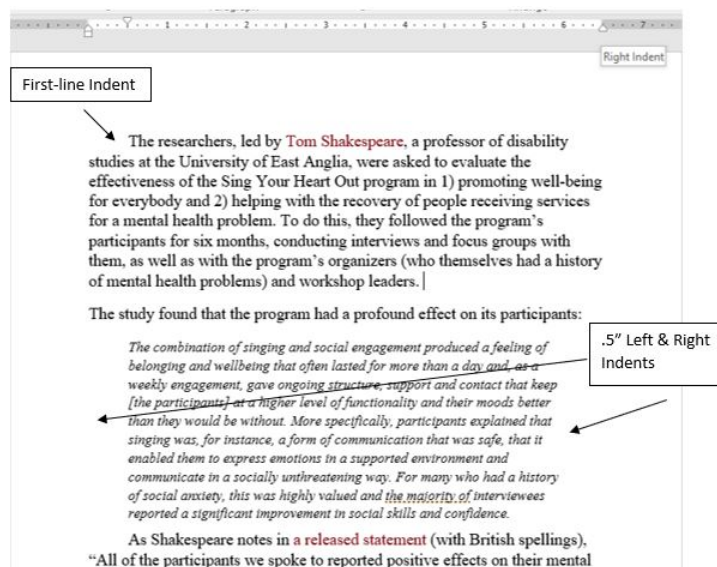
Paragraph Group

A semi-block letter style requires the first line of each paragraph to be indented from the left margin, which is known as a **first-line indent**. Precise indent definitions can be specified in the Paragraph dialog window which can be opened by clicking the **Launcher** button in the Paragraph group. Alternatively, indents can also be set by dragging the markers on the ruler:



Indent ruler markers

A first-line indent requires the user to drag the marker on the ruler to the position where the first line of the paragraph should begin. Typically, this is the .5" mark, which can also be accomplished by pressing the Tab key to indent the first line to the default .5" tab stop. A **hanging indent** occurs when the subsequent lines of a paragraph are indented more than the first. Hanging indents are often used when manually creating citations in a bibliography. To create a hanging indent, drag the marker on the ruler to the right. When citing long quotations in a research paper, users typically use both a left and right indent to offset the quotation, as shown below.



Left and Right Indents example

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3.5: Setting Tabs and Tab Stops

Tabs allow users to align text vertically at a specific location in a document. A **tab stop** is a point on the horizontal ruler that indicates the location at which to align text. A tab stop is a location where the insertion point will stop when the user presses the



key. Tab stops can be used to help align text to create columns of data. Custom defined tab stops are displayed on the ruler above the document. A set of default tab stops are located every half inch, but they do not appear on the ruler. When a new tab stop is defined, Word automatically removes the default tab stops to the left. Using tabs, users can align text to the left, right, or center of a tab stop, or text can be aligned at a decimal point. Word stores paragraph formatting, such as tab stops, in the paragraph marks at the end of a paragraph. Therefore, when the user pressing the ENTER key, tab stops are copied to the next paragraph. The same tab stops can then be used in sequential paragraphs to create columns of text. Tabs can be set by clicking on the horizontal ruler, or by using the Tabs dialog window. The following icons represent different tab stops on the horizontal ruler:

Tab stop icon	How to Use
	Left tab
	Center Tab
	Right Tab
	Decimal Tab

Tab stop icons

Each type of tab stop is used in the example shown below. Note the markers on the ruler:

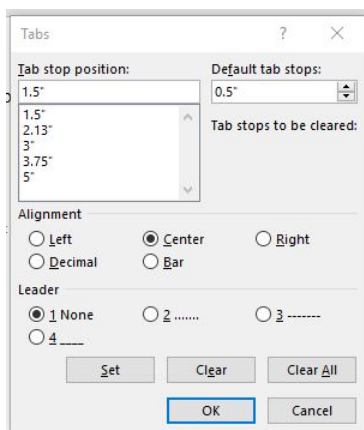


Name	Country	Color	Year	Type	Price
Tahbilk	Australia	Red	2013	Cabernet Sauvignon	\$18.99
Ritual	Chile	Red	2015	Pinot Noir	\$18.99
Simonnet Febvre	France	White	2015	Chablis	\$22.99
Borgo Scopeto	Italy	Red	2014	Chianti	\$15.99
Los Dos	Spain	Pink	2017	Rosé	\$7.99
Tokara	South Africa	White	2016	Sauvignon Blanc	\$19.99
Saint M	Germany	White	2016	Riesling	\$14.99
Ramspeck	USA	Red	2013	Merlot	\$16.99

Inserted tab stops

The default tab stop is Left, but tab stops can easily be switched by multi-clicking the tab selector  on the horizontal ruler. Existing tab stops on the ruler can be dragged to a new position if needed. To remove a tab stop, drag the tab stop off the ruler and release the mouse. The text will realign itself to the existing tab stops. Once the tab stops are in set, newly inserted text will align to the stops when the tab key is pressed. Alternatively, some users prefer to enter text with tabs, but without tab stops, and then apply the tab stops to the existing text.

The Tabs dialog window is useful for adding new, and editing existing tab stops.



Tabs dialog

The window can be opened by double-clicking an existing tab stop or by clicking the Tabs... button in the Paragraph Dialog window, which is opened from the Paragraph Launcher button. The Tabs window is useful for precise position definitions, and it is the only option for adding Leaders to tab stops. A tab **leader** is a character that is repeated to fill the space spanned by a tab. The dotted leader is very commonly used on menus to make it easier to associate the menu description with its correlating price. The Tabs window is also a convenient way to clear one or all tab stops in a document.

Practice 3: Wine Prices – Part 1

1. Open the data file *Wines unformatted.docx* from your data files.
2. Insert two blank paragraphs at the beginning of the document.
3. Select the text Name in the first paragraph. Apply the Arial font, size 12, bold and red text color.
4. Use the Format Painter tool to apply the same formatting from Name to Country, Color, Year, Type and Price. *Hint: Double-click the Format Painter after placing the cursor in Name, and then click each the headings. Click the Format Painter tool again to turn it off.*
5. Select the text starting with Name through \$16.99. Click the Paragraph Launcher button and then click the Tabs... button to open the Tabs dialog window.
6. Set the following five tab stops:
 - i. Center tab stop at the 1.5" position. (Type 1.5 in the Tab stop position field, then click Center, then click Set.)
 - ii. Left tab stop at the 2.15" position.
 - iii. Right tab stop at the 3" position.
 - iv. Center tab stop at the 3.75" position.
 - v. Decimal tab stop at the 6" position. Add a dotted leader before clicking Set. Then click OK.
7. A slight error may be noticeable. If you enable the Show/Hide ¶, you should notice that there are two tabs between Country and Color. Remove one of the tabs. This should align the data into neat columns.
8. Select the same block of text as step 5. Remove the 8 pt of paragraph spacing After each paragraph via the Layout tab.
9. At the top of the document enter the text: Wine Prices. Center-align the paragraph, and make the font 36pt and bold.
10. Save the file with a new name: Tab formatted Wine Prices.docx.

Your file should look like this:



Wine Prices

Name	Country	Color	Year	Type	Price
<u>Tahbilk</u>	Australia	Red	2013	Cabernet Sauvignon	\$18.99
Ritual	Chile	Red	2015	Pinot Noir	\$18.99
<u>Simonnet Febvre</u>	France	White	2015	Chablis	\$22.99
<u>Borgo Scopeto</u>	Italy	Red	2014	Chianti.....	\$15.99
Los Dos	Spain	Pink	2017	Rosé	\$7.99
Tokara	South Africa	White	2016	Sauvignon Blanc.....	\$19.99
Saint M	Germany	White	2016	Riesling	\$14.99
<u>Ramspeck</u>	USA	Red	2013	Merlot.....	\$16.99

Solution to Practice - Part 3

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3.6: Creating and Formatting Tables

A table is a great way to organize information within a document. A **table** is a grid of cells arranged in rows and columns. Tables can be used to organize any type of content, whether you're working with text, graphics or numerical data. Unlike tabs, table cells can have headers (in bold), as well as borders or boundaries, which make the information easier to read. A table typically includes headings that identify each column or row that contains data. The following is a 5×3 table, which means it has five columns and three rows.

Header row in bold

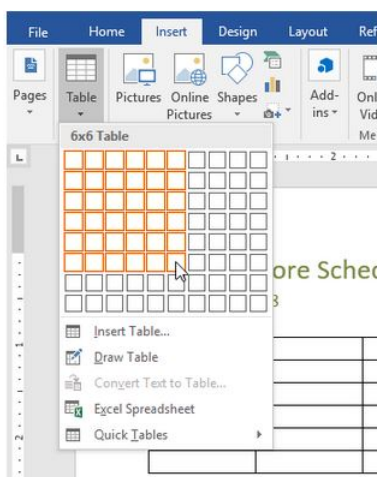
Player	AB	H	R	RBI
Buxton	4	2	2	0
Rosario	4	3	2	2

Columns

Rows

Sample table

To create an empty table, click Table from the Insert tab, and move the cursor over the grid to select the number of cells for the table. Click the grid to create the table and then type text into the individual cells.



Insert Table

Word automatically adjusts the column widths to be equal so that the table fills the space between the left and right margins. To manually adjust the width or height of a cell, drag the border. Press the Tab key to move from cell to cell. If the insertion point is in the last cell, pressing the Tab key will automatically add a new row.

If the number of rows and columns you create turns out to be different than what is needed, you can easily add or delete rows and columns via the Table Tools Contextual tab. The Layout side of this contextual tab will allow the user to change cell size, merge & split cells, sort table data, change text alignment, and modify table properties.

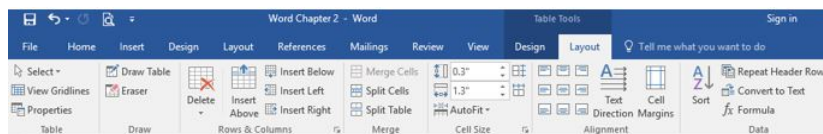


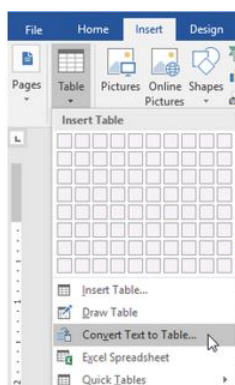
Table Tools tab

The Table Tools Design tab offers additional functionality to modify Word tables. Design elements include defining Table Style Options, like Header and/or Total Rows, selecting from a gallery of Table Styles, as well as adding shading and borders. You can easily insert and delete table rows and columns via this tab as well.



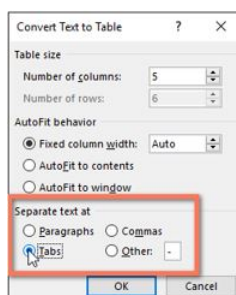
Table Tools Layout tab

It is possible to create a table from text that already exists.



Convert text to table

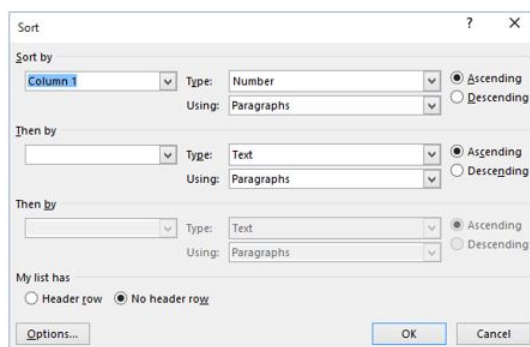
However, the data must be consistently separated, field-by-field, using a delimiter. A **delimiter** can be tabs, paragraphs, commas or some other user-defined character which is used to separate each field. With the cursor residing inside the existing source data, select the Convert Text to Table... option from the Table tab of the Insert ribbon.



Delimiter Separator

Clicking an option from a menu that ends with the ellipsis notation (...) indicates that a dialog window will appear. The Convert Text to Table dialog window allows the user to define the table size, AutoFit behavior, and the delimiter.

The contents of the rows in a table can be sorted based on a column. Users can sort in alphabetic (text), numerical (numbers), or chronological (dates) order using either Ascending (A → Z) or Descending (Z → A) manner. Clicking the Sort button on the Table Tools Layout tab will open the Sort dialog window.



Sort Word

The Sort by options will be the column headers, or Column 1, Column 2, etc. if there is No header row. The first sort selection is known as the primary sort, followed by the secondary, and tertiary sort options. The Type drop-down list will offer the choices of Text, Number or Date, depending on the existing table data. Make sure to choose either Ascending or Descending for each sort level.

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3.7: Inserting Headers and Footers

A header is the area at the top of a page, and a footer is the area at the bottom of a page. Headers and footers consist of one or more lines of text, page numbers, graphics, and other fields, such as the file name, document title, current date and/or time, or author's name. To create a header or footer, click either the Header or Footer drop down list from the Insert ribbon.

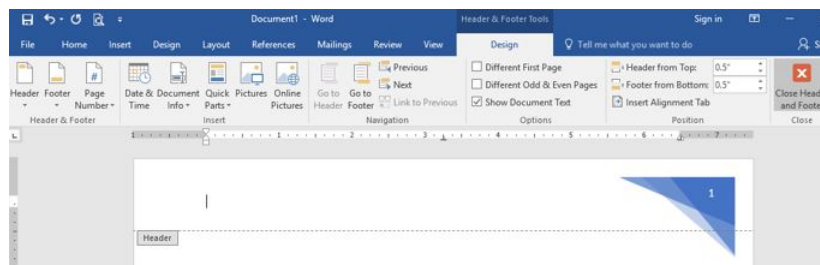


Header gallery

A gallery of built-in designs is displayed. Clicking a built-in design makes the header or footer the active area of the document, while the body of the document fades to the background. A header or footer has three sections: left, center, and right. The user can either type text into existing placeholders, or insert fields from the Header & Footer Tools Design contextual tab, which only appears when the cursor is placed in either the header or footer.

To return to the body of the document, double-click in the document body, or click the Close Header and Footer button on the Header & Footer Tools Design tab. Double-click in the header or footer area to make it active and allow for editing.

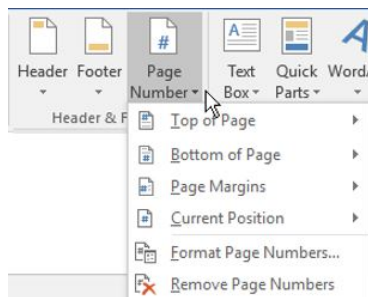
The header or footer is printed on each page of the document. To specify a different header and footers for the first page, select the Different First Page checkbox on the Options group of the Header & Footer Tools



Header Footer Tools tab

Design tab. Any existing header or footer will automatically be removed. A different first page is common in long documents to prevent the cover page from including the headers and footers contained in the rest of the document. A cover page usually does not include any header or footer data.

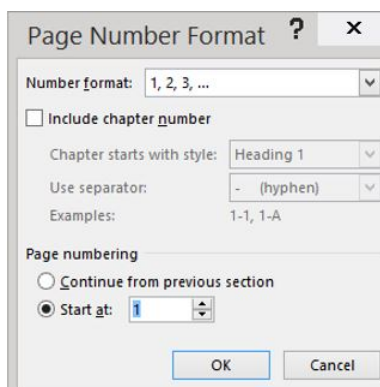
One of the most common purposes of headers and footers is to include page numbers.



Insert Page Numbers

Page numbers are helpful in documents that have more than one page. To add a page number at the current location in an existing header or footer, click Page Number > Current Position, and then choose a style from the gallery of choices. Scroll through the list of style options in the gallery to find one you like. You can select a plain number style, or a **Page X of Y** style to get a more defined starting and ending number (**Page 1 of 7**) format. Experiment to find the style that best meets your needs.

An inserted page number can be further formatted as needed. Number formatting and different starting page numbers can be defined in the Page Number Format dialog window, which is opened when the user selects Format Page Numbers.... from the Page Number drop down list. Number formats include Arabic, alphabet, and roman numeral formats.



Page Number format

The Page numbering options allow a user to restarting the page numbers at a user-defined number. This can be useful to recognize unnumbered pages that precede the main part of the document.

In the Position group, you can control the amount of space allotted to the header and footer. By default, each is 1/2-inch tall. Users can change these values in the Header from Top and Footer from Bottom list boxes. Manipulating these selections will affect the printable area of the document's margins.

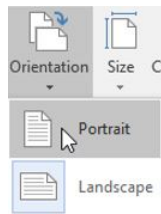
It is a "best practice" to add page numbers before adding other header and footer fields, because any existing text will be replaced by adding page numbers using the Insert > Page Number process. Alternatively, users can add page numbering to existing header and footer text through the Quick Parts feature, which is not explained in this text. Other than page numbers, headers and footers often contain the document's author, date and/or title. Each of these fields help identify the document, particularly when the document is printed and compared with other similar documents.

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3.8: Setting Page Orientation and Margins

The page setup of a document includes settings such as margins, orientation, and other pagination settings. These settings can be applied to the entire document, or specific sections, which can be created by inserting section breaks (not explained in this text). The Page Setup group found under the Layout tab contains these selections.

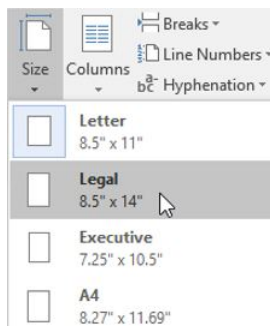
Page **orientation** refers to how a rectangular page is arranged for viewing.



Orientation

The orientation of a Word document can be either portrait or landscape. Portrait orientation is taller than it is wide (vertically), and landscape orientation is wider than it is tall (horizontally). The default orientation is portrait.

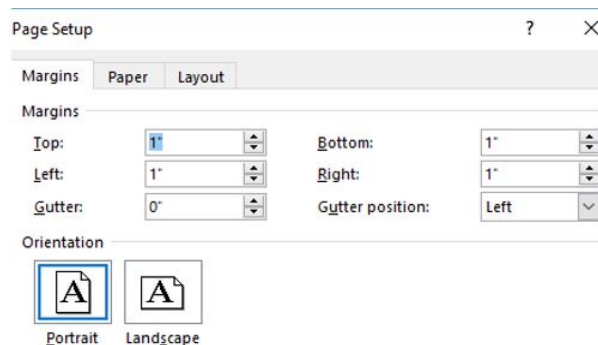
Choosing a page orientation needs to consider the paper size selected for the document. The standard paper size in North America is called Letter, which has the dimensions of 8.5" x 11". Legal documents are 14" instead of 11", which means when printed in portrait orientation, legal documents are three inches longer (and a pain to fit in a standard folder!). The standard paper size in Europe is known as A4. Its dimensions are 210mm x 297mm, which is closer to the Legal size, than the Letter size.



Paper size

Many posters and tables are often printed on Tabloid sized paper, which is 11" x 17". However, since a lot of home printers cannot accommodate this size of paper, many users choose to change their orientation to landscape, which changes the printable width to 11", and the printable height to 8.5". If adjusting the orientation doesn't solve the layout challenges of the document, consider adjusting the margins!

Margins are the white space surrounding the text on a page. Margins can be specified for the top, bottom, left and right edges of a document. The default margins are 1" each, but margins can easily be adjusted from the pre-set choices in the Margins drop-down list, or by manually adjustments in the Page Setup window, which can be opened by clicking the launcher button in the Page Setup group in the Layout tab. Narrow margins leave more room for more data, while wider margins decrease the amount of printable space. Similarly, larger top and bottom margins decrease the available space. If adjusting orientation and margins aren't enough to resolve page formatting, consider using page breaks.



Page Setup window

Pagination is how a document is divided into pages. Word automatically determines how much text will fit on a page based on the amount of text and the document formatting. As new data is added to a page, Word creates automatic page breaks, also known as soft page breaks. To force data to a new page, a user can insert a manual (hard) page break. Inserting a **page break** moves the text after the insertion point to the next page. To insert a page break, press Ctrl + Enter or click Page Break from the Insert tab. To remove manual page breaks, utilize the Show/Hide button to display formatting marks, such as the Page Break mark:



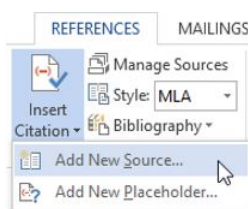
To remove a hard page break, place the insertion point to the left of the page break and press the Delete key. Word will re-paginate itself, and move data to the previous page.

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3.9: Creating and Inserting Citations and Bibliographies

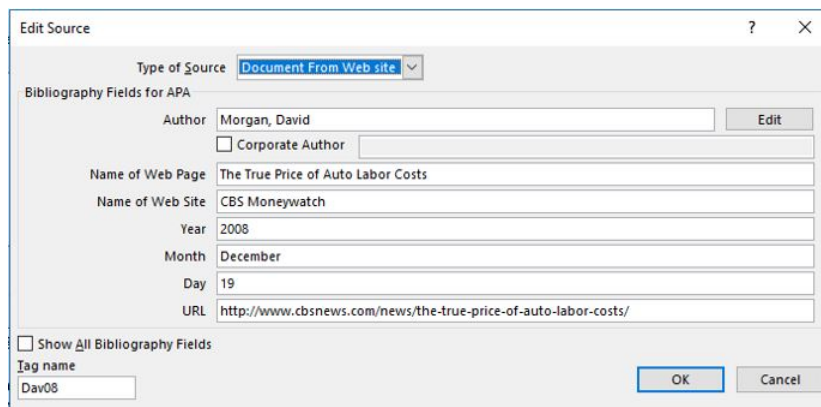
Many college courses require students to write research papers. While conducting the appropriate research may be the main objective of the assignment, collecting the research is often not as challenging as documenting the sources of the research. Part of the challenge associated with properly documented sources is understanding the format of the required style guide assigned by the instructor. A style guide is a set of standards for creating documents, and citing of sources. A **citation**, or a **reference**, is a formal acknowledgement to a published or unpublished source. The purpose of using citations is to give credit to the author of the original research, and avoid plagiarism. **Plagiarism** occurs when a user presents the data of another author as if it were their own. The major writing style guides include MLA, APA, CSE, and Chicago. Each style has unique requirements for handling citations.

A typical requirement of a research paper is the production of a bibliography, a Works Cited or References page. A **bibliography** is an alphabetic list of the sources used to produce a scholarly work. Each style guide has different requirements for what data is needed to be listed for each source. The bibliography helps the reader identify the source of the writer's research. Manually creating a bibliography can be a tedious and inexact process, and updating a manually-generated bibliography will likely induce heartburn. However, by carefully entering sources into Word, a bibliography can be accurately generated and re-generated with ease.



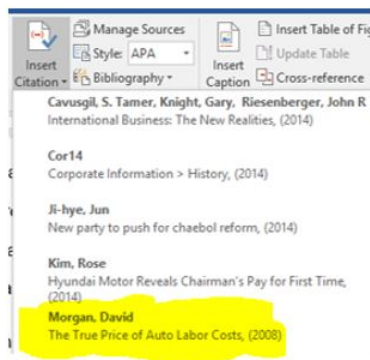
Insert Citations

Before a user can create a bibliography, they must create at least one citation and source in the document. Whenever a source is referenced in a document, the user should create a citation to give the original author credit. To add a citation, place the cursor in the desired location (follow the style guide), and click Insert Citation from the References tab, then choose Add New Source...



Edit Source

The Create/Edit Source dialog window will appear where the user can enter as much information regarding the source as possible.



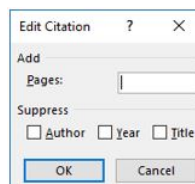
Citations

The first field, Type of Source, will dictate which bibliography fields are needed for the source depending on the specific style guide. After entering the publication details, and clicking OK, the citation will appear in the document, and the source will be saved.

account for about 10 percent of the entire cost of producing a vehicle. The remaining 90 percent includes R & D, parts, advertising, marketing and management overhead (Morgan, 2008). Therefore, any savings on parts can offer a significant competitive

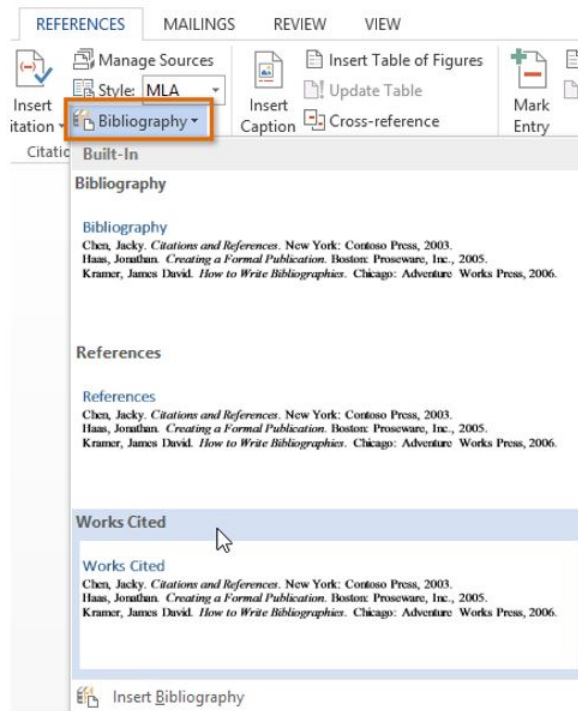
Inserted citation

Types of sources can include books, a web site, an article in a periodical, a sound recording, and many more. Often, a single source can be cited numerous times in a report. Users can easily add the citation again by clicking the Insert Citation drop down button from the References tab, and selecting the source from the drop-down menu. A citation can be edited to add page numbers. Open the citation's inline drop-down menu and choose Edit Source. Certain fields can even be suppressed.



Edit Citation

After completing the paper, adding all the sources for the document, and completing the summary, adding the bibliography or works cited is extremely easy! Typically, a bibliography will reside on its own page. Therefore, create a manual page break, and then on the References tab, in the Citations & Bibliography group, choose the Bibliography option and choose from the pre-designed formats to insert the Bibliography or Works Cited into the document.



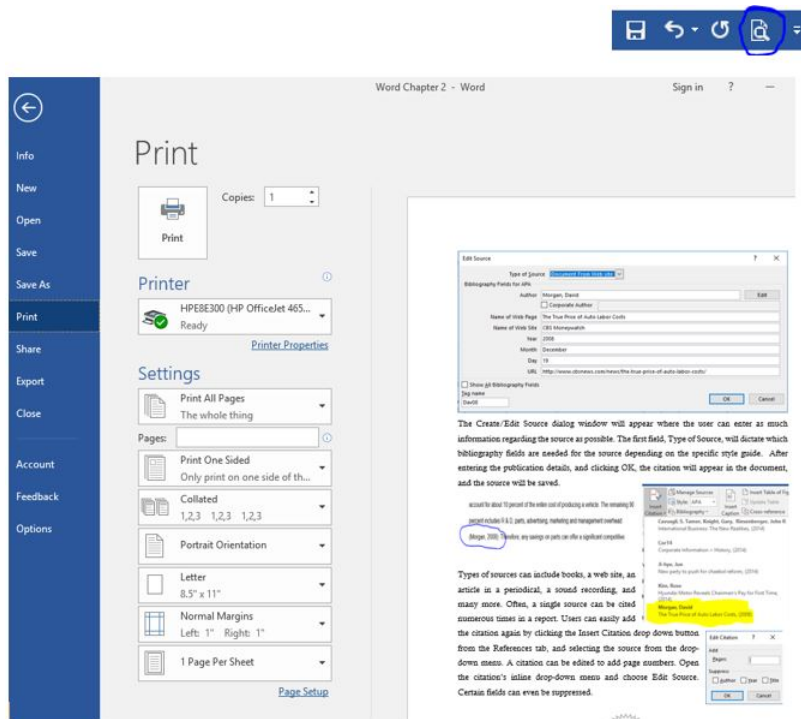
Built-in Bibliography

The bibliography appears and the sources are formatted to match the selected style guide. If the user ends up adding more sources to the document, they can easily update the bibliography by clicking it and selecting Update Citations and Bibliography.

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3.10: Printing and Saving Files in Alternative File Formats

Before printing a document, it is a good idea to preview the document and specify which pages should print. The preview might help the user discover some layout issues that can be addressed before wasting ink/toner and paper. The Print Preview window can be accessed in Backstage view by clicking File > Print. It is also a popular idea to add the Print Preview command to the Quick Access toolbar if it doesn't already exist.

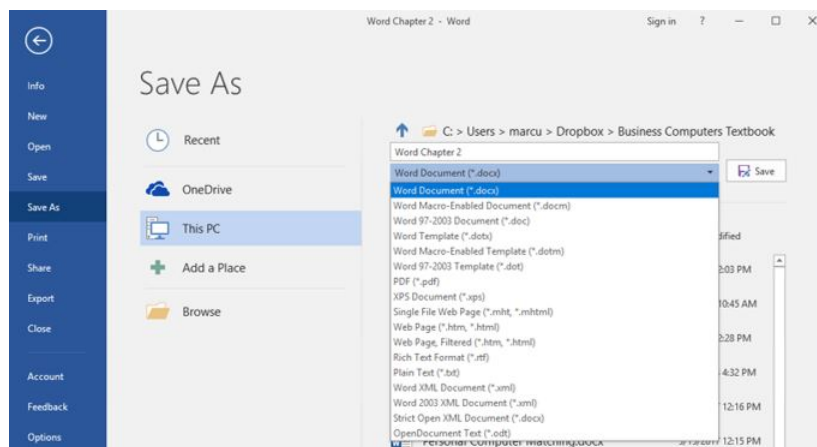


Print Preview

Numerous options can be defined in Backstage view, such as which printer, how many copies, which pages, etc. Once these decisions are made, pressing the big Print button in the top left of the window, will send the data to the selected printer. The back button  will exit Print Preview.

If printing a hard copy is not desired, saving the file is the obvious alternative. The way that the user saves a document and the format that they save it in depends on how they plan to use the document. While choosing Save from the File menu will resave the file in its existing format, choosing the Save As command (F12) provides numerous alternatives.

The first option available by using the Save As dialog window, is the ability to choose an alternative storage destination versus the existing location. Alternate storage destinations include a different file folder on the user's hard drive, a portable file storage location, such as a USB drive device, or a cloud-based storage location. OneDrive is Microsoft's cloud-based storage option, but other cloud-based solutions, such as Dropbox, exist as well. Cloud computing requires Internet-connectivity to access the current versions of the files. An alternative file format is another option to consider from the Save As window. Choosing the drop-down list to the left of the Save button displays a list of alternative file formats.



Save As Word

One of the most common alternative file formats is a PDF (Portable Document Format) file. PDFs are popular formats to share with non-Microsoft Office users, commercial printers, and users for whom the document is not to be edited. The PDF format looks the same on most computers, has a smaller file size, and preserves most formatting characteristics of the source document. The only software that is required to read or print a PDF file is Adobe Reader, which is available as a free download from Adobe's web site. While prevention of editing was a key feature of PDF files, the current version of Word can actually edit PDF files, however, the edits are traceable.

The other common file format is saving a file to be viewed on a web site or simply in a web browser. Saving a file as a Single File Web Page is the optimal approach to allow users to open the document using a web browser. The file extension of a single file web page is .MHT. Other occasionally used file formats include: .XPS, .ODT, and RTF.

Practice 4: The Solar System – Part 3

Name	Number of Moons
Mercury	0
Venus	0
Earth	1
Mars	2
Jupiter	63
Saturn	59
Uranus	27
Neptune	13

Table of planets

1. Open the recently edited data file *The Solar System2.docx* from your data files.
2. Create a 2 x 9 table at the end of page 2.
3. Add and format data to table as shown to the right.
4. Add a new column to the table to the left of the Name column. The header should be Proximity to the Sun. The data should be 1, 2, 3 8.
5. Sort the table in descending order by Number of Moons.
6. Apply the Grid Table 4 – Accent 4 table style to the table.

Comets-consist mostly of gas, ice and dust. They orbit in large, oval orbits. the ice melts creating the comet's tail.

Proximity to Sun	Name	Number of Moons
5	Jupiter	63
6	Saturn	59
7	Uranus	27
8	Neptune	13
4	Mars	2
3	Earth	1
1	Mercury	0
2	Venus	0

Footer

The Solar System3 Page | 2

Formatted table

7. Add the file name field to the left side of the footer, and the Accent Bar 2 page number to the center section of the footer. Refer to the illustration at right for steps 4-8.
8. Change the paper size to Legal.
9. Insert a page break before the paragraph beginning with The Dwarf Planets.
10. Change the margins to the Office 2003 defaults.

The Sun

The sun is one of millions of stars in Earth's galaxy. It is a relatively small star but it is still 109 times the size of the Earth. The sun's diameter is 1392000km and the temperature on the sun ranges from 4000 to 9000° Celsius. (The Sun, 2018)

11. Add a new citation source following the period at the end of the paragraph regarding the Sun on page 1. The source details should be a web page (The Sun) on a web site (Nine Planets). Use today's date for the Year, Month, Day, and the URL: nineplanets.org/sol.html. Mark the Corporate Author checkbox.

Works Cited

12. Add a Works Cited at the bottom of page 2. *The Sun*. (2018, 06 17). Retrieved from Nine Planets: nineplanets.org/sol.html
13. Save the file with a new name. *i.e. The Solar System*. Save another version of the file in PDF format.

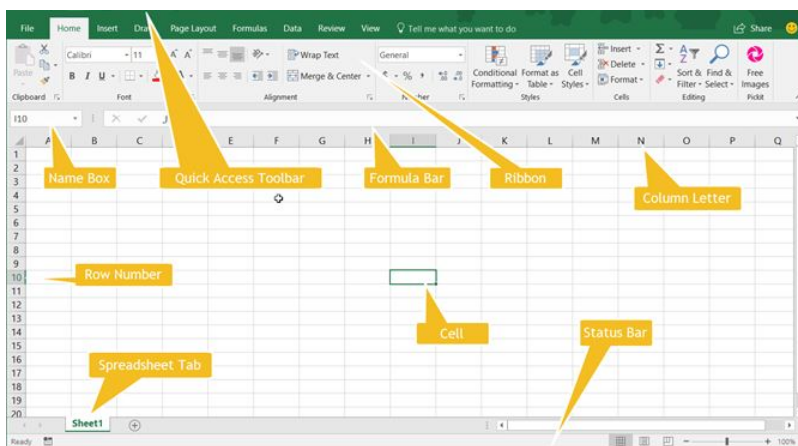
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CHAPTER OVERVIEW

4: Excel Chapter I - Spreadsheet Basics

Learning Objectives

- What is a Spreadsheet?
- Entering, Selecting and Inserting Data
- Manipulating Sheets
- Formatting Worksheets
- Creating Formulas to Perform Calculations
- Copying and Pasting Formulas
- Adding Basic Functions to Formulas
- Inserting Headers and Footers
- Adjusting the Page Layout and Preparing to Print



- 4.1: What is a Spreadsheet?
- 4.2: Entering Data
- 4.3: Selecting Data
- 4.4: Inserting Data
- 4.5: Manipulating Sheets
- 4.6: Formatting Worksheets
- 4.7: Creating Formulas to Perform Calculations
- 4.8: Copying and Pasting Formulas
- 4.9: Adding Basic Functions to Formulas
- 4.10: Inserting Headers and Footers
- 4.11: Adjusting the Page Layout and Preparing to Print

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4.1: What is a Spreadsheet?

A **spreadsheet** is a collection of data that is organized into rows and columns. Microsoft® Excel is a spreadsheet application used to store and analyze quantitative data. An Excel file is called a **workbook**, and it is saved with an .xlsx extension. A workbook file consists of one or more **worksheets** which consists of many columns and rows. **Columns** are the vertical part of a worksheet grid identified by letters. Rows are the horizontal part of a worksheet grid identified by numbers. The intersection of a row and column is called a **cell**. Each cell can store a single item of data. The data can contain text, numbers, formulas, and/or functions. Clicking a cell with the mouse pointer will make the selected cell the **active cell**. The active cell's contents are displayed in the formula bar.

Typical uses for Excel include:

- Accounting reports (Balance Sheets, Income Statements, etc)
- Budgets
- Calendars
- Checklists and task lists
- Contact/Address lists
- Expense tracking
- Inventory control
- Invoices
- Mortgage and other financial calculations
- Operational statistics
- Sales price lists, forecasts and analysis

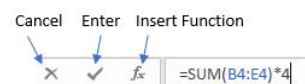
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4.2: Entering Data

Type of Data	Purpose
Label	Any text. Cannot be used in calculations. Left-aligned.
Value	Numbers that can be used in calculations. Right-aligned.
Date/Time	Can be used in calculations. Right-aligned.
Formula	An expression that starts with an equal sign and produces a result that may contain numbers, text, operators and/or functions.

Types of Data

Excel is great tool for generating useful information from data. However, the data has to be entered before it can be analyzed and manipulated. There are numerous types of data, and numerous ways to streamline data entry. As data is typed, it appears in the active cell and in the formula bar. Pressing the Enter key will complete data entry and make the next cell in the column the



active cell. If moving to the next cell after completing data entry is not the desired outcome, try clicking the Enter check mark in the formula bar. The data will be entered, but the active cell remains the current cell. Pressing the Esc key before completing data entry will cancel data entry and restore the original cell contents.

Streamlining data entry in Excel can be accomplished using several different features including keyboard shortcuts and Automatic Completion. **Keyboard shortcuts** allow rapid navigation in a worksheet without having to use the mouse.

Keyboard Shortcut	Result
Ctrl + C	Copy the cell contents to the clipboard.
Ctrl + X	Cut the cell contents and copy to clipboard.
Ctrl + V	Paste the contents from the clipboard.
Ctrl + N	Open a new workbook.
Ctrl + S	Save the current workbook (with same name).
F12	Opens the Save As window (save to a new location or with a new name).
Ctrl + P	Print the file.
Ctrl + F2	Open Print Preview window.
Ctrl + Z	Undo last action.
Ctrl + A	Select the entire worksheet.

Excel shortcuts

There are hundreds of keyboard shortcuts available in Excel and many are also available in other Microsoft Office applications. A few keyboard equivalents are illustrated at right, but for more examples, use the shortcut F1 to open the Help pane, and type *keyboard shortcuts* in the Excel Help field.

When entering data into a sheet that contains a lot of duplicates, Excel uses the Automatic Completion feature to speed up data entry. After typing a couple of characters, Excel guesses how to fill the rest of the cell based on data previously entered in the cells

Jordan Howard	RB	Eagles
Keenan Allen	WR	Chargers
Joe Mixon	RB	Bengals

above. To accept the suggestion (in highlighted text), press Enter, or alternatively, continue typing to replace the automatic entry.

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4.3: Selecting Data

After entering data, a common practice is to begin formatting the data. However, before a user can format the data, they must first select the data. Selecting data has multiple techniques based on user intent. Clicking on a single cell makes that cell the active cell. The cell reference appears in the Name box to the left of the formula bar. To select an entire column of data, just click the column letter heading. To select an entire row, click the row number heading. If a user wants to select several cells adjacent to each other, this would be considered selecting contiguous cells. Clicking the middle of the cell and dragging horizontally or vertically will select a **contiguous** range of cells. Another way to select a contiguous range of sequential cells is to click the first cell, hold down the Shift key, and click the last cell in the range. For example, clicking cell A3, and then holding down the Shift key and selecting F7 would select all of the cells from A3 through F7. The range reference would be written as A3:F7.

	A	B	C	D	E	F	G
1	Little Lizzie's Girl Scout Cookie Sales						
2							
3	Date	Thin Mints	Chocolate /Peanut Butter	Carmel D'Lites	Peanut Butter Sandwich	Sales \$\$	
4	1-Feb	13	10	8	3	\$136	
5	2-Feb	11	18	13	7	\$196	
6	3-Feb	12	19	8	4	\$172	
7	4-Feb	13	18	4	4	\$156	
8	5-Feb	15	11	7	3	\$144	
9	6-Feb	8	9	2	5	\$96	
10	7-Feb	2	3	0	2	\$28	

Contiguous Range

Selecting a non-contiguous range of cells requires the use of the Ctrl key. To select **non-contiguous cells**, click the first cell, hold down the Ctrl key, and click each additional cell. This practice is sometimes referred to as “cherry-picking” cells. In the example below, the selected range of cells are A4,A6,A7,F4,F6,F7. This practice can be used for selecting non-adjacent rows or columns as well.

	A	B	C	D	E	F
1	Little Lizzie's Girl Scout Cookie Sales					
2						
3	Date	Thin Mints	Chocolate /Peanut Butter	Carmel D'Lites	Peanut Butter Sandwich	Sales \$\$
4	1-Feb	13	10	8	3	\$136
5	2-Feb	11	18	13	7	\$196
6	3-Feb	12	19	8	4	\$172
7	4-Feb	13	18	4	4	\$156
8	5-Feb	15	11	7	3	\$144
9	6-Feb	8	9	2	5	\$96

Non-Contiguous cells

To select the entire worksheet, click the triangle box located to the left of column A and above row 1, or by pressing the keyboard shortcut: Ctrl+A.

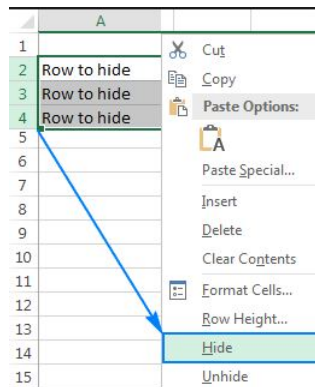
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4.4: Inserting Data

It is usually easy to add data to an existing worksheet, because Excel has seemingly unlimited columns and rows of cells. (There are limits, but this is not Jeopardy!) Nonetheless, sometimes it is necessary to insert a column or row into the middle of an existing

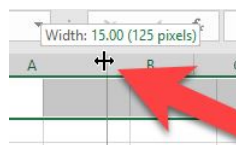


range of cells. To insert a new column, select the column heading to the right of where you want the new column to appear, and click the top-half of the Insert button from the Home tab. Alternatively, just right-click the column heading to the right of the destination, and choose Insert from the **Context Menu**. Deleting columns is very similar. Whichever column(s) that are selected will be deleted if using the Delete button instead of the Insert button. Inserting and deleting rows is also very similar. Selecting the row below the intended new row and either choosing Insert from the ribbon or from the Context Menu will create a new row above the selection. For example, right-clicking row 10, and choosing Insert from the Context Menu will create a new, blank row 10, and all existing data will move down one row.



Shortcut menu Excel

Using the right-click method is a little faster than clicking the worksheet and then clicking the ribbon, as the shortcut menu avoids the need to move the mouse to the ribbon. The Context Menu, also known as Shortcut Menu, provides added functionality by offering actions that can be taken with the selected item. In addition to inserting and deleting, formatting column widths and row heights, as well as hiding and unhiding columns and rows are options from the Context Menu. Adjusting the column width is a common action since excessively wide columns prohibit efficient worksheet printing. Therefore, it is often preferable to widen a column width by double-clicking the boundary bar that separates the column heading letters. This is known as **auto-fitting** the column width since the column will resize its width to be just wide enough to display the longest data contained in that column.



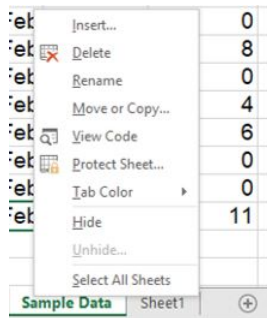
Column width pointer

Clicking and dragging the double-arrow pointer to the left or right allows users to manually adjust the column width.

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4.5: Manipulating Sheets

An Excel workbook consists of one or more worksheets.



Sheet Shortcut menu

Much like a binder can have multiple sections of sheets divided by colorful tabs, an Excel workbook can multiple sheets that can be re-arranged, colored and renamed to fit individual organization plans. Inserting and deleting worksheets is similar to the inserting of columns and rows. In addition to using the Insert or Delete buttons from the ribbon, right-clicking an existing sheet tab will produce a Context Menu with a plethora of options.

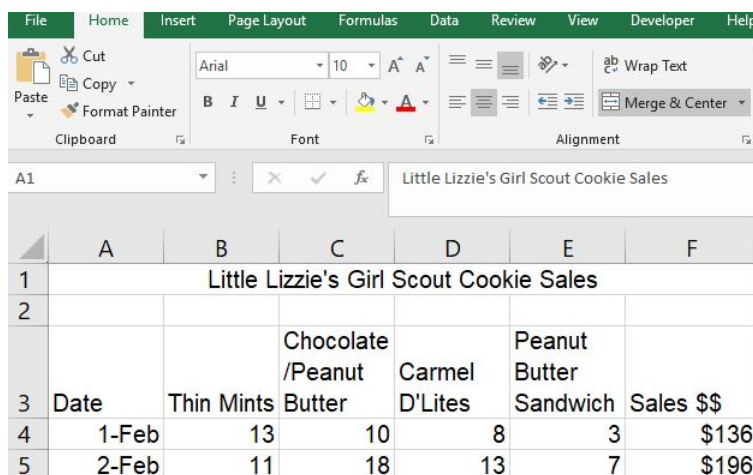
Just as inserting a new column will add the column to the left of the selected column, the newly inserted worksheet will appear to the left of the selected sheet tab. Options exist to insert a blank worksheet or a new sheet based off of an existing template. Clicking and dragging sheet tabs are easy method to rearrange the order of sheets. However, the Move or Copy... command offers the opportunity to move or place a duplicate sheet within an existing, open workbook. Adding tab colors and the Rename option can help organize sheets to user-specific criteria. Sheets can also be hidden and unhidden. If it is necessary to prevent others from unhiding sheets, the workbook can be protected with a password to be able to modify the sheets. The tab scrolling buttons to the left of the sheet tabs are enabled when too many sheets exist to be displayed above the status bar. To quickly add a new, blank sheet to the workbook, click the plus button  to the right of the sheet tabs.

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4.6: Formatting Worksheets

Formatting data generally makes it easier to comprehend, and more attractive. The goal of formatting a business spreadsheet should be to make it look professional, accurate, and understandable. Options to format worksheet data depends a lot on the type of data. Formatting text in Excel is very similar to formatting text in Word. Using the Font and Alignment group icons on the Home tab of the ribbon, users can manually format all of the data in a cell or in a range of cells. Changing default formats includes things like changing the font color, style, size, text alignment in a cell, or apply formatting effects – all in an effort to make the data appear more visible.

Excel's tabular layout (organized into labeled columns and numbered rows) sometimes limits the amount of data that can be efficiently displayed.



	A	B	C	D	E	F
1	Little Lizzie's Girl Scout Cookie Sales					
2			Chocolate /Peanut	Carmel	Peanut Butter	
3	Date	Thin Mints	Butter	D'Lites	Sandwich	Sales \$\$
4	1-Feb	13	10	8	3	\$136
5	2-Feb	11	18	13	7	\$196

Alignment of data

Using the Alignment group options can help format data to make it appear as much like a word processed report as possible. In the screenshot above, two Excel-unique formatting features help make the data more readable. In row 1, the text has been merged and centered across cells A1:F1. This required the cell range A1:F1 be selected before clicking the **Merge & Center** button from the Alignment group. This is very popular for worksheet titles. If the wrong cell range was selected and the Merge & Center is not effective, the user must re-select the Merge & Center button to unmerge the data, so the correct range can be selected before again clicking the Merge & Center button.

Another popular Excel text-formatting feature illustrated above is the **Wrap Text** tool, which will prevent text from being truncated by wrapping the text into multiple rows within the same cell. If a cell has a lot of text, the data will overlap into the next cell to the right of the active cell. However, if the adjacent cell already has data, the text will be truncated (cut-off) without applying this feature. Cells C3:E3 in the above screenshot each have the Wrap Text feature applied.

While Excel has some pretty useful text-formatting functionality, the majority of data entered into Excel is usually numerical data. Therefore, utilizing Excel's number formats effectively is crucial to make the worksheet as professional as possible. Professional formatting relies a lot on consistent formatting. Therefore, using the Format Painter tool (introduced in the Word chapters) and workbook themes are very helpful to maintain that consistency. Changing the existing **theme** will dynamically update the appearance of all worksheets in a workbook by modifying the fonts, styles, colors and/or effects.

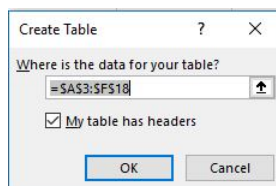
Applying the correct cell format to numerical data is more than just style – it is substance too, because applying the wrong format can impact how other, related cell results are interpreted. The following graphic describes some of the more popular number formats. In addition to the examples provided, there are also other formats, including date & time values, which can be accessed by clicking the Number Format drop-down list.

	A	B	C	D	E	F	G	H	I	J
1	Number Formats									
2	Format Name	Example	Ribbon Icon	Description						
3	General	7500		Default format; displays the numbers the way they were typed.						
4	Number	7500.00		Displays the number with two decimal places.						
5	Currency	\$7,500.00		Displays the number with a currency symbol and two decimals.						
6	Accounting	\$ 7,500.00	\$ -	Similar to Currency format except the currency symbol left aligns.						
7	Percentage	750000.00%	%	Displays the number as a percentage and two decimals.						
8	Comma	7,500.00	,	Displays the number with two decimal places.						

Number Formats

Changing the number of decimals displayed can be manipulated by the Increase Decimal and Decrease Decimal buttons in the Number group. The displayed value could change to a rounded value, however, the actual value stored in the cell has not changed unless a ROUND function has been applied. Formatting only affects how the value is displayed. Applying formats can result in number signs (#####) being displayed in a cell. This is not an error, but an indication that the cell width is not wide enough to display the formatted number.

Excel data can also be formatted as a table. A **table** is a collection of related data, organized into a tabular layout of rows and columns, that can be manipulated via sorting, filtering and formulas. To create a table, select the data and click Insert > Table from the ribbon to open the Create Table dialog window.



Create table

Applying a table style will format the table with a predefined set of special table properties that includes options to define a header row or total row, and to band the row and/or columns to make the data easier to read. The filter buttons can also be removed. If the table functionality is no longer desired, click the Convert to Range option in the Tools group of the Design tab to convert the table to a normal range.

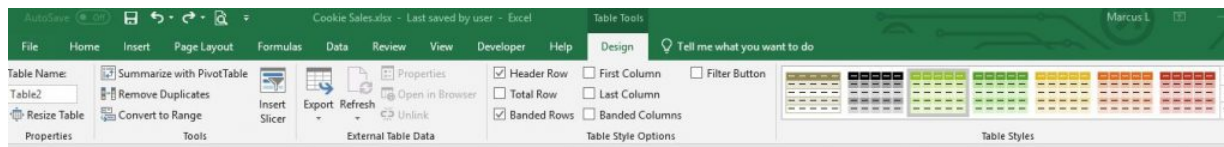


Table Tools Design tab

	A	B	C	D	E	F
1	Little Lizzie's Girl Scout Cookie Sales					
2						
	Chocolate/					
	Thin	Peanut	Carmel	Peanut Butter		
3	Date	Mints	Butter	D'Lites	Sandwich	Sales \$
4	1-Feb	13	10	8	3	\$136
5	2-Feb	11	18	13	7	\$196
6	3-Feb	12	19	8	4	\$172
7	4-Feb	13	18	4	4	\$156
8	5-Feb	15	11	7	3	\$144
9	6-Feb	8	9	2	5	\$96
10	7-Feb	2	3	0	2	\$28

Table style Blue, Table Style Medium 16 with banded rows, a header row, and filter buttons.

There are many additional formatting tools available within Excel, but it is important to consider that sometimes, less is more! Too much formatting can be overkill and reduce the readability of a worksheet. Try to limit the use of multiple colors, fonts, and

background colors/graphics. Format with a design purpose, not to entertain, and don't forget to use the Spell Check tool (F7) to proof your workbook before printing or sharing!

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4.7: Creating Formulas to Perform Calculations

Perhaps the biggest benefit of using Excel is its ability to create formulas that, when written correctly, can dynamically update when predecessor data is updated. Formulas are mathematical calculations using data in the existing workbook to calculate new values. All formulas in Excel must begin with an equal sign (=), and can contain cell references, ranges of cell references, arithmetic operators, and constants as part of the formula's **syntax**. Calculations in Excel follow normal math rules as it pertains to the order of operations rule. There are mnemonics available in various dialects to help decipher the order. The following graphics illustrate the order of operations rules and different formula syntax examples:

Order of Operations Rules			Formula Example	Description
American	British	Canadian		
(P) Parenthesis	(B) Brackets	(B) Brackets	=A4 + B4	Uses cell references and the plus sign mathematical operator.
(E) Exponentiation	(O) Orders	(E) Exponentiation		
(M) Multiplication	(D) Division	(D) Division	= (A4 + B4) * 4	Uses cell references, parenthesis, a plus sign and multiplication symbol, as well as a constant value.
(D) Division	(M) Multiplication	(M) Multiplication		
(A) Addition	(A) Addition	(A) Addition	=SUM(A4:A11)	Uses a function and a cell range.
(S) Subtraction	(S) Subtraction	(S) Subtraction		

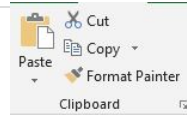
Formula Rules

Formulas typically reference values stored in other cells. For example, in the Accounting equation: Assets = Liabilities + Owner's Equity, one could calculate the Owner's Equity using a formula. Assume that the value for Total Assets resides in cell D30, and the value for Total Liabilities resides in D60. The formula for Owner's Equity in D65 using cell references would be =D30-D60. Using cell references is advantageous because if any of the cells that generate either the Total Assets or Total Liabilities is changed, the formulas in D30, D60 and D65 will also get updated. Another advantage is when a cell containing a formula is copied to another location, the formula will dynamically update to the new location's reference information. This is called **Relative Cell Referencing**. If the formulas in column D are copied to column E, the new formula for Owner's Equity in column E will be =E30-E60. Additionally, if rows are added or deleted in the range that the Total formulas reference, the formula will automatically update to the new formula range.

Entering the syntax for a formula can be accomplished through typing the formula components, using a **pointing** technique or a combination of both. The pointing method can help avoid typing errors. In the Owner's Equity example, the user would start by typing the equal sign, and then instead of typing D30, just click on D30. Continue by pressing the minus sign, and then click on cell D60, and then click the Enter check mark on the formula bar. Using the point method is even more practical when defining large cell ranges in formulas. Just make sure not to reference the active cell in the formula. This will likely create a **circular reference** error, which is a formula in a cell that directly or indirectly refers to its own cell.

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4.8: Copying and Pasting Formulas



Cut copy paste icons

Data in Excel can be cut, copied and pasted using similar shortcut menu options, keyboard equivalents, and ribbon icon commands as seen in Microsoft Word. Following operating system file management principles, moving data is synonymous with using the “Cut” and “Paste” commands, while duplicating data is the same as using the “Copy” and “Paste” commands. Other terminology that should be recognized is “source”, which is the cell or range to be moved or duplicated, and “destination”, which is the upper-left cell in a worksheet where the data is to be pasted.

Copying and pasting formulas contain cell references is a very powerful feature, and to expedite this process, Excel has a nifty feature called **AutoFill**. The AutoFill procedure utilizes the **fill handle**, which is the solid, green square in the lower-right corner of the active cell or cell range. Clicking and dragging the fill handle to adjacent cells (horizontally or vertically) will copy and paste the contents and update the destination cells with relative cell references or sequential data aligned with built-in Custom Lists. This should save significant time, and likely improve accuracy, and AutoFill has many uses.

	A	B	A
1	10	1	Jan
2	20	2	Feb
3	30	3	Mar
4	40	4	Apr
5	50	5	May
6	60	6	Jun

	A	
1	1/14/2019	Quarter 1 Quarter 2 Quarter 3 Quarter 4
2	1/21/2019	
3	1/28/2019	
4	2/4/2019	
5	2/11/2019	
6	2/18/2019	

	A	B	C	D	E	F	G	H
1	6:00 AM	7:00 AM	8:00 AM	9:00 AM	10:00 AM	11:00 AM	12:00 PM	1:00 PM

AutoFill Examples

Not only can AutoFill copy formulas, but it also be used to complete lists that have a recognizable pattern. It is helpful to select the source cells that demonstrate a pattern, then hover the mouse pointer over fill handle. The mouse pointer will change from the default pointer icon to a thin, black plus sign. The patterns can be numbers, dates, months, days of the week, etc. If AutoFill incorrectly guesses the series pattern, the AutoFill Options icon is available to change the paste actions. In the screenshots below, the fill handle in cell D5 will be copied to cells D6:D13. The results shown in the second screenshot will update the formula from D5 with relative cell references to rows 6:13. What is happening in cells D7:D8?

D5					D5				
	A	B	C	D		A	B	C	D
1	Peach Sales Profits				1	Peach Sales Profits			
2	Rotary Club				2	Rotary Club			
3					3				
4	<u>Year</u>	<u>Income</u>	<u>Expenditures</u>	<u>Balance</u>	4	<u>Year</u>	<u>Income</u>	<u>Expenditures</u>	<u>Balance</u>
5	2012	9,000.00	3,952.96	5,047.04	5	2012	9,000.00	3,952.96	5,047.04
6	2013	6,895.00	6,649.45		6	2013	6,895.00	6,649.45	245.55
7	2014	8,536.00	10,807.94		7	2014	8,536.00	10,807.94	#####
8	2015	7,560.00	10,104.10		8	2015	7,560.00	10,104.10	#####
9	2016	9,019.80	9,865.99		9	2016	9,019.80	9,865.99	-846.19
10	2017	12,113.60	9,838.57		10	2017	12,113.60	9,838.57	2,275.03
11	2018	14,816.00	10,183.40		11	2018	14,816.00	10,183.40	4,632.60
12					12				0.00
13		67,940.40	61,402.41		13		67,940.40	61,402.41	6,537.99
14					14				
15					15				

AutoFill before filling

AutoFill after

Practice 5: Test Scores

	A	B	C	D	E
1	Student Name	Test 1	Test 2	Test 3	Total Points
2	Amir	98	77	80	
3	Beto	85	90	88	
4	C.C.	100	84	96	
5	Dharma	89	66	94	
6	Evan	69	89	88	
7	Felix	75	80	80	

Excel Test Scores Start

1. In a new Excel workbook, enter the above data.
2. Make sure to apply bold formatting to row 1, and text wrapping to cell E1.
3. Format the data as a table with a header row and banded rows, but no Filter buttons.
4. Apply the Facet theme.
5. Ensure that cell E1 has the text wrapping format applied and then resize the column width of column E to be 7 points wide and the height of row 1 to 36 points.
6. AutoFit columns B, C & D.
7. In cell E2, enter the following formula: $=B2+C2+D2$ and click Enter. Your worksheet should look like the screenshot at right. Notice that Excel automatically filled in formulas for the rest of column E cells using relative cell references! If this action is unwanted, click the lightning icon, and choose to Undo the Calculated Column.

	A	B	C	D	E
1	Student Name	Test 1	Test 2	Test 3	Total Points
2	Amir	98	77	80	255
3	Beto	85	90	88	263
4	C.C.	100	84	96	280
5	Dharma	89	66	94	249
6	Evan	69	89	88	246
7	Felix	75	80	80	235

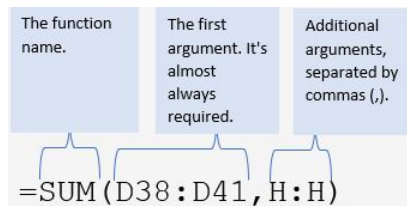
Excel Test Scores Step 7

8. Press F12 to invoke the Save As command and save the file as Test Scores.xlsx.

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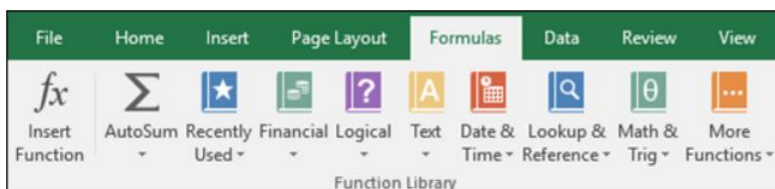
4.9: Adding Basic Functions to Formulas

Excel contains over 400 built-in functions that can be included in a formula to perform common calculations. A **function** performs a calculation on data called arguments to compute a result. **Arguments** are variables or values the function requires and are contained within parenthesis, and usually consist of cell references, but can also contain constants, text, cell ranges, and even other functions! The syntax of a formula using a function is: *function name(argument1, argument2, etc.)*



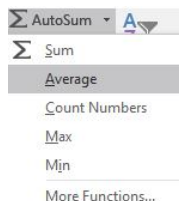
Sample function syntax

Functions can be typed with the help of a ScreenTip, or added from the Insert Function window, which can be opened by clicking the  symbol found at the left of the formula bar, or at the left side of the Function Library found in the Formulas tab of the ribbon.



Function library

The most popular functions are also the easiest to comprehend, which might be correlated! Some of these most popular functions are easily accessible from the AutoSum button in the Editing group on the Home tab of the ribbon. Look for the Greek sigma symbol. This feature is invaluable when it comes to entering functions, especially for common calculations computed via the SUM, COUNT, AVERAGE, MAX or MIN functions.



AutoSum

There are multiple ways to utilize AutoSum, but the following procedure is probably the simplest. In the screenshot below, assume the desire is to total the number of boxes of Thin Mints cookies were sold the first 15 days of February. Make B19 the active cell (the destination cell), then click the AutoSum button. The defaulting SUM option will be inserted into the formula bar with a defaulting cell range (the source cells) inside parenthesis. The cell range that defaults appears on screen with a scrolling marquee surrounding the cell range. This range is usually correct, but not always. If Excel chooses the wrong range, simply type in the cell range, or use the mouse to re-select the correct range (pointing method), and then click the Enter check mark.

	A	B	C	D	E	F
1			Little Lizzie's Girl Scout Cookie Sales			
2						
3	Date	Thin Mints	Chocolate/Peanut Butter	Caramel D'Lites	Peanut Butter Sandwich	Sales \$\$
4	1-Feb	13	10	8	3	\$136
5	2-Feb	11	18	13	7	\$196
6	3-Feb	12	19	8	4	\$172
7	4-Feb	13	18	4	4	\$156
8	5-Feb	15	11	7	3	\$144
9	6-Feb	8	9	2	5	\$96
10	7-Feb	2	3	0	2	\$28
11	8-Feb	0	0	0	0	\$0
12	9-Feb	5	8	3	6	\$88
13	10-Feb	1	0	0	1	\$8
14	11-Feb	2	4	7	3	\$64
15	12-Feb	9	6	1	2	\$72
16	13-Feb	0	0	0	0	\$0
17	14-Feb	0	0	0	0	\$0
18	15-Feb	6	11	2	2	\$84
19						
20						
21						
22						

AutoSum Example 1

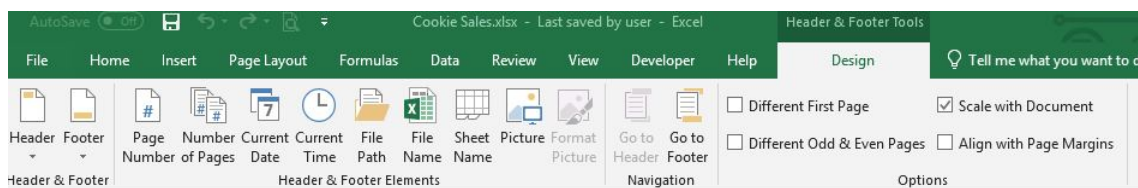
The formula that defaults should be =SUM(B4:B18). Once this formula is submitted, the result, 97 will display. The intent of the **SUM** function is pretty self-explanatory. The **AVERAGE** function takes the SUM function one step further by dividing the sum of the values by the number of cells in the range. The **MIN** and **MAX** functions are used to find the smallest and largest values in a range of cells. These can be useful to identify outlier data that might skew the results. Each of these functions ignore cells that contain text or are empty. Alternatively, the **COUNT** function totals the number of cells that contain values. If a cell contains the value 0 (zero), it will be counted. However, if the cell is blank or contains the text zero, the cell will not be counted. This function is useful for determining the number of people who mark a checkbox in an Employee roster. For example, how many employees identify as a Veteran? Those who don't, wouldn't have a value, and therefore, would not be counted. If the desire is to count all cells that contain any data – use the **COUNTA** function.

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4.10: Inserting Headers and Footers

In Excel, **headers** and **footers** are lines of data that print at the top (header) and bottom (footer) of each page in a worksheet to help identify printouts. Headers and footers can contain descriptive text, graphics, and/or fields, such as titles, dates, or page numbers. Header and footer information does not display in Normal view, so to edit a header or footer, click Insert > Header & Footer to open the sheet in Page Layout view, and activate the Header & Footer Tools contextual tab on the ribbon. There are left, center and right sections for both the header and footer areas.

Users have the option to use one or more of the many built-in headers and footers, or they can click any of the buttons in the Header & Footer Elements group on the Header & Footer Tools Design toolbar to create custom fields.



Header and Footer toolbar

Command buttons in the Header & Footer Elements group include:

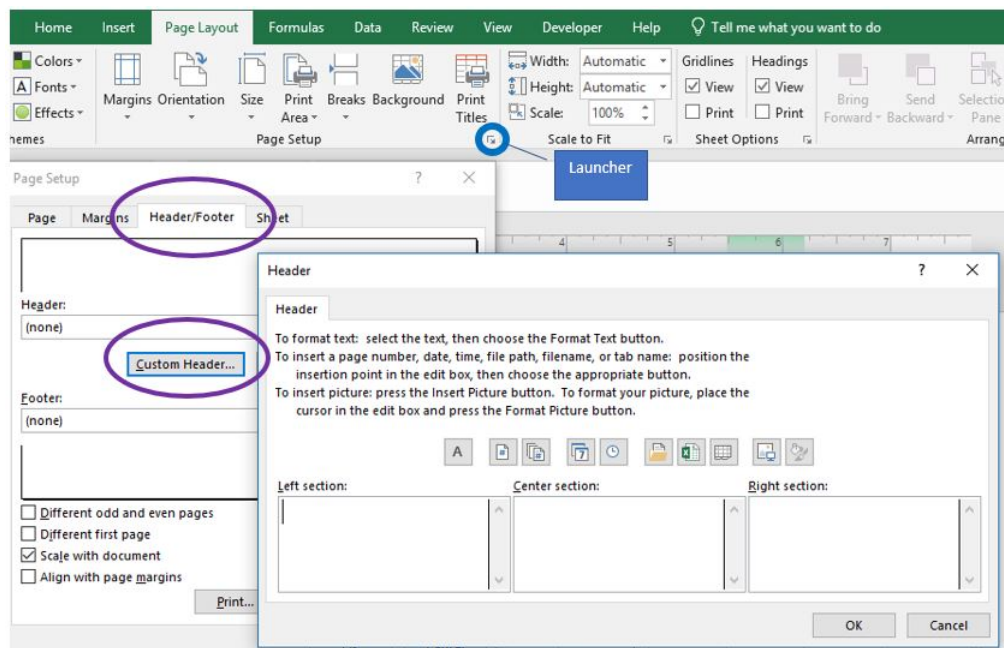
- **Page Number:** Click this button to insert the `&[Page]` code that puts in the current page number.
- **Number of Pages:** Click this button to insert the `&[Pages]` code that puts in the total number of pages.
- **Current Date:** Click this button to insert the `&[Date]` code that puts in the current date.
- **Current Time:** Click this button to insert the `&[Time]` code that puts in the current time.
- **File Path:** Click this button to insert the `&[Path]&[File]` codes that put in the directory path along with the name of the workbook file.
- **File Name:** Click this button to insert the `&[File]` code that puts in the name of the workbook file.
- **Sheet Name:** Click this button to insert the `&[Tab]` code that puts in the name of the worksheet as shown on the sheet tab.
- **Picture:** Click this button to insert the `&[Picture]` code that inserts the image that you select from the Insert Picture dialog box that enables you to select a local image (using the From File option) or download one from an online source using a Bing Image Search.
- **Format Picture:** Click this button to apply the formatting that you choose from the Format Picture dialog box to the `&[Picture]` code that you enter with the Insert Picture button without adding any code of its own.

The following screenshot illustrates fields in each section of the header. The Page Number and Number of Pages fields are in the left section. Manually entered text is in the center section, and finally, the Current Time and Current Date fields are being inserted into the right section.

Header						
1 of 3			Lakes Area Girl Scouts - Troop 293		&[Time] &[Date]	
Little Lizzie's Girl Scout Cookie Sales						
	Thin	Chocolate/P	Carmel	Peanut Butter		
Date	Mints	eanut Butter	D'Lites	Sandwich	Sales \$	
1-Feb	13	10	8	3	\$136	

Sample Excel Header

To create a custom header or custom footer, click the Launcher icon in the Page Setup group of the Page Layout ribbon to open the Page Setup window. Next, click the Header/Footer tab, and then choose to open either the Custom Header... or Custom Footer... buttons.



Header Footer dialog windows

Four checkboxes appear at the bottom of the “Header/Footer” tab, and in the Options group of the Design tab of the ribbon. To remove headers and footers from the first printed page, select the **Different First Page** check box. To specify that the headers and footers on odd-numbered pages should differ from those on even-numbered pages, select the **Different Odd & Even Pages** check box. These options are similar to those in Microsoft Word. The other two options are unique to Excel. To specify whether the headers and footers should use the same font size and scaling as the worksheet, select the **Scale with Document** check box. To make sure the header or footer margin is aligned with the left and right margins of the worksheet, select the **Align with Page Margins** check box.

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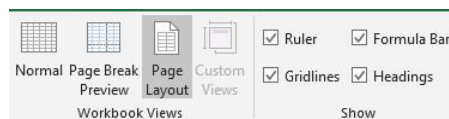
4.11: Adjusting the Page Layout and Preparing to Print

The size of Excel workbooks tend to grow the more each worksheet is manipulated, typically by adding more columns and rows, and sometimes, more sheets. This added complexity makes physical output of Excel data somewhat challenging. Too many columns will result in the sheet not being able to be printed on one sheet of paper, and too many rows make it difficult to interpret data on pages beyond the first page. Fortunately, the Page Layout tab can help fit the data on fewer sheets of paper and make each page easier to understand.



Page Layout tab

While themes can help modify the appearance of a spreadsheet's colors and fonts, the other groups in the Page Layout tab can impact the arrangement of data, and streamline the readability of the output. Starting with the Page Setup group, Excel allows tremendous flexibility with the margins of each worksheet. For example, Narrow **margins** allow more data to fit on one page by reducing the amount of white space on the edges of the sheet. A quick and easy way to allow more columns to print on one sheet, is to change the **orientation** from the default Portrait, to Landscape, which allows more columns and fewer rows to print on one sheet. The effects of these Setup decisions can be more easily illustrated by switching from the default Normal workbook view to the Page Layout. The View tab also allows users to enable/disable the Ruler, Formula Bar, and on-screen gridlines and headings.



View tab

If changing the margins and/or orientation is not resolving the issue of getting extra columns to print on the same page, an alternative could be changing the paper size. The default printer determines the paper sizes available from the Size drop-down list. To check the range of paper sizes that a printer can print on, consult the printer manual, or view the paper sizes that are currently set for the printer in the **Print Setup** dialog box. Some users have the option of printing to Legal (8.5" x 14") or even 11" x 17" (tabloid) printers, especially if commonly printing large worksheets.

A final, more drastic option to keep data from overlapping into multiple sheets, is to utilize the scaling feature. Using the Scale to Fit group from the Layout tab, a printed worksheet can be scaled by to modify the font size of printed output by either shrinking or enlarging the output. The options exist to scale the output to fit to 1 page wide (width) by 1 page tall (height). It might make sense to only modify the width, or by choosing a Scale percentage, which adjusts the overall sheet height and width proportionately. Keep in mind the needs of your audience. Too small of font might make the spreadsheet unreadable, and for certain audiences, the output might need to be scaled to a larger font than the editing view.

The Sheet Options group of the Layout tab provides two significant print features for basic Excel printing. These include the options to have gridlines and/or headings appear in printed output. By default, the options appear in the Viewing screen, but do not appear when printed. Without Headings, the output would be very difficult to explain to others, and gridlines, much like banded rows, make it easier for the eye to line up the intersections of rows and columns.

More advanced options exist for enhancing page layout and printing options by clicking the launcher button in each group. Additionally, several print settings can be adjusted in the Print Preview window. The sheet in the screenshot below is modified to print in landscape orientation with Narrow Margins and it is scaled to Fit on One Page. It also has headings included in the print output.

Print



Copies: 1

Printer

HPE8E300 (HP OfficeJet 465...
Ready

[Printer Properties](#)

Settings

Print Active Sheets
Only print the active sheets

Pages: to

Print One Sided
Only print on one side of th...

Collated
1,2,3 1,2,3 1,2,3

Landscape Orientation

Letter
8.5" x 11"

Narrow Margins
Left: 0.25" Right: 0.25"

Fit Sheet on One Page
Shrink the printout so that it...

[Page Setup](#)

	A	B	C	D	E	F	G	H	I	J	K	L	M
	TEAM		FISH 1	FISH 2	FISH 3	FISH 4	FISH 5	FISH 6	Nightly points	SHOW UP POINTS	BONUS	OVERALL TOTAL	Grand total
1													
2	Acme Fishing Co.	Length	C 11-1/8	C 10-1/2	C 10-1/2	C 10-1/2	C 10-1/2	C 10-1/2					
3		Points	2	1	1	1	1	1	7	2	2	11	78
4	Dead Eyes	Bonus Points	1										
5		Length	B 15-1/8	C 10	B 15-1/8	B 15-3/8	B 15-3/4	B 17-5/8					
6	Rusty Rapalas	Points	2	1	2	2	2	4	13	2	1	18	38
7		Bonus Points											
8	Pop's Lucky Leeches	Length	C 10-3/4	C 10	C 10-3/4	C 10-14	S 8-1/2	S 8-5/8					
9		Points	1	1	1	1	1	1	8	2	2	10	24
10	OutKast	Bonus Points											
11		Length	B 14-3/4	B 13-1/2	B 14								
12	Tiger Sharks	Points	1	-1	1				1	2	0	3	19
13		Bonus Points											
14	Aquatic Studies Group	Length	N 23	B 15-3/4	B 10-1/8	B 18	B 15	B 15					
15		Points	2	3	3	3	2	3	16	2	2	20	64
16	Wild Bills	Bonus Points	1										
17		Length	B 15-1/2	C 11	B 14-1/8	W 17-1/8							
18	Puddle Jumpers	Points	2	2	1	4			9	2	1	12	37
19		Bonus Points											
20	No Name Walleyes	Length	B 15-1/8	B 17-1/2	C 10-1/2	C 10-1/2	C 10-1/2	C 10-1/2					
21		Points	2	4	1	1	1	1	10	2	1	13	58
22	Just for Fun	Bonus Points											
23		Length	B 14	B 15	B 14	B 14-1/2	B 15-1/8	B 15-5/8					
24	LAKE	Points	1	2	1	2	2	2	9	2	1	12	29
25		Bonus Points											
26	DATE	Length	B 15	B 15-1/2	B 15-3/4	B 18	B 17-1/2	B 15-3/4					
27		Points	2	2	3	5	4	5	21	2	2	25	77
28	6/8/2017	Bonus Points											
29		Length	C 10-1/2	C 10-14	C 10-1/8	C 10-14	C 10-1/8	W 15					
30		Points	1	1	1	1	1	3	8	2	1	11	40
31		Bonus Points											
32		Length											
33		Points											
34		Bonus Points											
35		Length											
36		Points											
37		Bonus Points											
38		Length											
39		Points											
40		Bonus Points											
41		Length											
42		Points											
43		Bonus Points											
44		Length											
45		Points											
46		Bonus Points											
47		Length											
48		Points											
49		Bonus Points											
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51		Points											
52		Bonus Points											
53		Length											
54		Points											
55		Bonus Points											

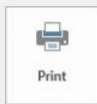
1 of 1

Excel Print Preview

Practice 6: Test Scores, continued

1. Open the Test Scores workbook previously saved.
2. In the Table Tools Design tab, click the Convert to Range button remove the table functionality from the data. (Click Yes to the message)
3. Type the labels: Total Points in cell A8 and Average in cell A9.
4. In cell B8, click the AutoSum button to insert the SUM function. Accept the range that Excel proposes for the formula by clicking the Enter check mark on the formula bar. The formula should be: =SUM(B2:B7).
5. With B8 as the active cell, use the fill handle to copy the formula to the destination cells C8:D8.
6. In cell B9, enter a formula using the AVERAGE function without using the AutoSum functionality. Instead, use the Insert Function button to select the AVERAGE function, and enter the range B2:B7 as the arguments. NOTE: B8 should not be included in the range of argument cells. Use the fill handle to copy the formula to cells C9 and C10.
7. In cell E2, double-click the fill handle. See what happens!
8. Change the view to Page Layout.
9. Add a header that includes the Current Date field from the Header & Footer Tools Design ribbon in the left side of the header.
10. Ensure the Gridlines and Headings appear in printouts, scale the sheet to 150%, then view the file in Print Preview. Your worksheet should resemble the following:
11. Save the file as TestScores2.xlsx.

Print

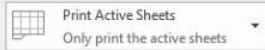


Copies: 1

Printer


[Printer Properties](#)

Settings



Only print the active sheets

Pages: to



Only print on one side of th...



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Portrait Orientation


Letter
8.5" x 11"

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Custom Scaling

[Page Setup](#)

5/24/2019

	A	B	C	D	E
1	Student Name	Test 1	Test 2	Test 3	Total Points
2	Amir	98	77	80	255
3	Beto	85	90	88	263
4	C.C.	100	84	96	280
5	Dharma	89	66	94	249
6	Evan	69	89	88	246
7	Felix	75	80	80	235
8	Total Points	516	486	526	1528
9	Average	86	81	87.667	

TestScores2

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CHAPTER OVERVIEW

5: Excel II

Learning Objectives

- Absolute versus Static References
- Understanding Complex Formulas
- Date & Time Functions
- Logical Functions
- More Math Functions
- Sorting and Filtering
- Conditional Formatting
- Pie Charts
- Bar & Column Charts
- Line Charts

	A	B	C	D	E	F	G
1		Alaskan Insider Cruises					
2		July Revenue by Accommodation Category					
3							
4	Cruise Date	Accommodation Category	Rooms Available	Rooms Rented	Rate	Revenue	Shortfall
5	July 26, 2019	Balconies	60	58	\$ 6,000	↑ \$ 348,000	\$ 12,000
6	July 19, 2019	Balconies	60	45	\$ 6,000	→ \$ 270,000	\$ 90,000
7	July 12, 2019	Balconies	60	45	\$ 5,600	→ \$ 252,000	\$ 84,000
8	July 5, 2019	Balconies	60	35	\$ 5,000	→ \$ 175,000	\$ 125,000
9	July 26, 2019	Inside	50	48	\$ 3,000	↓ \$ 144,000	\$ 6,000
10	July 12, 2019	Inside	50	50	\$ 2,500	↓ \$ 125,000	\$ -
11	July 19, 2019	Inside	50	32	\$ 3,000	↓ \$ 96,000	\$ 54,000
12	July 5, 2019	Inside	50	30	\$ 2,500	↓ \$ 75,000	\$ 50,000
13	July 26, 2019	Outside Level 1	80	80	\$ 5,225	↑ \$ 418,000	\$ -
14	July 19, 2019	Outside Level 1	80	70	\$ 5,375	↑ \$ 376,250	\$ 53,750
15	July 12, 2019	Outside Level 1	80	72	\$ 5,025	↑ \$ 361,800	\$ 40,200
16	July 5, 2019	Outside Level 1	80	60	\$ 4,500	→ \$ 270,000	\$ 90,000
17	July 26, 2019	Outside Level 2	90	89	\$ 5,000	↑ \$ 445,000	\$ 5,000
18	July 19, 2019	Outside Level 2	90	82	\$ 5,000	↑ \$ 410,000	\$ 40,000
19	July 5, 2019	Outside Level 2	90	75	\$ 4,300	↑ \$ 322,500	\$ 64,500
20	July 12, 2019	Outside Level 2	90	66	\$ 4,800	↑ \$ 316,800	\$ 115,200
21	July 26, 2019	Outside Level 3	100	92	\$ 4,750	↑ \$ 437,000	\$ 38,000
22	July 12, 2019	Outside Level 3	100	89	\$ 4,450	↑ \$ 396,050	\$ 48,950
23	July 19, 2019	Outside Level 3	100	78	\$ 4,850	↑ \$ 378,300	\$ 106,700
24	July 5, 2019	Outside Level 3	100	80	\$ 4,000	↑ \$ 320,000	\$ 80,000
25	July 26, 2019	Penthouse	3	3	\$ 7,500	↓ \$ 22,500	\$ -
26	July 19, 2019	Penthouse	3	2	\$ 8,000	↓ \$ 16,000	\$ 8,000
27	July 12, 2019	Penthouse	3	2	\$ 7,000	↓ \$ 14,000	\$ 7,000
28	July 5, 2019	Penthouse	3	1	\$ 6,000	↓ \$ 6,000	\$ 12,000
29							

[5.1: Absolute versus Static References](#)

[5.2: Understanding Complex Formulas](#)

[5.3: Date and Time Functions](#)

[5.4: Logical Functions](#)

[5.5: More Math Functions](#)

[5.6: Sorting and Filtering](#)

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[5.10: Line Charts](#)

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5.1: Absolute versus Static References

One of the first things that new Excel users need to realize is that Excel is so much more powerful than a calculator. Some users insist in setting up a worksheet as if it is merely a calculator. These people fail to realize the power of cell references. Instead they use static references to constant values. A **static reference** is a reference to a value that does not change.

D5				
	A	B	C	D
1				
2				
3				
4	Year	Income	Expenditures	Balance
5	2012	9,000.00	3,952.96	5,047.04
6	2013	6,895.00	6,649.45	245.55
7	2014	8,536.00	10,807.01	-2,271.01

Cell References example

In the example above, instead of using static references (= 9000-3952.96) for the formula in D5, the user should employ cell references. (= B5-C5). The main benefit of use cell references is that the user can manipulate the input values in columns B and C, and the formulas in column D will remain accurate. If the user changes either input values in columns B or C with static references, the formulas in column D will need to be manually updated.

Cell referencing is an extremely useful feature when formulas need to be copied across ranges in a worksheet. When creating formulas that contain references to cells or cell ranges, the default cell reference is considered to be a relative cell reference. When formulas with these type of cell references are copied to other cells the formulas will automatically change relative to the cells that they are copied to. However, there may be instances where it is necessary for Excel to keep the exact cell referenced in a formula when copying to other cells. A cell reference that does not change when copied is called an **absolute cell reference** (sometimes called a fixed cell reference). The indicator that a cell reference is absolute is the presence of a dollar sign symbol in front of both the column letter and row number, such as \$A\$3. To create an absolute cell reference, either type the dollar sign manually, or press the F4 after entering the cell reference. Repeatedly pressing the F4 key cycles the reference through the four different combinations of relative, absolute, and mixed cell references.

Mixed cell references are a combination of relative and absolute: either the column is relative and the row fixed (absolute), for example D\$2, or the column is fixed and the row relative: \$D2. Mixed cell references are rarely used, but they play a significant role when it is necessary to keep a single row or column unchanged while copying the formula. Mixed cell references are commonly used when creating a table of values, like a multiplication table or a mortgage rate table.

Whenever possible, utilize relative and/or absolute references instead of static cell references.

B3				
	A	B	C	D
1				
2				
3				
4				
5	Scout Name	Sales	Commission	
6	Happy Hannah	352	=B6*B3	
7	Fearless Fatima	1440		
8	Little Lizzy	1244		
9	Silly Sally	96		
10	Shy Sheila	52		
11	Naughty Nina	0		
12	Quiet Quin	72		
13	Nervous Nelly	16		
14	Chatty Patty	192		
15	Clever Cleo	984		
16	Timid Tina	40		
17				
18				

Relative Cell Reference

In the worksheet above, the formula in C6 is using relative cell references to both the Sales amount (B6), and the Commission Rate (B3). Unfortunately, if this formula is copied (perhaps by using the fill handle) to rows 7:16, the resulting formulas will be wrong.

Some cells will display zeros or a #VALUE! error, while others will display inflated amounts because the Rate percentage is being replaced by higher sales values. Therefore, the reference to B3 in the formula should be an absolute cell reference, i.e. $=B6*\$B\3 . It may be tempting to construct the formula using a static reference to the constant value of .075 (i.e. $=B6*.075$). However, if the rate needs to be changed to 7.25%, the formulas with the static references would each need to be changed manually. Conversely, if the formulas in column C are using absolute cell references to $\$B\3 , a single edit to B3 is all that is needed to update all of the cells in column C. Knowing the differences between the various type of cell reference will make the worksheet more scalable and flexible for future expansion.

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5.2: Understanding Complex Formulas

Formulas can be simple mathematical formulas or complicated formulas involving multiple mathematical operations, multiple cell ranges and nested functions. While it is a good idea to remember the order of operations rules, complex formulas can use parentheses to identify the arguments of functions and to override the order of operations. In mathematical operation formulas, operations within parentheses are performed before those outside of it. For example, in $=A3+B3*C3$, B3 is multiplied by C3 before A3 is added to the result, but in $=(A3+B3)*C3$, A3 and B3 are added together first, then the result is multiplied by C3.

Parentheses in operations may be nested inside each other. The operation in the innermost set of parentheses will be performed first. Whether nesting parentheses in mathematical operations or in nested functions, always be sure to have as many closed parentheses in the formula as there are open parentheses, or Excel will return an error message. In the illustrated worksheet below, cell D30 contains a complex formula that calculates the differences between rooms available and rooms rented to determine the total number of unrented rooms in the Balcony and Penthouse categories. The formula in D30 is: $=(SUM(C5:C8)-SUM(D5:D8))+(SUM(C25:C28)-SUM(D25:D28))$. Notice the number of open and closed parenthesis!

D30 = (SUM(C5:C8)-SUM(D5:D8))+(SUM(C25:C28)-SUM(D25:D28))						
	A	B	C	D	E	F
1	 Alaskan Insider Cruises					
2	July Revenue by Accommodation Category					
3						
4	Cruise Date	Accommodation Category	Rooms Available	Rooms Rented	Rate	Revenue
5	July 5, 2019	Balconies	60	35	\$ 5,000	\$ 175,000
6	July 12, 2019	Balconies	60	45	\$ 5,600	\$ 252,000
7	July 19, 2019	Balconies	60	45	\$ 6,000	\$ 270,000
8	July 26, 2019	Balconies	60	58	\$ 6,000	\$ 348,000
9	July 5, 2019	Inside	50	30	\$ 2,500	\$ 75,000
10	July 12, 2019	Inside	50	50	\$ 2,500	\$ 125,000
11	July 19, 2019	Inside	50	32	\$ 3,000	\$ 96,000
12	July 26, 2019	Inside	50	48	\$ 3,000	\$ 144,000
13	July 5, 2019	Outside Level 1	80	60	\$ 4,500	\$ 270,000
14	July 12, 2019	Outside Level 1	80	72	\$ 5,025	\$ 361,800
15	July 19, 2019	Outside Level 1	80	70	\$ 5,375	\$ 376,250
16	July 26, 2019	Outside Level 1	80	80	\$ 5,225	\$ 418,000
17	July 5, 2019	Outside Level 2	90	75	\$ 4,300	\$ 322,500
18	July 12, 2019	Outside Level 2	90	66	\$ 4,800	\$ 316,800
19	July 19, 2019	Outside Level 2	90	82	\$ 5,000	\$ 410,000
20	July 26, 2019	Outside Level 2	90	89	\$ 5,000	\$ 445,000
21	July 5, 2019	Outside Level 3	100	80	\$ 4,000	\$ 320,000
22	July 12, 2019	Outside Level 3	100	89	\$ 4,450	\$ 396,050
23	July 19, 2019	Outside Level 3	100	78	\$ 4,850	\$ 378,300
24	July 26, 2019	Outside Level 3	100	92	\$ 4,750	\$ 437,000
25	July 5, 2019	Penthouse	3	1	\$ 6,000	\$ 6,000
26	July 12, 2019	Penthouse	3	2	\$ 7,000	\$ 14,000
27	July 19, 2019	Penthouse	3	2	\$ 8,000	\$ 16,000
28	July 26, 2019	Penthouse	3	3	\$ 7,500	\$ 22,500
29						
30	Unrented Balcony & Penthouse rooms:		61			
31						

Complex Formula

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5.3: Date and Time Functions

Excel can produce the current date and/or time, based on the computer's regional settings. Excel can also add and subtract dates and times. For example, it may be necessary to keep track of how many hours an employee worked each week, and calculate their pay and overtime. There are numerous Date and Time functions in Excel to help calculate the addition or difference between dates or times. Excel stores all date and time values as sequential serial numbers. For example, January 1, 1900 is represented by the serial number 1, and January 1, 2020 is represented by serial number 43831 because it is 43,831 days after January 1, 1900. To view the serial number of an existing date, format the date using the General Number format. The conversion of dates and times to serial numbers simplifies the process of using dates and times in calculations. The key to displaying the results of these calculations is using the appropriate Number format, which may require diving into the world of creating custom number formats to display only days, hour and/or minutes. For example, if only the number of years is desired to be displayed when calculating the difference between two dates, the Custom Number format should be yy.

Popular Excel Date and Time Functions	
Function & Syntax	Usage
= TODAY()	Returns the current computer system date. No arguments are necessary inside the parenthesis.
= NOW()	Returns the current computer system date and time. No arguments are necessary inside the parenthesis.
= DATE (year,month,day)	Returns a date, from a user-supplied year, month and day. Popular for birthdates, invoice dates or other static dates.
= DAYS (end_date,start_date)	Calculates the number of days between two dates. The arguments can be cell references or static values entered within quotation marks.

Date and Time functions

The TODAY and NOW functions are very similar since both return the current system date. However, the NOW function also returns the current system time. Many users format the results of the NOW function to only display the current system time. One characteristic of these functions versus the DATE function is that TODAY and NOW are volatile functions, so if the workbook is opened tomorrow, these functions will update automatically, whereas the DATE function will not change. These functions are for use within the grid of the worksheet, typically to calculate durations. There are separate Date and Time fields for use in worksheet headers and footers.

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5.4: Logical Functions

Many employers and educators are placing increasing emphasis on the value of critical thinking. Critical thinking skills are often associated with problem solving skills, empathy, and thinking and acting in purposeful ways by making fact-based decisions. Excel is a practical tool for collecting and analyzing data critically. Excel's logical functions are especially useful for enabling critical thinking. However, before exploring the utilization of Excel's logical functions, it is necessary to review the logical operators that are used to compare data between cells. The operators are often referred to as comparison operators. The six main logical operators are explained in the following graphic:

Condition	Operator	Formula Example	Description
Equal to	=	=A1=B1	The formula returns TRUE if a value in cell A1 is equal to the values in cell B1; FALSE otherwise.
Not equal to	<>	=A1<>B1	The formula returns TRUE if a value in cell A1 is not equal to the value in cell B1; FALSE otherwise.
Greater than	>	=A1>B1	The formula returns TRUE if a value in cell A1 is greater than a value in cell B1; otherwise it returns FALSE.
Less than	<	=A1<B1	The formula returns TRUE if a value in cell A1 is less than in cell B1; FALSE otherwise.
Greater than or equal to	>=	=A1>=B1	The formula returns TRUE if a value in cell A1 is greater than or equal to the values in cell B1; FALSE otherwise.
Less than or equal to	<=	=A1<=B1	The formula returns TRUE if a value in cell A1 is less than or equal to the values in cell B1; FALSE otherwise.

Comparison operators

These comparison operators can be used in Excel functions to compare all types of data, including dates, numbers, Boolean values (True or False, Yes or No), or text. All arguments must evaluate to the Boolean values of either True or False, or contain another, nested logical function.

The **IF** function is one of the most popular and useful functions in Excel. It can be used to make a decision based on a comparison. If the comparison is true, one value is displayed in the cell; if the comparison is false, a second value is displayed. The syntax of the IF function is: IF(logical_test, [value_if_true], [value_if_false]).

- **logical_test** – a value or logical expression that can be either TRUE or FALSE. Required. In this argument, you can specify a text value, date, number, or any comparison operator.
- **value_if_true** – the value to return when the logical test evaluates to TRUE, i.e. if the condition is met. Optional.
- **value_if_false** – the value to be returned if the logical test evaluates to FALSE. Optional.

Simple IF functions test to see if a cell contains a certain text string, and returns different values depending on if the logical test returns a True or False logic. A sample formula is illustrated in the screenshot below. That's some logical critical thinking!

=IF(E36="Vikings", "Good", "Bad")

	E	F	G
	Bears	Bad	
	Lions	Bad	
	Packers	Bad	
	Vikings	Good	

Simple IF

Instead of returning text strings, the IF formula can test the specified condition, perform a corresponding math operation and return a value based on the result. This is done by using arithmetic operators or other Excel functions in the value_if_true and /or value_if_false arguments. For example, =IF(C4>=D4, E4*.25, E4*10%). This formula is determining if the value in column C is greater than or equal to the value in column D. If the result of the comparison is true, then the value to be displayed should be the value in column E multiplied by .25 (25%). If the result of the comparison is false, then the value to be displayed should be the value in column E multiplied by 10% (.10).

Other popular Excel Logical functions include the **AND**, as well as the **OR** functions. These functions allow users to create multiple logical tests within a single IF function. These functions return either TRUE or FALSE results when their arguments are evaluated.

The AND function only returns TRUE if every condition is met. However, the OR function returns TRUE if any condition is met. The syntax of both functions are the same: =AND(logical1, logical2, etc.) Examples of each function are illustrated in the screenshots below. The first illustration uses the AND function to determine if any of the people are eligible for the Inner Circle. They need to have a Customer Satisfaction Score of at least 4.0, and be a Vikings fan. The second example uses the OR function. The more lenient comparison operator yields more eligible people for the Inner Circle.

D2    =AND(B2>=4,C2="Vikings")

	A	B	C	D	E	F	G
	Name	Customer Satisfaction Score	Favorite NFL Team	Inner Circle			
2	Fozzie	4.5	Bears	FALSE			
3	Patrick	2.6	Saints	FALSE			
4	Leo	4.2	Lions	FALSE			
5	Thor	3.3	Vikings	FALSE			
6	Theresa	4.8	Saints	FALSE			
7	Helga	4.3	Vikings	TRUE			
8	Simba	3.9	Lions	FALSE			
9	Anish	4.7	Vikings	TRUE			
10							
11							

AND function example

D2    =OR(B2>=4,C2="Vikings")

	A	B	C	D	E	F	G
	Name	Customer Satisfaction Score	Favorite NFL Team	Inner Circle			
2	Fozzie	4.5	Bears	TRUE			
3	Patrick	2.6	Saints	FALSE			
4	Leo	4.2	Lions	TRUE			
5	Thor	3.3	Vikings	TRUE			
6	Theresa	4.8	Saints	TRUE			
7	Helga	4.3	Vikings	TRUE			
8	Simba	3.9	Lions	FALSE			
9	Anish	4.7	Vikings	TRUE			
10							
11							

OR function example

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5.5: More Math Functions

The most popular Excel function in the Math category is undoubtedly the SUM function. The Excel Math Functions perform many of the common mathematical calculations, including basic arithmetic, conditional sums & products, quotients, and rounding calculations. There are many more examples, but some of the more popular Math functions are identified in the table below. There are many variations of some of these functions to be found in the Insert Function window.

Popular Excel Math Functions	
Function & Syntax	Usage
PRODUCT =PRODUCT(number1, number2,...)	Multiplies all of the numbers given as arguments.
QUOTIENT =QUOTIENT(numerator,denominator)	Returns the integer portion of a division.
RAND =RAND()*100	Returns an evenly distributed random real number greater than or equal to 0 and less than 100.
ROUND =ROUND(number,num_digits)	Rounds a number to a specified number of digits.
SUMIF =SUMIF(range,criteria,sum_range)	Adds the cells specified by a given condition or criteria.

Math functions

The first two functions from the table above are considered basic mathematical operations. Instead of multiplying two cells using the * operator, Excel users can opt to use the **PRODUCT** function. i.e. =PRODUCT(B2,B3) versus =B2*B3. The PRODUCT function is most useful when multiplying a series of cells. Ensure that the cells referenced contain numbers or dates. If the data referenced includes text, the PRODUCT function will return the #VALUE! error result.

	A	B
1	13	5
2		
3	Formula	Result
4	=A1/B1	2.6
5	=QUOTIENT(13,5)	2
6	=QUOTIENT(A1,B1)	2
7		

Quotient function example

The **QUOTIENT** function is similar to the PRODUCT function, except instead of multiplying cells, it divides cell(s) by other cell(s) and returns a result in Integer format. An integer is a whole number, therefore it will not display the remainder typically generated in division calculations. The graphic at right illustrates the differences between using the divide operator and the QUOTIENT function. The numerator is the **dividend** and is the value before the forward slash (/). The denominator is the **divisor**, and is the value after the forward slash (/). In this example, A1 (or 13) is the dividend, and B1 (or 5) is the divisor.

An alternative to using the QUOTIENT function is to utilize the ROUND function or any of its related functions (ROUNDDOWN, ROUNDUP,MROUND).

	A	B	C
1	13	6	
2			
3	Formula	Result	Result * 5
4	=A1/B1	2.166667	10.83333333
5	=QUOTIENT(13,6)	2	10
6	=QUOTIENT(A1,B1)	2	10
7	=ROUND(A1/B1,0)	2	10
8	=ROUND(A1/B1,1)	2.2	11
9	=ROUND(A1/B1,2)	2.17	10.85
10			

ROUND vs QUOTIENT function

In the graphic above, a user could rewrite the formula in A4 as =ROUND(A1/B1,0) by using the ROUND function to get the similar results as the QUOTIENT functions. The difference is that the QUOTIENT result does not store any remainder amounts. As shown in the graphic at the right, using the ROUND function can yield significantly different results than using the QUOTIENT function, however, the user can control the level of detail desired in the calculation. Some users simply opt for the first scenario without using either functions. Instead, they utilize Excel's formatting functionality to remove the displaying of decimals. Using

the Decrease Decimal button  from the ribbon on cell B4 can change the display to various results. However, the untruncated/un-rounded result is still stored in the cell.

Practice 7: Expense Report

1. Create the a new worksheet with the following data from the image below:

	A	B	C	D	E	F	G
1							
2							
3							
4		Reason for Travel	Conference in Minneapolis				
5		Name	Helga				
6		Mileage Rate	0.51				
7							
8	Date	Description	Meals	Mileage	Lodging	Other	Total
9							
10							

2. In row 9 enter the following data:
 - **Date:** 5/30/2019
 - **Description:** Travel to Minneapolis
 - **Meals:** 25
 - **Mileage:** 205
 - **Lodging:** 150
 - **Other:**
3. In cell G9 enter the following complex formula using relative and absolute cell references: $=C9+(D9*\$C\$6)+E9+F9$ (are the parenthesis necessary?)
4. Format columns C, E, F and G as Currency format with two decimals.
5. Enter the following in row 10:
 - **Date:** 5/31/2019
 - **Description:** Travel home
 - **Meals:** 20
 - **Mileage:** 205
 - **Lodging:**
 - **Other:** 15
6. Use the fill handle to copy the formula in G9 to G10.
7. Insert a new row below the Mileage Rate row, and in B6 enter the label: Trip Duration. (bold the label)
8. In cell C6 enter a formula that subtracts A9 from A10. Change the format of cell C6 to General.
9. In cell B15 enter the label: Totals: (right-align & bold this cell).
10. Select cells C15:G15 and click the AutoSum button. Change the format of D15 to General.
11. Enter the label: Need Receipts? in cell B2. (bold the label)
12. In cell C2, enter the following logical function: $=IF(F15>0,"Yes","No")$
13. Save the file as Helga Expenses May2019. Your worksheet should resemble the following:

C2		=IF(F15>0,"Yes","No")					
	A	B	C	D	E	F	G
1							
2		Need Receipts?	Yes				
3		Reason for Travel	Conference in Minneapolis				
4		Name	Helga				
5		Mileage Rate	\$0.51				
6		Trip Duration	1				
7							
8	Date	Description	Meals	Mileage	Lodging	Other	Total
9	5/30/2019	Travel to Minneapolis	\$25.00	205	\$150.00		\$279.55
10	5/31/2019	Travel home	\$20.00	205		\$15.00	\$139.55
11							
12							
13							
14							
15		Totals:	\$45.00	410	\$150.00	\$15.00	\$419.10
16							
17							

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5.6: Sorting and Filtering

Worksheets can have large amounts of data, and it can be overwhelming if it is not sorted correctly. Arranging data in a specified order is called **sorting**. Rows can be sorted in either ascending (low to high) or descending (high to low) order. Ascending order can also be considered *alphabetic* order if the data is text or *chronological* order if the data is dates or times.

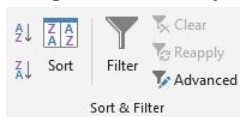
Before data can be sorted, Excel needs to know the exact range of cells that is to be sorted. Excel will select areas of related data as long as there are no blank rows or columns in the data range. Blank rows and columns define the outer limits of the data range. To ensure that the correct data is selected, highlight the range before starting the sort.

As Excel determines the defined range of data to be sorted, Excel also determines if field names exist. Users should format the first row of the data range with unique formatting. Often, just making the labels bold will help Excel identify the field names. Identifying the field names will prevent Excel from including these fields in the records to be sorted. The field names become the sort keys needed for multiple column sorts. In the image below, the possible sort keys are: Cruise Date, Accommodation Category, Rooms Available, Rooms Rented, Rate, Revenue and Shortfall.

	A	B	C	D	E	F	G
1	 Alaskan Insider Cruises						
2	July Revenue by Accommodation Category						
3							
4	Cruise Date	Accommodation Category	Rooms Available	Rooms Rented	Rate	Revenue	Shortfall
5	July 5, 2019	Balconies	60	35	\$ 5,000	\$ 175,000	\$ 125,000
6	July 12, 2019	Balconies	60	45	\$ 5,600	\$ 252,000	\$ 84,000
7	July 19, 2019	Balconies	60	45	\$ 6,000	\$ 270,000	\$ 90,000
8	July 26, 2019	Balconies	60	58	\$ 6,000	\$ 348,000	\$ 12,000
9	July 5, 2019	Inside	50	30	\$ 2,500	\$ 75,000	\$ 50,000
10	July 12, 2019	Inside	50	50	\$ 2,500	\$ 125,000	\$ -
11	July 19, 2019	Inside	50	32	\$ 3,000	\$ 96,000	\$ 54,000
12	July 26, 2019	Inside	50	48	\$ 3,000	\$ 144,000	\$ 6,000
13	July 5, 2019	Outside Level 1	80	60	\$ 4,500	\$ 270,000	\$ 90,000
14	July 12, 2019	Outside Level 1	80	72	\$ 5,025	\$ 361,800	\$ 40,200
15	July 19, 2019	Outside Level 1	80	70	\$ 5,375	\$ 376,250	\$ 53,750
16	July 26, 2019	Outside Level 1	80	80	\$ 5,225	\$ 418,000	\$ -
17	July 5, 2019	Outside Level 2	90	75	\$ 4,300	\$ 322,500	\$ 64,500
18	July 12, 2019	Outside Level 2	90	66	\$ 4,800	\$ 316,800	\$ 115,200
19	July 19, 2019	Outside Level 2	90	82	\$ 5,000	\$ 410,000	\$ 40,000
20	July 26, 2019	Outside Level 2	90	89	\$ 5,000	\$ 445,000	\$ 5,000
21	July 5, 2019	Outside Level 3	100	80	\$ 4,000	\$ 320,000	\$ 80,000
22	July 12, 2019	Outside Level 3	100	89	\$ 4,450	\$ 396,050	\$ 48,950
23	July 19, 2019	Outside Level 3	100	78	\$ 4,850	\$ 378,300	\$ 106,700
24	July 26, 2019	Outside Level 3	100	92	\$ 4,750	\$ 437,000	\$ 38,000
25	July 5, 2019	Penthouse	3	1	\$ 6,000	\$ 6,000	\$ 12,000
26	July 12, 2019	Penthouse	3	2	\$ 7,000	\$ 14,000	\$ 7,000
27	July 19, 2019	Penthouse	3	2	\$ 8,000	\$ 16,000	\$ 8,000
28	July 26, 2019	Penthouse	3	3	\$ 7,500	\$ 22,500	\$ -

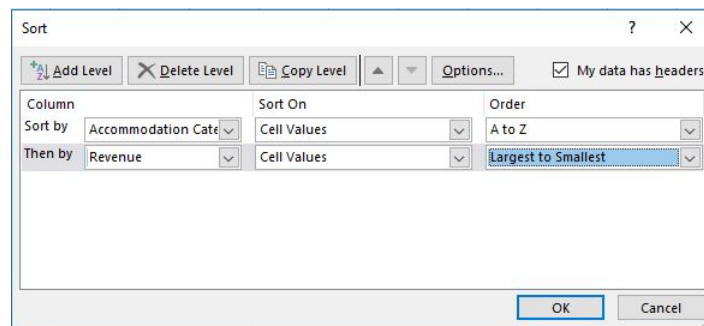
Sort Data Range

The data range above is already sorted in ascending order by the Accommodation Category key field. A single column sort is quite easy. Simply click any cell in the column that represents the key sort. In the above example, any cell from B4 to B28 would



be acceptable. Then, click the the A-Z option in the Sort & Filter group of the Data tab. The entire row is sorted because each row is a record that should stay grouped together. Be careful NOT to select a single column of data or the records may not be kept together. Excel will warn the user with a warning message. If the user chooses to Continue with the current selection, only the data in the column with change their order, while the data in the other columns remain unchanged. This will most likely destroy the integrity of the data.

Advanced sorting involves multiple key fields from multiple columns. A multi-level sort can be set up by clicking the Sort button from Sort & Filter group from the Data tab (or the Sort & Filter button from the Editing group of the Home tab and choose Custom Sort) to open the Sort dialog window. The first sort criteria, also known as the primary sort, was previously defined to sort by Accommodation Category in ascending order.



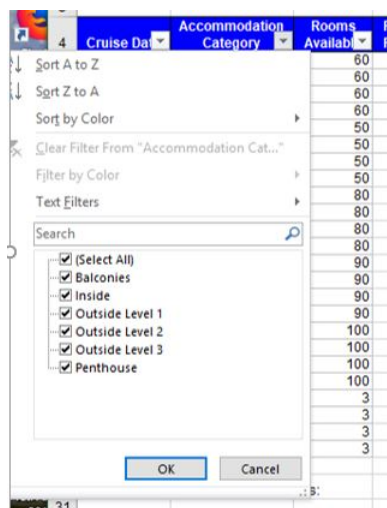
Multi-level sort Excel

To add a second level, also known as a secondary sort, click the Add Level button. After entering additional sort criteria, additional levels can be added. As shown in the graphic to the right, secondary criteria has been added to sort in descending order by Revenue. The data in column B will not appear to change, but the records will reorder. Compare the results below with the table above.

	Cruise Date	Accommodation Category	Rooms Available	Rooms Rented	Rate	Revenue	Shortfall
5	July 26, 2019	Balconies	60	58	\$ 6,000	\$ 348,000	\$ 12,000
6	July 19, 2019	Balconies	60	45	\$ 6,000	\$ 270,000	\$ 90,000
7	July 12, 2019	Balconies	60	45	\$ 5,600	\$ 252,000	\$ 84,000
8	July 5, 2019	Balconies	60	35	\$ 5,000	\$ 175,000	\$ 125,000
9	July 26, 2019	Inside	50	48	\$ 3,000	\$ 144,000	\$ 6,000
10	July 12, 2019	Inside	50	50	\$ 2,500	\$ 125,000	\$ -
11	July 19, 2019	Inside	50	32	\$ 3,000	\$ 96,000	\$ 54,000
12	July 5, 2019	Inside	50	30	\$ 2,500	\$ 75,000	\$ 50,000
13	July 26, 2019	Outside Level 1	80	80	\$ 5,225	\$ 418,000	\$ -
14	July 19, 2019	Outside Level 1	80	70	\$ 5,375	\$ 376,250	\$ 53,750
15	July 12, 2019	Outside Level 1	80	72	\$ 5,025	\$ 361,800	\$ 40,200
16	July 5, 2019	Outside Level 1	80	60	\$ 4,500	\$ 270,000	\$ 90,000
17	July 26, 2019	Outside Level 2	90	89	\$ 5,000	\$ 445,000	\$ 5,000
18	July 19, 2019	Outside Level 2	90	82	\$ 5,000	\$ 410,000	\$ 40,000
19	July 5, 2019	Outside Level 2	90	75	\$ 4,300	\$ 322,500	\$ 64,500
20	July 12, 2019	Outside Level 2	90	66	\$ 4,800	\$ 316,800	\$ 115,200
21	July 26, 2019	Outside Level 3	100	92	\$ 4,750	\$ 437,000	\$ 38,000
22	July 12, 2019	Outside Level 3	100	89	\$ 4,450	\$ 396,050	\$ 48,950
23	July 19, 2019	Outside Level 3	100	78	\$ 4,850	\$ 378,300	\$ 106,700
24	July 5, 2019	Outside Level 3	100	80	\$ 4,000	\$ 320,000	\$ 80,000
25	July 26, 2019	Penthouse	3	3	\$ 7,500	\$ 22,500	\$ -
26	July 19, 2019	Penthouse	3	2	\$ 8,000	\$ 16,000	\$ 8,000
27	July 12, 2019	Penthouse	3	2	\$ 7,000	\$ 14,000	\$ 7,000
28	July 5, 2019	Penthouse	3	1	\$ 6,000	\$ 6,000	\$ 12,000

Secondary Sort

An Excel **filter**, also known as an AutoFilter, is used to display only the data that meet specific criteria. Data that does not meet the criteria is hidden from view. Excel's basic filter functionality allows users to filter rows by value, by format and by criteria. Filters can reduce a large, complex worksheet of data into meaningful information. With filtering, you can control not only what you want to see, but what you want to exclude. Users can filter based on choices they make from a list, or they can create specific filters to focus on exactly the data that they want to see.



Applied Filter

Clicking the filter button from the Data tab will add drop-down arrows to the column headers in a range of data. Clicking a drop-down arrow provides sorting and filtering options, like filter by color or text filters. A simple AutoFilter will be signified by the clearing of check boxes of the data that should be hidden. After applying a filter, a user can copy, edit, chart or print only visible rows without rearranging the entire list. Like sorting, filters can be applied to multiple columns to further reduce the results that are displayed.

A column that has been filtered will have its drop-down arrow icon switch from an upside-down triangle to a filter icon, as shown highlighted in yellow below. Only the cruises from the Penthouse accommodation category will be displayed after clearing all check boxes except the Penthouse category.

Cruise Date	Accommodation Category	Rooms Available	Rooms Rented	Rate	Revenue	Shortfall
July 26, 2019	Penthouse	3	3	\$ 7,500	\$ 22,500	\$ -
July 19, 2019	Penthouse	3	2	\$ 8,000	\$ 16,000	\$ 8,000
July 12, 2019	Penthouse	3	2	\$ 7,000	\$ 14,000	\$ 7,000
July 5, 2019	Penthouse	3	1	\$ 6,000	\$ 6,000	\$ 12,000

Applied Filter example

To remove a single filter, click the filter icon in the row header and choose Clear Filter from.... To clear all filters quickly, choose the Clear button from the Data tab on the ribbon or to remove filtering functionality, re-click the Filter icon from the Sort & Filter group. For more advanced users there are many more ways to utilize filters in Excel, such as Custom Filters and Advanced Filters. Nonetheless, a lot can be accomplished with the basic AutoFilter feature.

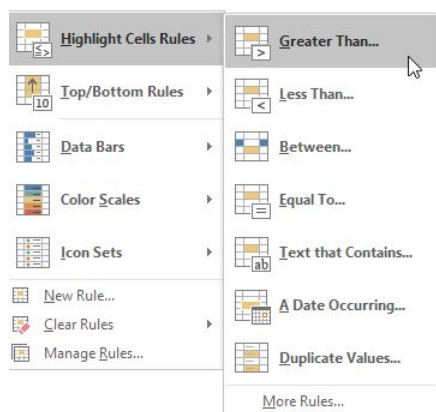
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5.7: Conditional Formatting

Using spreadsheet functionality to enhance critical thinking is a primary reason that Excel is so popular among business professionals. Decision-making is made easier when users can quickly spot trends, identify variances, and be alerted when certain criteria is met. Excel's conditional formatting feature is a really powerful tool when it comes to applying different formats to data that meets certain conditions. **Conditional formatting** is one of the most simple yet powerful features in Excel by applying user-specific formats to a cell/cells when user-specific conditions (rules) are met. Not only does it make a spreadsheet look awesome, but it also helps make sense of the data.

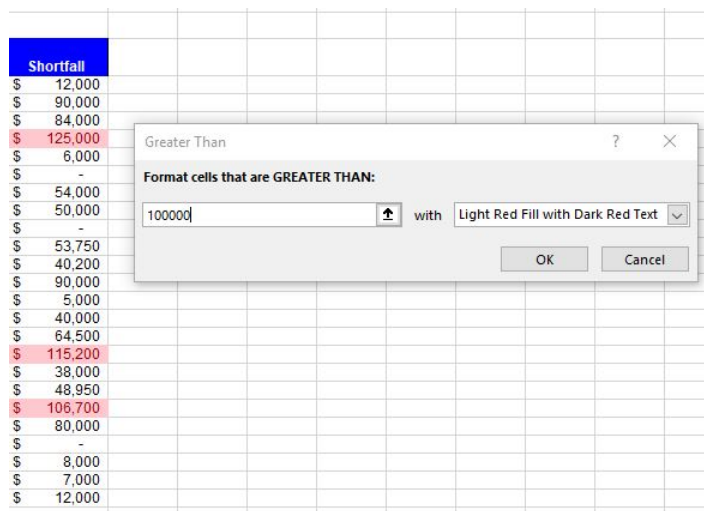


Clicking the Conditional Formatting button on the Home tab of the ribbon offers several options to define the condition criteria (rules), and several formatting options to display the data in meaningful ways. To choose formats that are applied to a cell(s) when a condition is met, select a range of cells, then click the Conditional Formatting button to display a menu of rules. Clicking a rule will expand an additional menu.



Conditional Formatting menus

For example to identify which cruise accommodation categories provide the most significant revenue shortfall, utilizing a highlighting rule that formats cells that are greater than \$100,000 would be a very practical conditional formatting rule that could provide some strategic information. Selecting the range of G5:G28 and applying the Greater Than rule, will create eye-catching formatting. The data in the first field can either be a cell reference or a static value, as shown below.



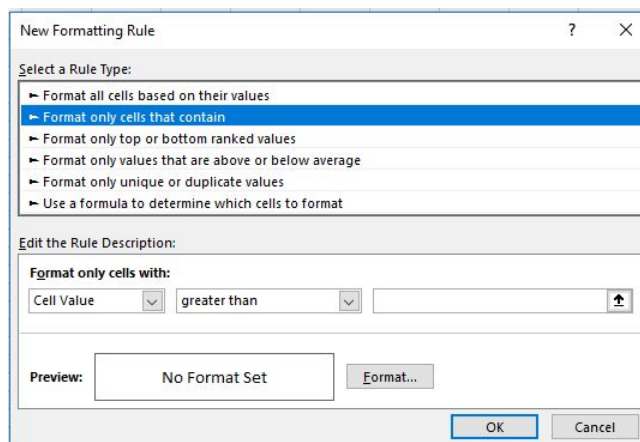
Greater Than CF rule

Numerous rule types exist beyond the preset comparison operator menu choices. Rules can identify cells that contain certain text or before/after a certain date, or even highlight duplicate data. Top/Bottom Rules can reveal the top or bottom 10 records in a certain column. The quantity can be modified from the top/bottom 10 to a user-specific number.



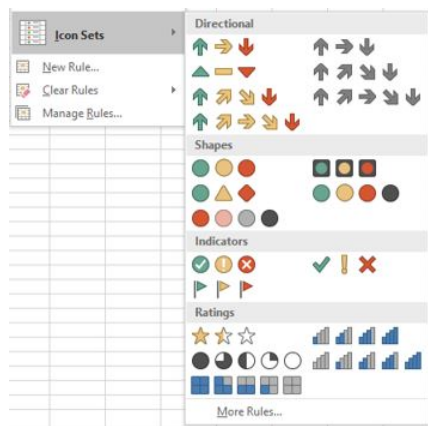
Top 10 criteria

Custom rules can be defined by choosing More Rules... from the Highlight Cells Rules menu, which opens the New Formatting Rule window. Choosing alternative Rule Types will modify the functionality available in this window.



New Formatting Rule

After defining the rule criterion, custom formats can be selected by clicking the Format button. The Format Cells window opens to allow custom Number, Font, Border or Fill formatting.



Icon sets menu

To enforce more complex rules, multiple conditional formatting rules can be applied to the same data. However too many colors can sometimes be distracting, and should be used sparingly. Therefore, Excel offers more formatting choices than just color fills. Data bars, color scales and icon sets can also be used to emphasize data that meets certain conditions.

The icon sets work great when color is not effective, such as when printing to black & white laser printers. Icons are even more noticeable than colors because of their unique look and sparing use. Icon sets will help visually represent the data with directional arrows, shapes, indicators, ratings, and other objects. For icons in sets of three, Excel will assign icons by dividing values into thirds – the first icon is assigned to the top one third of values, the second icon is assigned to the second third of values, and the third icon is assigned to the lowest one third of values. The values are adjusted for four and five-icon sets. Conditional formatting's flexibility is extensive, but perhaps even more impressive is that, like formulas, conditional formatting rules are volatile. As the data changes, the conditional formatting dynamically adjusts to evaluate the new data against the existing conditional rules.

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5.8: Pie Charts

With Excel, users can organize data so that it has context and meaning. The output of Excel manipulation can take the shape of either a table or chart. When deciding to use a chart or a table to communicate the data-driven message, it is wise to always ask how the information will be used, and who is the audience? People interact very differently with these two types of visuals. **Tables**, which display data in a columnar layout, are meant to be read. Therefore tables are ideal when the data requires more specific analysis. Tables offer preciseness, letting users dive deeper to crunch the numbers and examine exact values, instead of focusing on approximations or visualizations.

A **chart** is a visual representation of a range of related worksheet data. A chart can illustrate a large amount of numerical data quickly and in an easy-to-understand fashion. Charts are particularly useful for simplifying complex sets of data to expose the shape of the data – numerical patterns, trends, and other significant activity. What charts lack in terms of precision they overcome with broader insight and quicker comprehension.

According to some psychologists, people can be classified as either “left-brained” or “right-brained” thinkers. A person who is “left-brained” is often said to be more logical, analytical, and objective.

Note

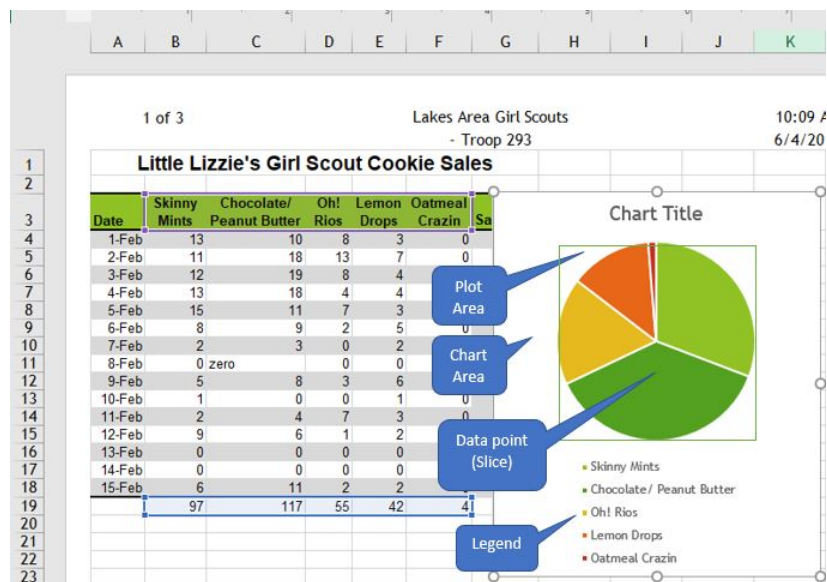
The right brain-left brain theory originated in the work of Roger W. Sperry, who was awarded the Nobel Prize in 1981 .

Utilizing tables to display spreadsheet data may be more effective with “left-brained” people. A person who is “right-brained” is said to be more creative, thoughtful, and subjective. Conversely, displaying spreadsheets data using certain Excel charts may be more suitable for “right-brained” people. Both tables and charts offer unique advantages, but one is not always better than the other. The choice ultimately depends on the data at hand, the message that is intended to convey, and the audience that will be consuming the information.

Learning how to work with charts means not only knowing how to create them but also realizing that different types of chart and layouts can reveal and emphasize different knowledge. Like a picture, a chart can be worth a thousand words. It all depends on how well the chart is designed and developed. A well constructed chart will provide context and clarity for data analysis and story telling. The first step to creating useful charts is to organize and precisely select the data that should be charted. This includes the cells that contain both the data and the label headings.

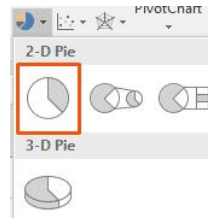
Each chart type conveys information in different ways. **Pie charts**, for example, are best for charting data that is a percentage of a whole. For example, what percentage of your monthly income is spent on transportation? Charts contain different objects for each chart type. Objects in a pie chart include:

- **Chart title** – describes what is charted. The label heading of the data series is used by default, but this can be edited.
- **Legend** – an index of information that corresponds to the category labels.
- **Data labels** – identify each value in the data series.
- **Plot area** – the part of the chart that displays data graphically.
- **Chart area** – the entire chart and all of its elements.



Pie chart annotated

A pie chart can only include a single series of data, whether it is a single column or a single row of data. A **data series** is the sequence of values that Excel uses to plot in a chart. Each value from the data series is represented by a slice (or wedge) of the pie. The size of each slice varies with its percentage of the total of the entire data series. To create a pie chart, first carefully select the appropriate data range before selecting the chart type from the Insert tab. In the above chart, the selected data range is \$B\$3:\$F\$3, \$B\$19:\$F\$19, since the only data series being charted is the total sales (quantity) of each cookie flavor. Every date (row) represents an additional data series, but since pie charts only plot a single data series, these series' should not be selected. Pie charts should be avoided when there are many categories, or when categories do not total 100%. Typically, 2-D charts are easier to read than 3-D charts.



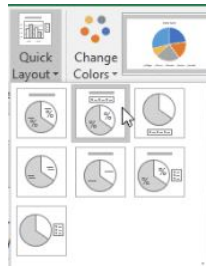
Insert pie chart

When a chart is created as an object on a worksheet, sizing handles will appear on the outer borders. The chart, or any object within the chart, can be moved and/or resized similarly to a picture or other objects in Microsoft Office. When a pie chart is first created, Excel will use the default colors and design. Users can customize the chart look easily by utilizing chart styles. In the Design contextual tab of the Ribbon, a number of different styles will be displayed in a row. Mouse over them to see a preview:



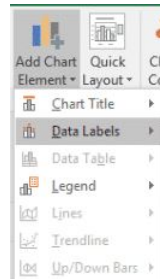
Chart styles

An additional option for quickly changing the look of a chart is to utilize the **Quick Layout menu** to select one of several preset to add elements like percentage labels, value labels, and differently located legends to the chart.



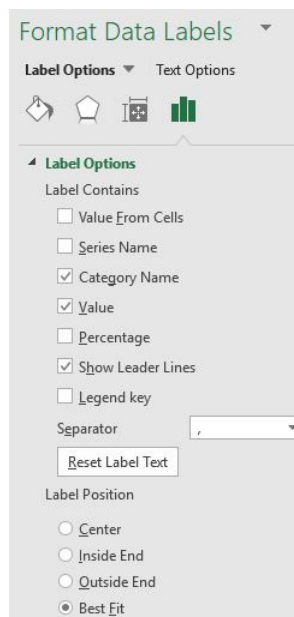
Quick layout menu

Users can also add and remove individual elements, such as chart titles, data labels, data tables, and more by using the **Add Chart Element** menu.



Add chart element

Some elements are not available for certain chart types. One of the most useful chart elements that get added manually to a chart are **data labels**.



Format Data Labels task pane

Data labels are linked to values on the worksheet, and they update automatically when changes are made to these values. Data labels make a chart easier to understand because they show details about a data series or its individual data points. Users can add data labels to all data points or a specific data slice by ensuring that only the specific slice is selected. In addition to the Add Chart Element menu and quick layout options, users can add data labels by right-clicking the chart and choosing Add Data Labels from the shortcut menu. Once added, the data labels can be further modified by right-clicking the chart and choosing Format Data Labels to open the Format Data Labels task pane. One or more types of labels can be added and positioned. Adding Category Name labels make the legend redundant. Be careful not to add so many labels that the chart becomes too crowded to read!

Pie chart with labels

After adding labels, it may become necessary to resize or move the chart. After adding a title, data labels, and removing the legend, the chart looks different, but is still the same size, even though certain elements have resized.

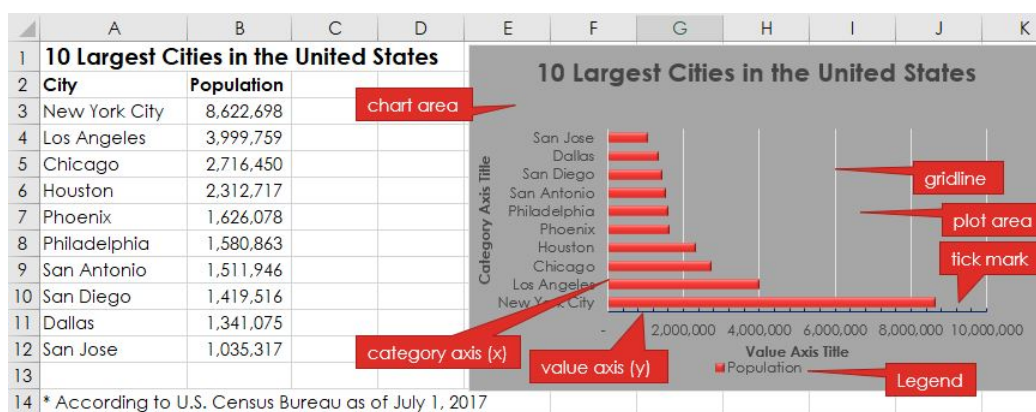
Which pie chart looks better? Generally, removing the legend through use of data labels is considered a preferable design strategy. Alas, there are even more ways to customize a pie chart that is beyond the scope of this text! Additional functionality includes creating 3-D pie charts, exploding slices, rotating, sorting, adding different fill designs, and much more!

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5.9: Bar and Column Charts

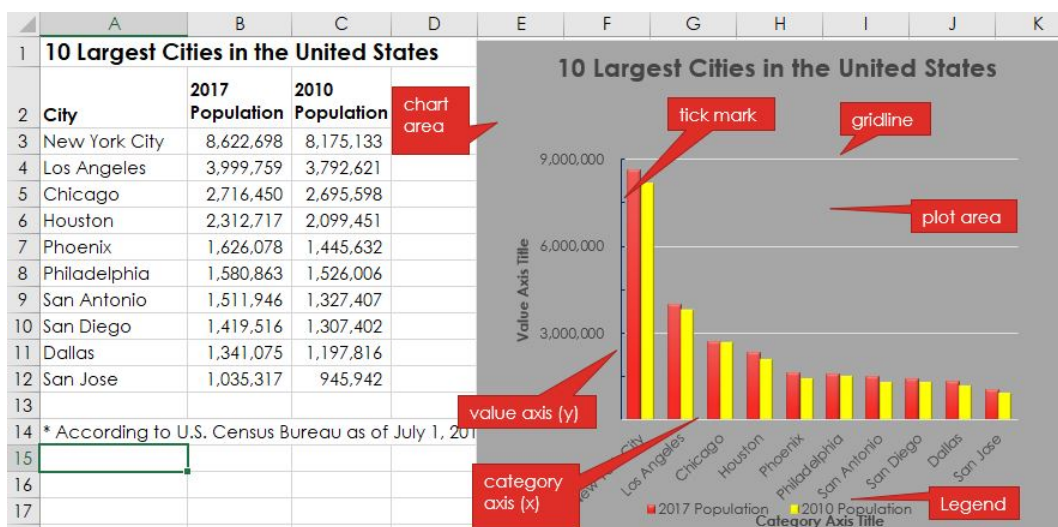
Bar charts are practical for comparing the differences between values with horizontal bars. The lengths of the bars are proportional to the size of the data category they represent. A vertical bar chart is referred to as a column chart, and they are basically the same – just 90° apart. Unlike a pie chart, a bar chart can include several series of data. Bar charts are simple, easy and flexible, and thanks to the horizontal layout, bar charts can accommodate longer category names. Bar (and column) charts contain the following objects:

- **Chart title** – describes what is charted.
- **Chart area** – the entire chart and all of its elements.
- **Plot area** – the region within the horizontal and vertical axes.
- **Axes titles** (horizontal, vertical)- describe the data.
- **Legend** – an index of information that corresponds to the series names.
- **Data labels** – identify each value in a data series.
- **Value axis (y-axis)** – contains values. Horizontal axis on bar charts and vertical axis on column charts.
- **Category axis (x-axis)** – contains the category labels. Horizontal axis on column charts and vertical axis on bar charts.
- **Gridlines** – mark the intervals on an axis.



Bar chart annotated

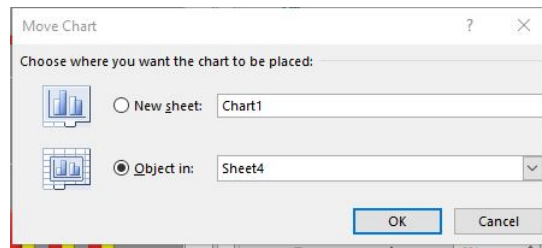
While the data and chart above only displays one data series, most bar and column charts tend to display multiple data series to compare and contrast one set of data against another. The chart below adds a second data series in column C, and changes the chart type to a column chart. The two different data series are illustrated with different color data points. Also, note how the axes change directions! The value axis maximum, major and minor units were also modified to different numerical values.



Multiseries column chart

Charts can easily get crowded with details. Therefore, keeping the chart on the same worksheet as the data is not always feasible. Users can move a chart to any location on a worksheet or to a new or existing worksheet. By default, a chart is created as an object

within a sheet. The chart can be resized, but sometimes the chart needs to be as large as possible. To move the chart to a new worksheet, click the Move Chart button on the Chart Tools Design tab.



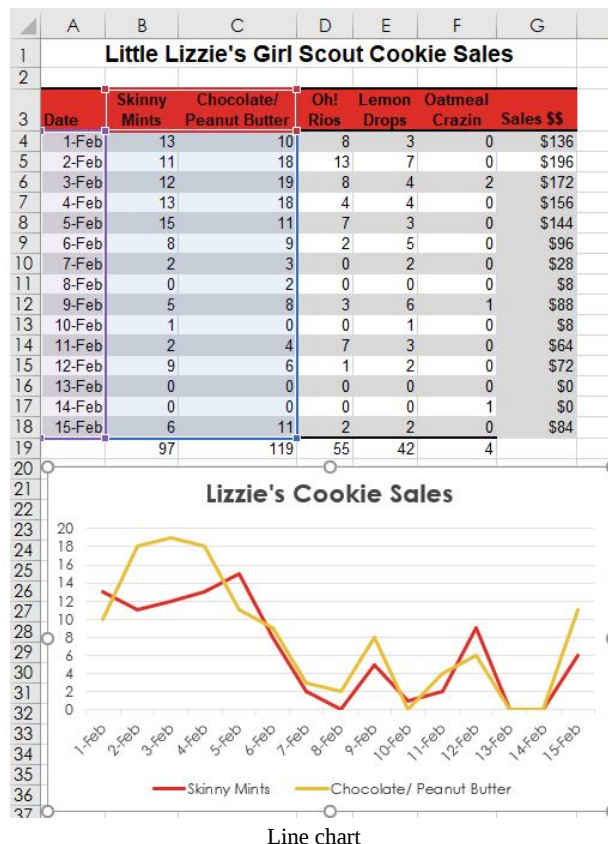
Move Chart

Next, click the New sheet radio button, and then in the New sheet box, type a name for the new worksheet. After clicking OK, the new sheet will be to the left of the existing sheet. A new, standalone chart will occupy the entire page to maximize the visibility of the data. The Move Chart window also provides the option of moving the chart as an embedded object into an existing sheet.

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5.10: Line Charts

A line chart displays a series of data points connected by a straight line. Line charts are a good way to show change or trends over time. Line charts are simple to create and easy to read. In contrast to column or bar charts, line charts can handle more categories and more data points without becoming too cluttered. Each line displays as a different color. Line charts help people examine why data is changing and make decisions about how to proceed. The Line Chart is especially effective in displaying data trends. Stock market investors utilize line charts to track historical stock performances, and help determine if a trend can be forecasted in the future.



In a Line Chart, the vertical axis (Y-axis) always displays numeric values and the horizontal axis (X-axis) displays time or other categories. Time intervals can be measured in years, months, days, or hours.

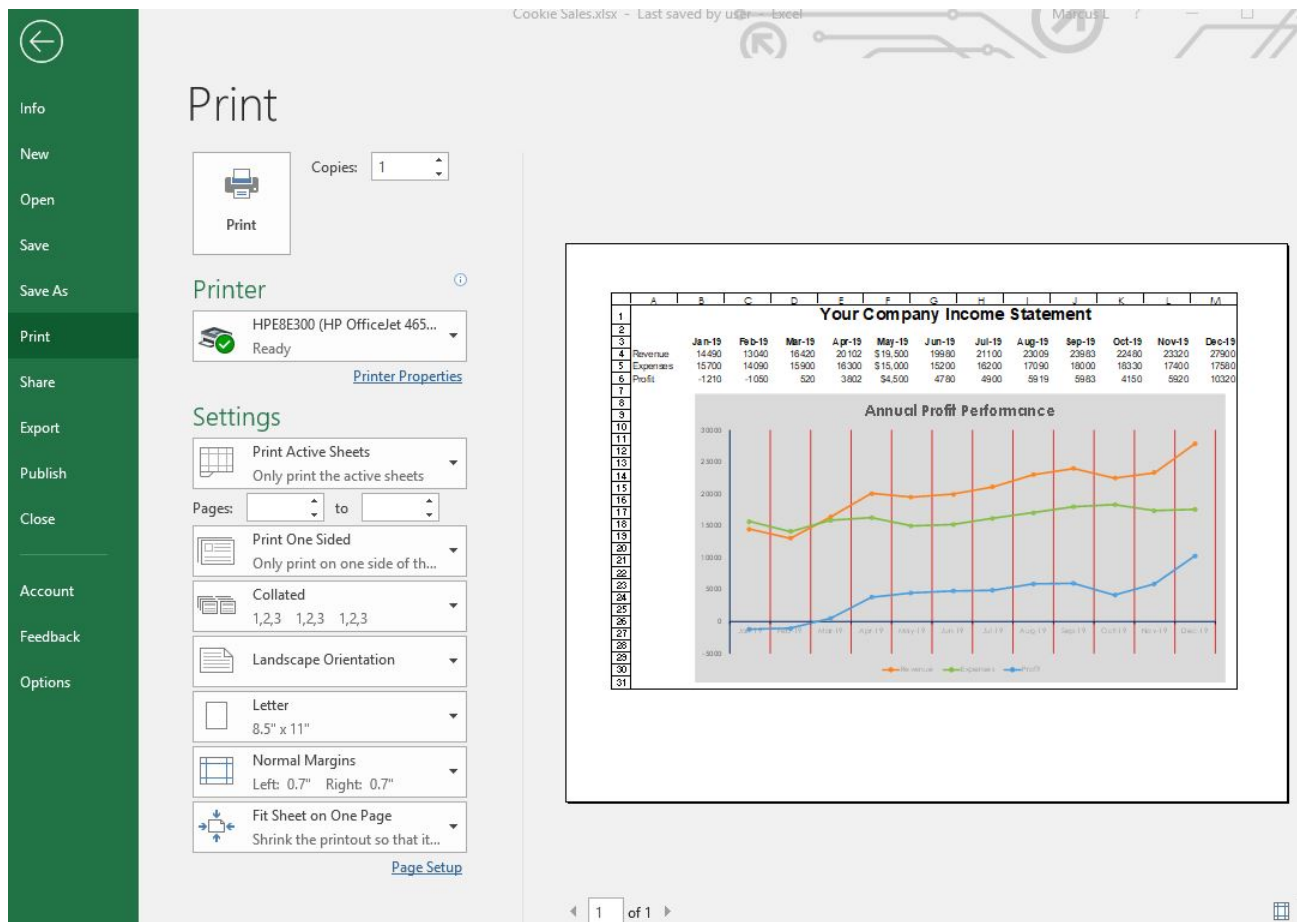
To create a line chart, start by selecting the data range, then choosing the Line Chart button  in the Charts group from the Insert tab.

In the 2-D line chart illustrated above, two sets of data series are plotted for fifteen days. The Skinny Mints cookies are identified by the red line, and the orange line plots the Chocolate/Peanut Butter cookies. Each date is a data point. Additional data series can be added by expanding the data source range. Line charts provide an easy way to track historical data. In many cases, the way the data is trending makes it easy to predict the results of data in future periods.

Excel offers numerous other charts that might better help illustrate the story behind the data, however all charts must address the challenge of sharing or outputting the graphic(s) to their target audience(s). Here are a few printing issues to consider:

- Printing only the chart. If the active cell is not selecting the chart, both the chart and worksheet data will print. However, if the chart is currently selected, only the chart will print by default (as a chart sheet). If the intent is to print both the chart and the data, make sure to move and/or resize the chart to ensure everything fits appropriately within the sheet margins. This will embed the chart within the sheet. Utilizing the Print Preview window to verify what will print by default will allow the user to make numerous changes, such as the orientation, margins and scaling. A different installed printer can also be selected. The

graphic below illustrates from the Print Preview window, an embedded line chart in landscape orientation with headings enabled for print. The sheet has also been scaled to fit to one page.



Excel Print Preview Line Chart

- Chart colors that are not compatible with black and white printers. A lot of office printers are black and white laser printers due to their low-cost to operate at high volumes. A color laser printer may be a worthy investment for common chart printing. If a black and white printer is all that is available, it may be necessary to change the colors to patterns or contrasting shades of grey.
- Not enough or too much information. Reads of the chart must be able to comprehend the message the chart is attempting to convey. This might require adding context, such as titles, data labels, and text-box callouts. Conversely, a chart can have too much information that the chart is cluttered and unreadable. In this case, summarizing the data may be prudent, or even re-selecting a different source data range. A chart can also be unreadable due to poor design considerations like wrong fonts and font sizes, as well as distracting colors and object sizes.
- Excel charts are volatile and will change as often as the source data is changed. If a static copy of a chart is needed, consider saving the chart as a picture. This can be accomplished through using the copy and paste special commands. Using Paste Special will allow a chart to be pasted in either PNG, JPEG, GIF or other formats. Alternatively, Excel files can be saved as PDF files for inserting in other electronic documents/files.

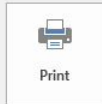
Practice 8: Weather Report

	A	B	C	D	E	F	G	H	I	J	K	L
1	The Weather Report											
2	Average Monthly High Temperatures (in Fahrenheit) of Potential New Plant											
3												
4												
5		Anchorage, AK	Mesa, AZ	Detroit Lakes, MN								
6	Jan	23	67	19								
7	Feb	27	71	26								
8	Mar	34	76	37								
9	Apr	44	85	56								
10	May	56	94	69								
11	Jun	63	104	78								
12	Jul	65	106	82								
13	Aug	64	104	81								
14	Sep	55	99	71								
15	Oct	40	89	56								
16	Nov	28	75	38								
17	Dec	25	67	22								
18												
19												
20	** U.S. climate data; www.usclimatedata.com											

The Weather Report

1. Open the data file *The Weather Report.xlsx* or create a new sheet from the illustration at right.
2. Add conditional formatting to all cells in B6:E17 so that any cell is at least 90° with red fill cell formatting, or below 32° in light blue fill.
3. Use the Internet to research average monthly high temps for Fort Myers, FL. Enter a label and the temps in column E. The conditional formatting should dynamically format the cells.
4. Create a 2-D bar chart of Anchorage and Mesa temps for all twelve months.
5. Move the bar chart to its own chart sheet.
6. Return to the original source data sheet and create an embedded 2-D line chart with markers for all four cities for all twelve months. Change the chart title to Average Month High Temps. Move the chart slightly so the top-left edge is in cell F6.
7. Use Print Preview to view the entire sheet (not just the chart). Change the orientation to landscape. Compare your results with the screenshot below:

Print



Copies: 1

Printer

HPE8E300 (HP OfficeJet 465...
Ready

[Printer Properties](#)

Settings

Print Active Sheets
Only print the active sheets

Pages: to

Print One Sided
Only print on one side of th...

Collated
1,2,3 1,2,3 1,2,3

Landscape Orientation

Letter
8.5" x 11"

Normal Margins
Left: 0.7" Right: 0.7"

No Scaling
Print sheets at their actual size

[Page Setup](#)

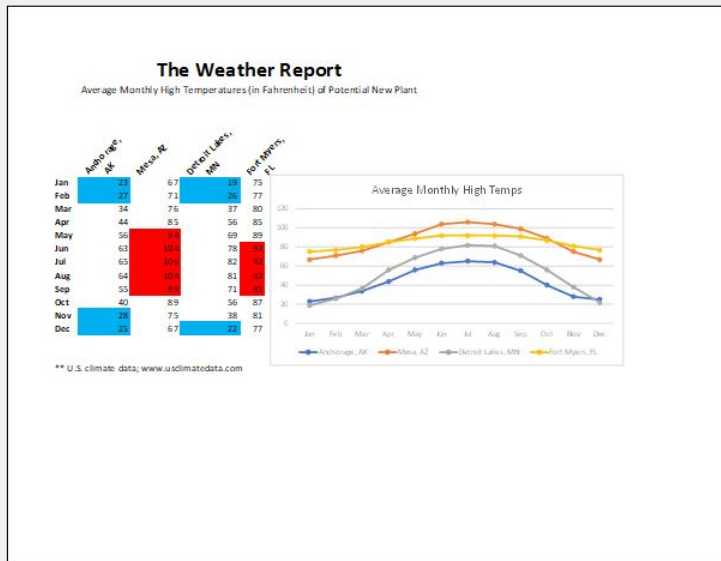


Figure 5.10.1: Copy and Paste Caption here. (Copyright; author via source)

8. Save the file as The Weather Report2.xlsx to your hard drive.

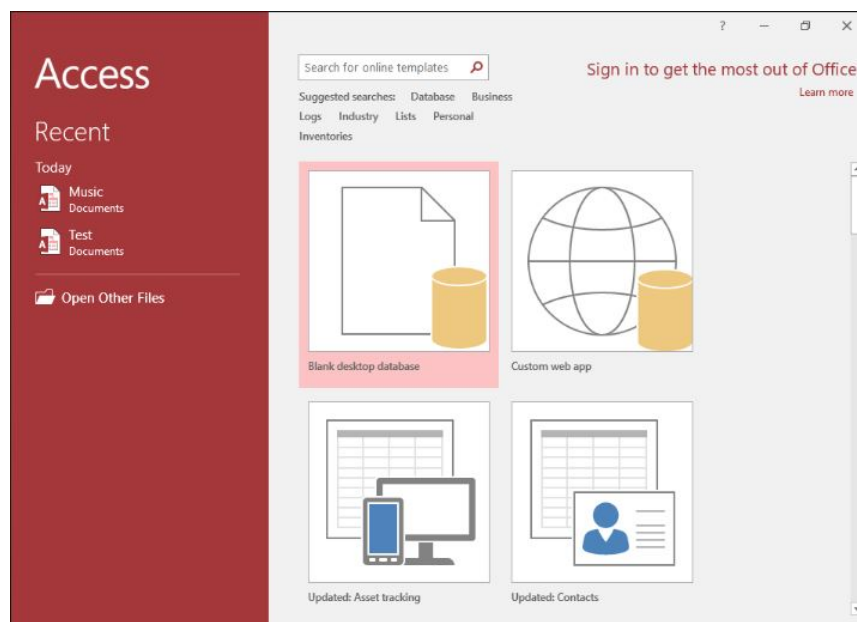
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CHAPTER OVERVIEW

6: Access Chapter 1 - Database Basics

Learning Objectives

- What is a Database?
- The Four Main Objects in a Database
- Database Design
- Creating a Table
- Primary and Foreign Keys
- Table Relationships
- Entering and Editing Records
- Creating Forms



[6.1: What is a Database?](#)

[6.2: The Four Main Objects in a Database](#)

[6.3: Database Design](#)

[6.4: Creating a Table](#)

[6.5: Primary and Foreign Keys](#)

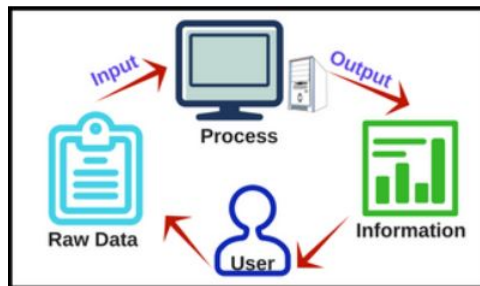
[6.6: Table Relationships](#)

[6.7: Entering and Editing Records](#)

[6.8: Creating Forms](#)

6.1: What is a Database?

A **database** is a collection of related data that is organized so that it can be easily access, managed and updated. Databases can store details about people, products, orders, or anything else. **Data** can be defined as facts and statistics about people, objects, events and ideas. Organizations interpret, process and analyze data to turn the data into useful **information**. This information is used to make better decision-making.



Data process

In the past, many databases were paper-based. Paper records were stored in files within file cabinets. File cabinets still exist today, in large part due to the fears associated with the insecurity of electronic records being compromised. The individual documents (records) are categorized into different folders (tables) to streamline user access. However, this process is labor-intensive, susceptible to errors, and an office eyesore!

Databases are used for two major purposes: for processing transactions and analytical research. Transactional databases track daily operations. This data can be extracted into other software programs for further manipulation, summation and classification. This allows users to perform analytical research and prepare reports to help create strategic information.

Computerized databases organize data into rows, columns and tables, and is indexed to make it easier to find things quickly. Data gets updated, expanded and deleted as new data is added. Automated processes quickly manipulate the data, and data accuracy is enhanced through automated rules. The advancements in database software technologies have contributed to the Information Age that currently exists. The growth of the filing cabinet market cannot compare to the growth of electronic data contained in private and public networks, and web sites throughout the Internet!

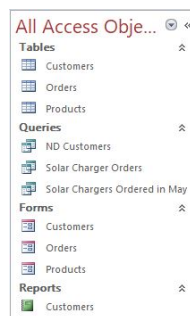
While a spreadsheet can function as a database, with it's utilization of columns and rows, the flat-file structure creates redundancies and inconsistencies which limit the ability to find and understand the data. In contrast, a relational database uses a tabular structure so that data can be easily reorganized and accessed in a number of different ways. Relational databases are made up of a set of tables with data that fits into predefined categories (fields). Each table has at least one data category (field) in a column, and each row has a certain data instance for the categories (fields) which are defined in the columns.

Microsoft's relational database software program available in Office 365 is called Access. Access only functions with Windows operating systems (not available on a Mac O/S), and is not available in all Office versions. Access is a tool to organize, store, and manipulate data, in order to report on the data stored in tables. The power of a database comes from the ability to link tables together to provide data processing efficiencies for large sets of data. Access' integration with the other Microsoft Office programs makes it a very popular and economical relational database solution.

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6.2: The Four Main Objects in a Database

While Microsoft Access is made up of seven components, this text will focus on the main objects: tables, forms, queries and reports. Together, these objects allow users to enter, store, analyze and compile data in various ways.



Navigation Pane

When an Access database is opened, the objects are illustrated in the **Navigation Pane** on the left side of the window. The standard view in the Navigation Pane displays all objects in the database organized by object type. The Navigation Pane is used to run, open, and manage the objects of a database. Double-clicking an object will open the object in a document window.

A **table** is the database object that stores data organized in an arrangement of columns and rows. Each row is a **record** and each column is a **field** within each record. A record is all of the data pertaining to a person, place, thing or event. Each record will have one or more fields and every database must have at least one table. A relational database must have more than one table.

The other three objects are typically based off of the tables, so take the time to set up the tables correctly, the first time! A **form** object is typically used for entering new records into a table, or edit/deleting/display existing records in a table. Forms are the primary interface that most users of a database enter and display data. A **query** object retrieves specific data from other database objects and then displays only the data that the user specifies. Queries are the equivalent of asking questions about the data. The **report** object summarizes the records from a table or query into an easy-to-read format suitable for printing or exporting to other software programs.

Access objects have several views. Each **view** gives users different perspectives and offer different functionality. The two most important views are Datasheet view and Design view. **Datasheet view** displays a table in a datasheet where fields are in columns and records are in rows.

Customers								
CustomerID	First Name	Last Name	Phone	Street Address	City	State/Provir	Zip/Postal C	Click to Add
1	Devinder	Patel	218-555-5641	212 Ash Street	Aurora	MN	59990	
2	Maria	Escobar	218-555-5146	212 Birch Street	Lake Cosmos	MN	59991	
3	Ahmed	Rashad	218-555-1658	212 Cedar Street	Park Falls	MN	59992	
4	Arnold	Hammer	218-555-8811	212 Elm Street	Aurora	MN	59990	
5	Susan	Wong	(218) 555-0182	212 Fir Street	Aurora	MN	59990	
*	(New)							

Datasheet view of a Customer table

This view is useful for comparing records and is often used when sorting or filtering data. This view is also practical for printing data since many of the records can fit on a single sheet of paper. Records can be added in datasheet view, but forms are a more typical object for data entry. Nonetheless, the asterisk (*) that appears to the left of the row below the last record indicates where a new record will appear. The grey box to the left of each record is a record selector. Clicking a record selector will make the record active. Right-clicking the record selector will allow users to delete the selector record or add a new record to the table. **Design view** allows users to setup and edit the fields in an object.

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6.3: Database Design

A properly designed database will divide data into tables to eliminate duplicate information (also known as *data redundancy*). **Redundancy** occurs when data is repeated several times in a database. Redundant data is bad, because it wastes space and increases the likelihood of errors and inconsistencies. A good database prevents redundant data when, for example, customer data (ID, Name, Address, etc) is stored in one table and then other tables store just the customer ID to refer to the customers. Another important design consideration to maintain is data accuracy. A common motto when performing data entry is “garbage in, garbage out”. The correctness and completeness of information is important if the user wants to rely on their data. If your database contains incorrect information, any reports that pull information from the database will also contain incorrect information. As a result, any decisions you make that are based on those reports will then be misinformed.

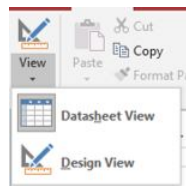
Creating a new database involves determining the database schema, which is a description of the data and the organization of the data into tables. Designing a schema consists of the following steps:

1. Determine the purpose of the database and which data to include in the database. It is a good idea to write down the purpose of the database on paper — its purpose, how you expect to use it, and who will use it.
2. Divide information into related groups to create tables and then give each table a descriptive name. Data should be grouped to ensure there is little to no redundancy. Each table must have data related to at least one other table through a table relationship.
3. Describe the fields and determine the primary key for each table.

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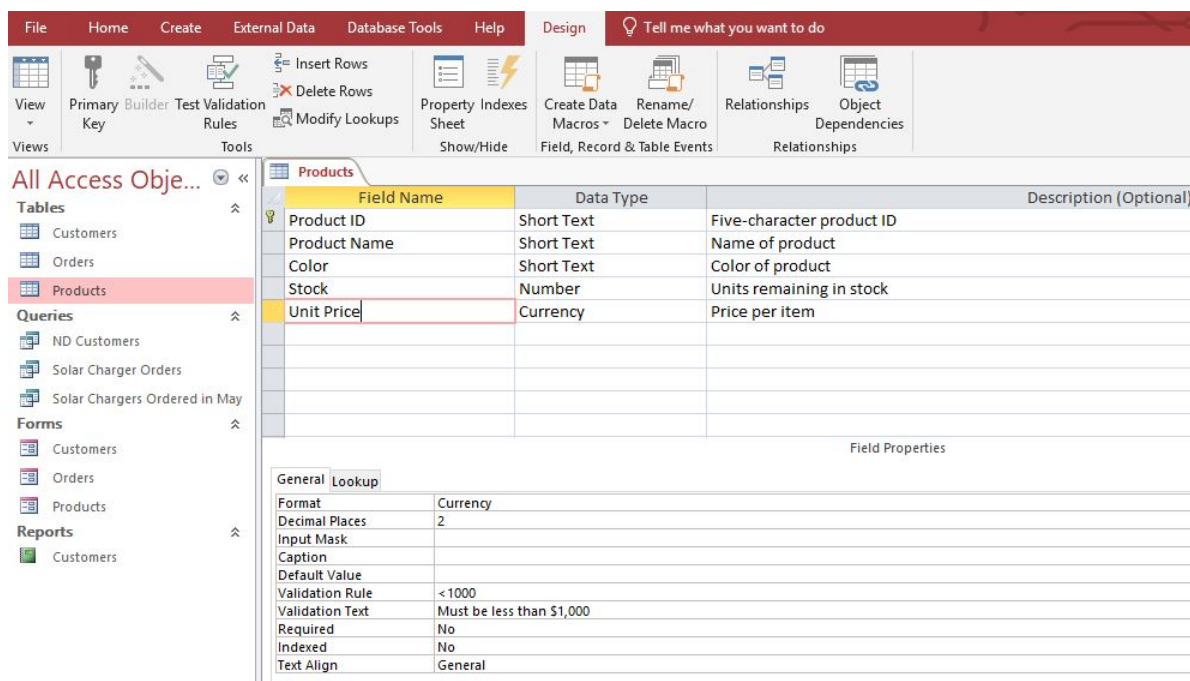
6.4: Creating a Table

As previously stated, a database cannot exist without at least one table. Therefore, when a new database is created in Access, the first object that opens is a table in datasheet view.



Access View tab

Switching the view to Design View allows the user to make many design decisions in a much more intuitive view. Many users like to use Datasheet View to paste data copied from Excel. However, setting up the fields in Design View makes it easier to define each field's properties and data type.



Design View

Design View doesn't display any data. Therefore, there's more space available to display other settings. In Design View, you can see the data type listed next to each field. When a user clicks on a field (in the top frame), the bottom frame displays the properties for that field. The user can then change these properties as desired.

Creating a table in Design View allows the user to define advanced settings, like data types and properties, for each field in the table. However, the first step is defining the field names. Here are a few guidelines when creating field names:

- Names can include numbers, UPPER and lowercase letters, and any combination. Avoid special characters (exclamation points, periods, brackets, quotes, etc.)
- No leading spaces. Spaces between words is acceptable, but not common practice, because:
- Make the names as short as possible without excessive abbreviation. Formatting column widths for displaying in printouts can be challenging with excessively long field names. For example, Order # or Order Number are better than Customer Order Number.
- Ensure the names are unique per table. If a table has fields for Customer ID and Product ID, neither field should be named simply ID. Likewise with the word Name. It is too generic and needs an prefix identifier.

- Break data into multiple fields. For example, instead of one field for Customer Name, create fields for First Name and Last Name. This will allow sorting and filtering on single fields. Another example would be separating an address into multiple fields for Street Address, City, State/Province and Zip/Postal Code.

Every field has a data type. A field's **data type** indicates the kind of data that the field stores, such as large amounts of text or attached files. A field's data type determines what other properties the field has including its size and formatting options. Field data types are defined in the table design grid, where as field properties are defined in the Field Properties pane in the bottom of the Table Design View window. Data types include:

Data type	Description	Size
Short Text	Use for text or combinations of text and numbers (i.e. Phone Numbers).	Up to 255 characters
Long Text	Use for larger amounts of alphanumeric data, including sentences and paragraphs. Note: You cannot sort a memo field. However, they are searchable.	Up to 1 GB
Number	Numeric values.	4 bytes
Large Number	Numeric values. Stores a non-monetary, numeric value and is compatible with the SQL_BIGINT data type in ODBC. Use this data type to efficiently calculate large numbers.	8 bytes
Currency	Use for monetary data. Holds up to 15 digits of whole dollars, plus 4 decimal places. Tip: You can choose which country's currency to use.	8 bytes
AutoNumber	Unique value generated by Access for each new record, usually starting at 1.	4 bytes
Date/Time	Use for dates and times.	8 bytes
Yes/No	A logical field can be displayed as Yes/No, True/False, or On/Off. In code, use the constants True and False (equivalent to -1 and 0). Note: Null values are not allowed in Yes/No fields.	1 byte
Ole Object	Can store pictures, audio, video, or other BLOBs (Binary Large Objects).	Up to 2 GB
Hyperlink	Contain links to documents or other files, e-mail addresses, or web pages.	Up to 8 bytes
Attachment	Attach pictures, documents, etc. Can contain an unlimited number of characters per record. Access will compress the file.	Up to 2 GB
Calculated	Use to create an expression that uses data from one or more fields. You can designate different result data types from the expression.	Dependent on the data type of the result type property
Lookup Wizard	When selecting this entry, a wizard starts to help define either a simple or complex lookup field. A simple lookup field uses the contents of another table or a value list to validate the contents of a single value per row. A complex lookup field allows you to store multiple values of the same data type in each row.	Dependent on the data type of the lookup field

After creating a field and setting its data type, users can set additional field properties. The field's data type determines which other properties that can be set. The **field size** is the number of characters or the type of number it can store. For Number and Currency fields, the Field Size property is especially important, because it determines the range of field values. For example, a one-bit Number field can store only integers ranging from 0 to 255. In the **Field Properties** pane, on the General tab, enter the new field size in the Field Size property. Users can choose from the following values:

- **Byte** — For integers that range from 0 to 255. Storage requirement is a single byte.
- **Integer** — For integers that range from -32,768 to +32,767. Storage requirement is two bytes.

- **Long Integer** — For integers that range from -2,147,483,648 to +2,147,483,647. Storage requirement is four bytes.
- **Single** — For numeric floating point values that range from -3.4×10^{38} to $+3.4 \times 10^{38}$ and up to seven significant digits. Storage requirement is four bytes.
- **Double** — For numeric floating point values that range from -1.797×10^{308} to $+1.797 \times 10^{308}$ and up to 15 significant digits. Storage requirement is eight bytes.
- **Replication ID** — For storing a GUID that is required for replication. Storage requirement is 16 bytes.
- **Decimal** — For numeric values that range from $-9.999... \times 10^{27}$ to $+9.999... \times 10^{27}$. Storage requirement is 12 bytes.

Numeric and date/time fields can have a specified format to define how the data is displayed. Short text, long text, and hyperlink fields usually have no format. Predefined numeric field formats include:

- **General Number** – (Default) Display the number as entered.
- **Currency** – Use the thousand separator; follow the settings specified in the regional settings of Windows for negative amounts, decimal and currency symbols, and decimal places.
- **Euro** – Use the euro symbol (€), regardless of the currency symbol specified in the regional settings of Windows.
- **Fixed** – Display at least one digit; follow the settings specified in the regional settings of Windows for negative amounts, decimal and currency symbols, and decimal places.
- **Standard** – Use the thousand separator; follow the settings specified in the regional settings of Windows for negative amounts, decimal symbols, and decimal places.
- **Percent** – Multiply the value by 100 and append a percent sign (%); follow the settings specified in the regional settings of Windows for negative amounts, decimal symbols, and decimal places.
- **Scientific** – Use standard scientific notation.

When it comes to date/time fields, Access automatically displays the date and time in the **General Date** and **Long Time** formats. The dates appear as, mm/dd/yyyy in the U.S. and as, dd/mm/yyyy outside the U.S. where mm is the month, dd is the day, and yyyy is the year. The time is displayed as, hh:mm:ss AM/PM, where hh is the hour, mm is minutes, and ss is seconds. Here are some other predefined formats for date/time fields:

- **Long Date** – Displays only date values, as specified by the Long Date format in your Windows regional settings. i.e. Monday, May 13, 2018.
- **Medium Date** – Displays the date as dd/mm/yyyy, but uses the date separator specified in your Windows regional settings. i.e. 13-May-2018.
- **Short Date** – Displays date values, as specified by the Short Date format in your Windows regional settings. i.e. 5/13/2018.
- **Medium Time** – Displays hours and minutes followed by AM or PM. Access uses the separator specified in the Time setting in your Windows regional settings. i.e. 9:23 AM.
- **Short Time** – Displays only hours and minutes. Access uses the separator specified in the Time setting in your Windows regional settings. i.e. 9:23.

Other popular (not all inclusive) field properties that appear based on certain data types include:

- **Decimal Places** – Specifies the number of decimal places to use when displaying numbers.
- **Input Mask** – Controls how data is entered and is useful when text or date entries should follow a certain format. Access has several predefined masks. To open the Input Mask Wizard, click the ellipses (...) at the end of the Input Mask field. Popular existing input masks include the Phone Number and Zip Code masks. Typically, clicking Next to accept the default options throughout the wizard will create the most common input masks. Custom masks can be created by clicking the Edit List button. Mask characters include the digits 0 and 9. A 0 placeholder means that a digit is required, whereas a 9 means that a digit is optional. For example, the last four characters of a Zip Code are often optional, so the mask would display as 00000-9999.

Input Mask Wizard

- **Caption** – The label text that is displayed for this field by default in forms, reports, and queries. If this property is empty, the name of the field is used. Any text string is allowed.
- **Default Value** – Automatically assigns the specified value to this field when a new record is added. Popular with State or Country fields for data entry in regional uses.

- **Validation Rule** – Helps ensure accurate data through creation of an expression criterion that must be true whenever the value is added or changed in the field. Validation rules are popular for numeric and date entries, and are formed with one or more relational operators and/or logical operators. A typical rule in an Order Entry table/form might require the Quantity be at least one. The rule in the Quantity field could be ≥ 1 .

Operators

- **Validation Text** – If an entry breaks the rule, it is cleared from the entry box and the Validation Text is displayed in a dialog box. Highly recommended to be used in conjunction with the Validation Rule so the data entry person knows why their entry is not acceptable.
- **Required** – Specifies if data must be entered or not. Choice is Yes or No. Default is No.
- **Indexed** – Specifies whether the field has an index. There are three available values: Yes (No duplicates) – Creates a unique index; Yes (Duplicates OK) – Creates a non-unique index; No – Removes any index on the field. If users often search a table in Access or sort its records by a particular field, users can speed up these operations by creating an index for the field. Access uses indexes in a table as people use an index in a book: to find data, Access looks up the location of the data in the index. In some instances, such as for a primary key, Access automatically creates an index. At other times, it may be necessary to create an index manually.

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6.5: Primary and Foreign Keys

Fields that are part of a table relationship are called keys. A key usually consists of one field, but may consist of more than one field. There are two kinds of keys:

- **Primary key** – To ensure that no two records in a table are identical, one field in each table is designated the primary key. A primary key consists of one or more fields that uniquely identify each record that you store in the table. Often, there is a unique identifier, such as an ID number (Employee ID, Customer ID, etc), a serial number, or a social security number that serves as the primary key. Always choose a primary key whose value will not change. A key icon appears next to the name of the primary key field. AutoNumber data type fields make good primary keys.
 - **Foreign key** – A table can also have one or more foreign keys. A foreign key contains values that correspond to values in the primary key of another table. For example, you might have an Orders table in which each order has a customer ID number that corresponds to a record in a Customers table. The customer ID field is a foreign key of the Orders table.
-

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6.6: Table Relationships

Access is a relational database management system. In a relational database, users divide information into separate, subject-based tables. Keeping data separated in related tables produces the following benefits:

- **Consistency** – Because each item of data is recorded only once, in one table, there is less opportunity for ambiguity or inconsistency. For example, storing a customer's name only once in a table about customers versus storing it repeatedly (and potentially inconsistently) in a table that contains order data.
- **Efficiency** – Recording data in only one place results in less disk space used. Additionally, smaller tables tend to provide data more quickly than larger tables. Finally, not using separate tables for separate subjects will introduce null values (the absence of data) and redundancy into the tables, both of which can waste space and impede performance
- **Comprehensibility** – The design of a database is easier to understand if the subjects are properly separated into tables.

In relational database terms, a **relationship** is a situation where multiple tables can contain related data that is linked by a common field. A relationship consists of a parent table and a child table. The child table references the parent table by having a field that matches a field in the parent table. The child's field is the foreign key, whereas the parent's field is the primary key. In a relationship, any data entered into the child's foreign key field must match a value from the parent's primary key field. By ensuring that the foreign key's data matches data in the primary key, Access ensures that all records in the child table will have an associated record in the parent table. There are three types of relationships:

- **One-to-One** – A row in table A can have only one matching row in table B, and vice versa. i.e. A baseball player can have only one Jersey Number.
- **One-to-Many** – A row in table A can have many matching rows in table B, but a row in table B can have only one matching row in table A. i.e. A baseball player can have many games played.
- **Many-to-Many** – A row in table A can have many matching rows in table B, and vice versa. This is achieved through the use of a third table (commonly called a *junction table*) that contains lookup data for both tables. Multiple players can play multiple games.

Determining the relationships between tables helps ensure that the right tables and columns exist. When a one-to-one or one-to-many relationship exists, the tables involved need to share a common column or columns. When a many-to-many relationship exists, a third table is needed to represent the relationship.

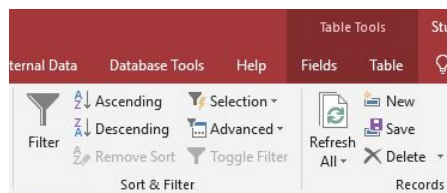
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6.7: Entering and Editing Records

Entering records directly into Datasheet View is probably the most intuitive way to enter data into a database. In Access, this is common because many Access databases are considered single-user databases. With multi-users databases, data integrity policies would discourage most users from having editing rights directly to the tables. Therefore, in these databases, the more common method for entering and editing records in a database would be via a form. Nonetheless, entering records directly into Datasheet View has some advantages, including:

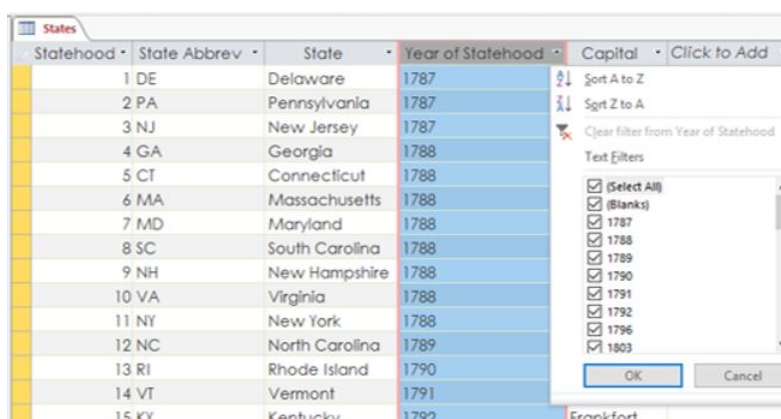
- Users can look at their data in columns and rows in a datasheet without using any special formatting.
- When a user opens a table in Datasheet View it resembles an Microsoft Excel worksheet, and the user can paste or add data in one or multiple fields. Data can be copy and pasted from a Word table or Excel worksheet into Access.
- Printing a table's datasheet in Portrait or Landscape orientation. Use Print Preview to change the orientation and margins before printing. Output can also be sent to a PDF file.
- Users don't need to explicitly save their data. Access commits user's changes in the table when they move their cursor in the same row towards a new field, or if they move their cursor towards another row.
- Sorting and filtering data is very similar to Microsoft Excel.

Access allows users to **sort** data in Datasheet View one iteration at a time in either **Ascending** or **Descending** order. Ascending order is also referred to as *alphabetical* order when the sort is based on a text field, *chronological* order when the field is a date/time data type or *numerical* order when the data type of the field is Number. Sorting a datasheet does not affect the order that the records are displayed in a form.



Sort & Filter

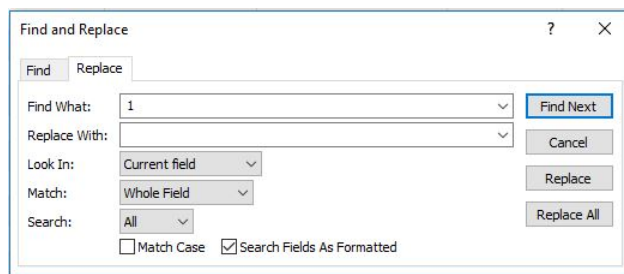
Displaying records based on specified criteria is called **filtering**. When a filter is applied, records that do not meet the specified criteria are hidden from view until the filter is removed. To filter records based on the data in a field, click in the field to base the filter on and then click on the Filter button on the ribbon or click the drop-down triangle to display a menu similar to the graphic below.



Filtered table

To remove a filter, clear the check boxes, and click OK or click the Filter  button again or click the Advanced button on the ribbon and choose Clear All Filters.

Most databases contains hundreds, if not thousands, of records. Therefore, when a table becomes so large that the records and data do not fit in the datasheet window without scrolling, the Find feature becomes very practical.



Find and Replace

In Datasheet view, use the Find command, from the Home tab, to quickly locate specific records using all or part of a field value entered in the Find What: field. If in the States table above, if the user entered the value North in the Find What field, Access would find two records for North Carolina and North Dakota, but only if the Match: value was changed from Whole Field to Any Part of Field or Start of Field. Using **wildcard characters** can be extremely helpful if the user does not know the exact spelling of the value they are looking for.

Wildcard Character	Usage
?	Used to match any single character; to search for a three-letter word that starts with "d" and ends with "g", use d?g.
*	Used to match any number of characters; to search for a word that ends in "son", use *son.
#	Used to match any single numeric character; to search for a three-digit number that starts with "3", use 3##.

Wildcards

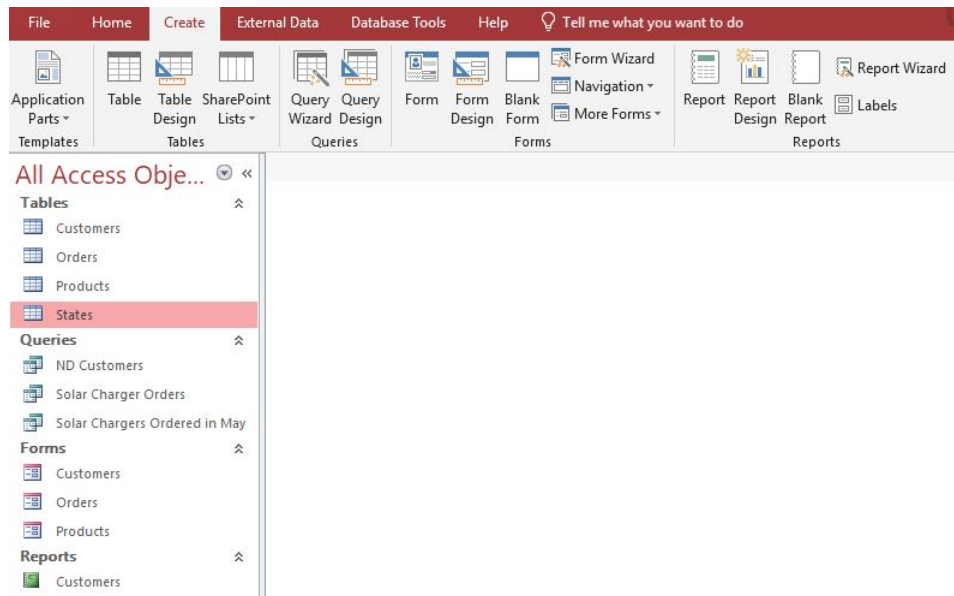
A wildcard character can replace a single character or multiple characters, which can be both text and numbers. Clicking the Replace tab will allow the user to replace the data in the Find What: field with the data entered in the Replace With: field. This could be very useful when updating name changes, such as when Kentucky Fried Chicken changed their name to KFC in 1991.

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6.8: Creating Forms

A form is a database object that offers an alternative interface to a table beyond the Datasheet view of the table. Forms can improve data entry proficiency by rearranging the order and tab sequence of fields within a table. Forms can also be designed to hide certain fields from appearing. For example, a credit limit or credit card number field might only be accessible from the table Datasheet view to limit the access to sensitive data from users who do not have rights to view or edit tables. In Access, users have the option of creating a blank form from scratch, using the Form Wizard, or having Access automatically create a form from a table or query.

A basic form can be easily created by using the Form tool. Simply select the table (or query) in the Navigation Pane that the form should be based off of, and then click Create > Form (from the Forms group). All the fields from the underlying data source are placed on the form. If Access finds a single table that has a one-to-many relationship with the table or query that you used to create the form, Access adds a datasheet to the form that is based on the related table or query.

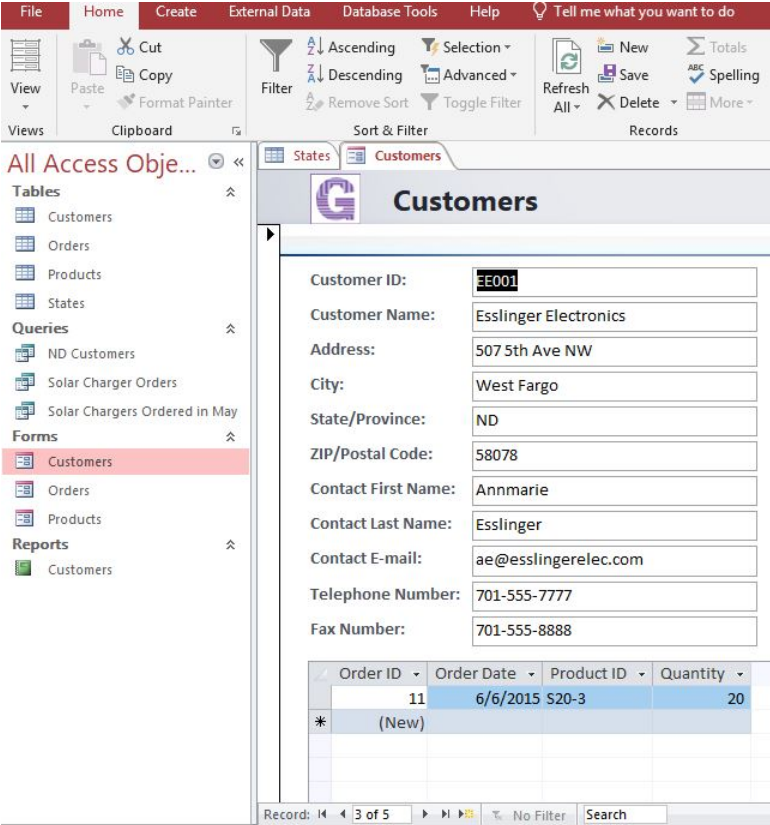


Access Create tab

A split form can be created by clicking More Forms from Create tab, and then choosing Split Form. A split form displays two views of the data simultaneously — a Form view and a Datasheet view. Working with split forms provides the benefits of both kinds of forms in a single form. For example, a user can use the datasheet portion of the form to quickly locate a record, and then use the form portion to view or edit the record.

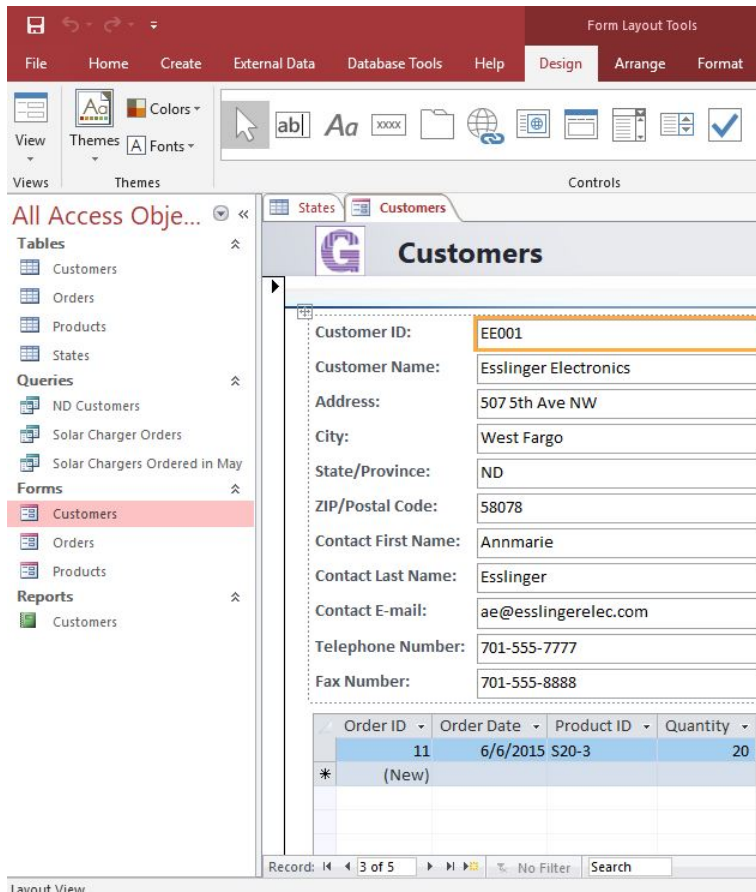
To be more selective about what fields appear on your form, use the Form Wizard. This multi-step process allows the user to define how the data is grouped and sorted, and in some instances, fields from multiple tables/queries can be added to the same form. Once a form is created, use the different views to modify the forms design or populate the forms with data. Forms have three views:

- **Form view** – shows the data in the form. This is the view to use to enter or change data. Record controls at the bottom of the form are used to display specific records and add a new record (the right arrow with the yellow star). The form's design properties cannot be changed in this view.



Form view

- **Layout view** – shows the form and the data in a visual layout. This is the view that opens when a form is initially created. Some of the form design properties, such as field fonts and column widths, can be changed in this view. However, the data cannot be changed in this view. Notice the Form Layout Tools contextual tabs!



Customers

Customer ID: EE001

Customer Name: Esslinger Electronics

Address: 507 5th Ave NW

City: West Fargo

State/Province: ND

ZIP/Postal Code: 58078

Contact First Name: Annmarie

Contact Last Name: Esslinger

Contact E-mail: ae@esslingerelec.com

Telephone Number: 701-555-7777

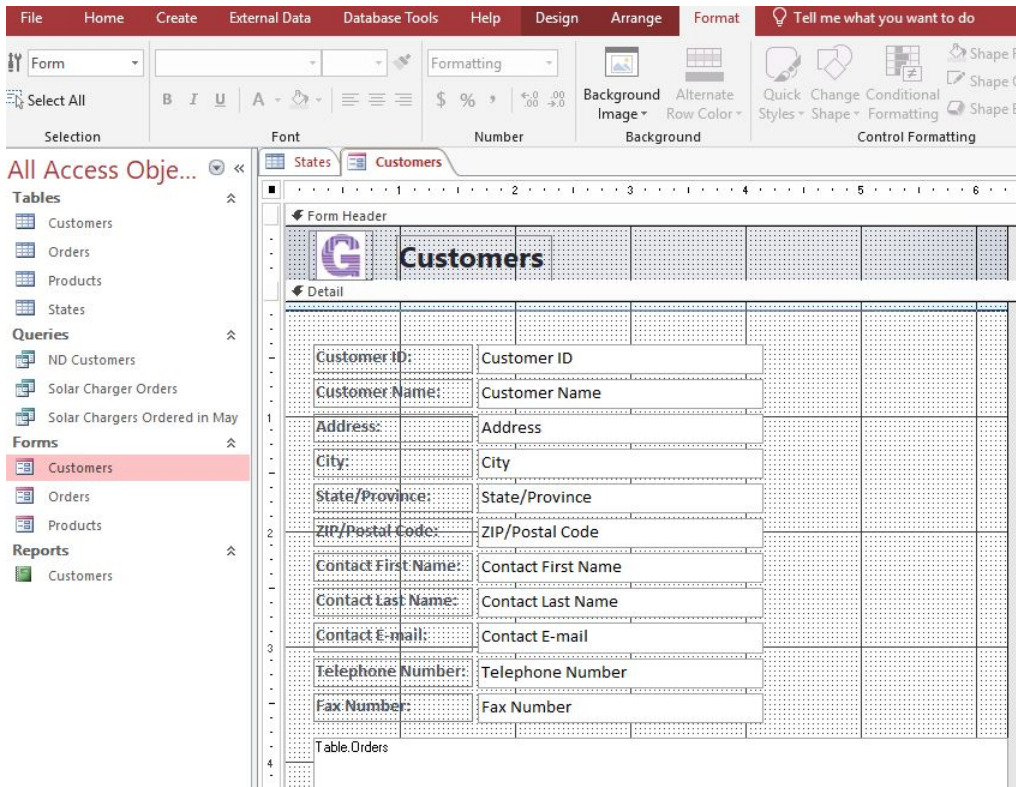
Fax Number: 701-555-8888

Order ID	Order Date	Product ID	Quantity
11	6/6/2015	S20-3	20
(New)			

Record: 14 3 of 5 No Filter Search

Form Layout view

- **Design view** – shows the form design, but not the data. Any aspect of the form's design can be changed in this view, but the data cannot be changed. The Design, Arrange and Format contextual tabs appear for this view too. The *Design* tab allows the user to modify the color, fonts or theme of the form. A logo, title and/or date/time field can also be added to the form. Form controls (buttons, text boxes, combo boxes, etc) can also be added. The *Arrange* tab is used for modifying the order and position of the fields on the form. The *Format* tab allows the user to modify the style of the form including the fonts and a background image can be added.



Form design view

A user can switch between views as often as desired while customizing the form. Switching views can be done by using the View button on the Ribbon, or the three icons at the bottom right of the Access window.

Note

If a field in a table has been modified after the form is created, the existing form does not automatically update. The form can be modified, but sometimes it is easier to delete the existing form and recreate it based off of the new table settings.

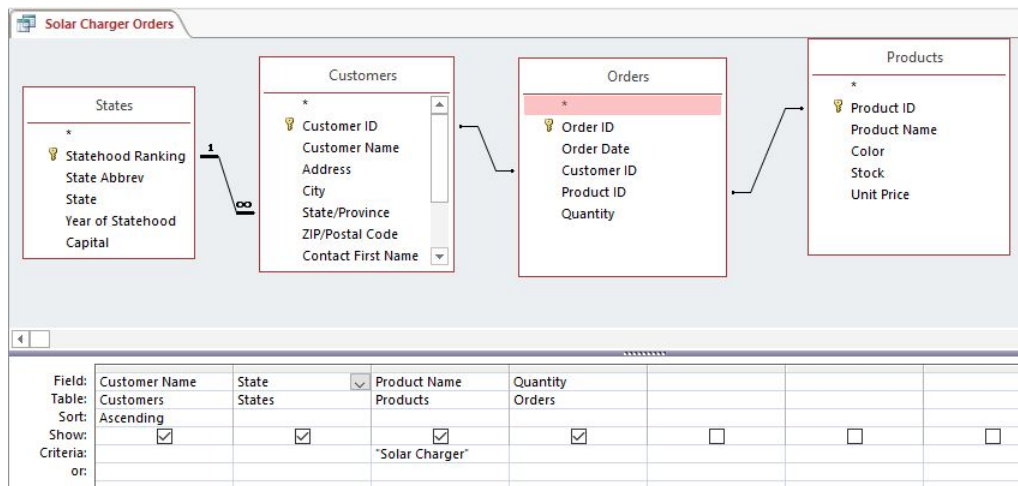
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CHAPTER OVERVIEW

7: Access II - Retrieving Information From a Database

Learning Objectives

- Query Basics
- Types of Queries
- Sorting Queries
- Access Reports



7.1: Query Basics

7.2: Types of Queries

7.3: Sorting Queries

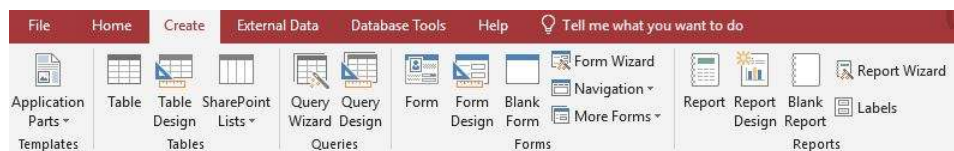
7.4: Access Reports

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7.1: Query Basics

Queries are far more powerful than the simple searches or filters that might be used to find data within a table. This is because queries can draw their information from multiple tables. The real power of a relational database, like Access, lies in its ability to quickly and easily retrieve and analyze data by running a **query**. Access queries allow users to pull information from one or more tables based on a set of search conditions the user defines. A common synonym for the word query is: question or inquiry. Queries essentially ask questions of databases. Queries do not store data. Therefore, a major benefit of queries is the ability to save a query to be re-ran at a later time after table data has been updated. This eliminates the need spend time recreating all of the fields and criteria desired to answer a popular question, such as a customer calling frequently to check on their latest account balance.

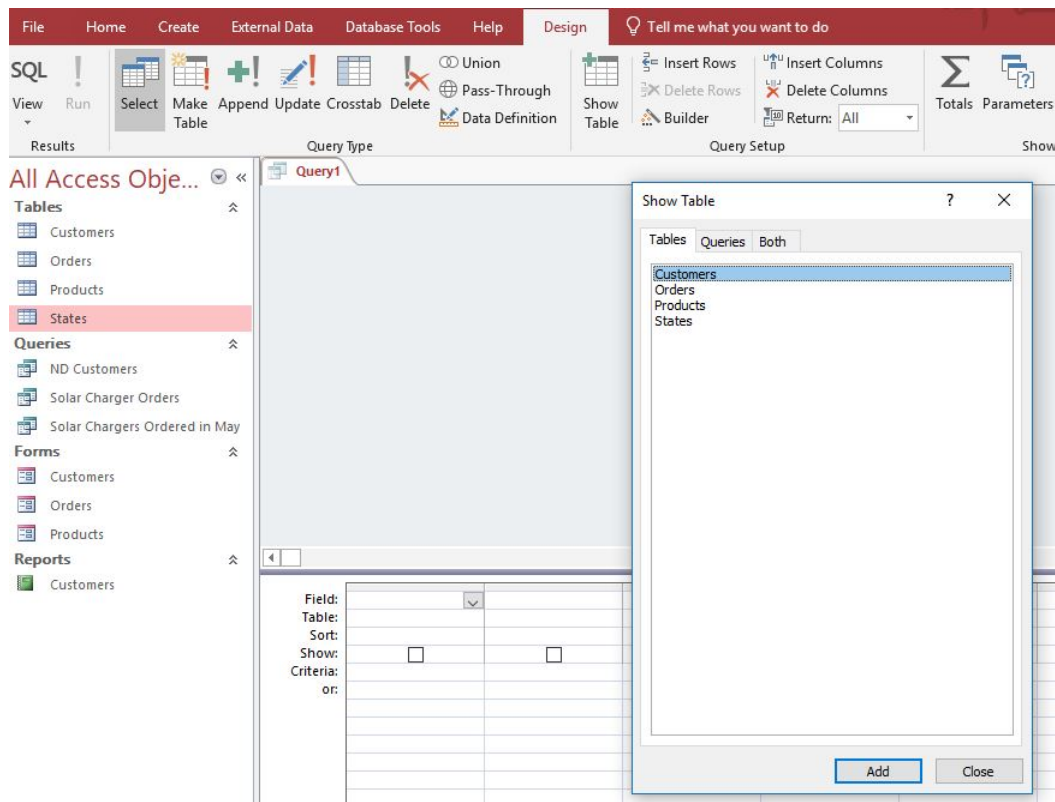
Queries can be something simple, like list all names in a table, or something a little more complex, like list all products that are priced over certain amount. A query can be very simple or very complex, depending on the user's requirements. As tables grow in size they can have hundreds of thousands of records, which makes it impossible for the user to pick out specific records from that table without a query. The tricky part about queries is that one must understand how to construct one before one can actually use them.



Access Create tab basic

When a query is ran, the results are presented in a table, but when a query is designed a different view is used. This is called **Query Design View**, and it lets users see how the query is put together. While the Simply Query Design Wizard can be used to display fields from one or more tables or queries with the option to choose a detailed or summary report, the wizard is limited by its inability to select data criteria. This is why most Access queries are created in Query Design View, as this allows for far more complexity to be added to create complex simple to complex queries.

After clicking the Query Design button on the Create tab, the Query Design View opens and by default the Show Table dialog window appears with a list of available tables and queries that can be added to build the query. Select one or more tables that contain the data desired to produce the answers to the potential questions. However, only add tables that contain fields that you intend to add to the query design. Tables added to the query design that do not have fields in the query grid can skew the query results. The exception to this rule is if the table is needed to join two or more other tables that are part of the query design. After the Show Table window is closed, it can be re-opened by clicking the Show Table button in the Design contextual tab.



Query Design

The next step to creating a query is to add the fields from the tables/queries into the query design grid (at the bottom of the window). Fields can be added by double-clicking the fields from the tables in the Object Relationship pane. A user can also drag a field from the table to the grid. A field can also be selected from the Field drop-down list in each column of the query design grid. If the fields are added in the wrong order, the column can be deleted or moved by clicking the top of the column and dragging the field to the appropriate location.

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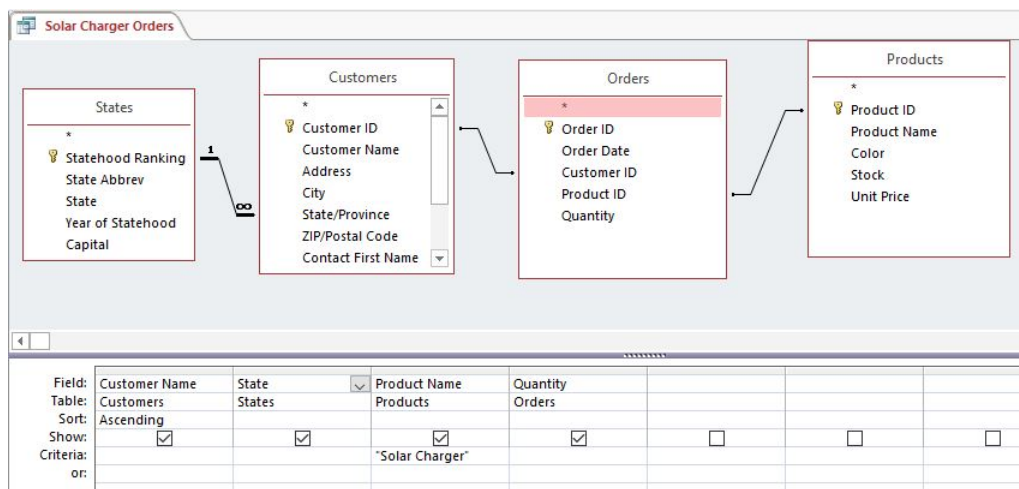
7.2: Types of Queries

Numerous queries from simple to complex can be created. A few of the more popular queries include:

- Single-Table Select query
- Multiple-Table Select query
- Range query
- Complex query
- Totals query
- Action query
- Parameter query
- Crosstab query

The simplest query is a **Single-Table select query**. A single-table query is based on only one table. It is essentially the same as an advanced filter applied to a table. To create a query in Design View follow these steps:

1. **Add the data source(s).** This can include table(s) and/or queries from the Show Table dialog window. For a single-table query, only one table will be selected.
2. **Join related data sources:** Access does not automatically create joins between queries and tables that are not related. If Access does not create joins when data sources are added, joins should be created manually. Data sources that are not joined to any other data source can cause problems with the query results. To add a join, drag a field from one data source to a corresponding field on another data source. Access displays a line between the two fields to show that a join has been created. **Note:** the graphic below is NOT an example of a Single-Table query. A Single-Table query would only have one table, so a join would not be applicable.



Query Design tables

3. **Add output fields** – Double-click or add a field from a data source in the upper pane of the query design window down to the **Field** row of the design grid, in the bottom pane of the query design window. To quickly add all fields down to the Field row of the query design grid, double-click the table or query name from the upper pane to highlight all the fields in that source and then drag them all down to the design grid at the same time. Alternatively, double-click the asterisk in the table.
4. **Specify criteria** – (Optional) Use the Criteria: and/or Or: rows in the grid to limit the records that the query returns based on whether data from the fields meet the specific criteria. Non-Select queries utilize this row extensively.
5. **Execute (Run) the query** – To see the results of the query, click the Run button on the Query Tools Design tab. Access will display the query results in Datasheet view. To make additional changes to the query, click the View button to return the Query Design View to make necessary edits before re-running the query. If the query is complete, click the **Save** command in the Quick Access toolbar. When prompted to name it, type a descriptive name and click OK. The new query should now appear in the Navigation Pane in the Queries object group.

As previously stated, a relational database must have multiple tables. Therefore, **Multiple-Table Select queries** are far more common than Single-Table queries. The key to these queries is adding tables or queries that are related through joins via a common field. This may require a little planning before composing at the computer. Determine what information is needed for output, and then pinpoint which tables contain the fields needed to produce the information. Further analysis may reveal that criteria might be needed to streamline the results. The query in the previous graphic uses fields from four related tables.

A select query with criteria that matches a range of values is called a **range query**. This type of query relies on relational operators to restrict the query results. When a range query compares text, alphabetical order is used to determine which data matches the criteria. For example, to return all used vehicles less than \$10,000 from a database of used vehicles, the criteria would be < 10000. Note the lack of a dollar symbol or comma delimiter? Adding a \$ in front a number would change the datatype from a Number to a Text data type. Another example using the States table that tries to return results that do not include North Dakota results would use a criteria such as <> "ND". Using the quotation marks indicates that the criteria is of the Text data type.

A complex query is any query that uses criteria in multiple fields. Criteria can include relational operators as well as logical operators. If criteria exists in the same row, the And operator is implied. The Or operator can be used in the Criteria row or using the Or: row below the Criteria: row.

Relational Operators	
<	less than
>	greater than
<=	less than or equal
>=	greater than or equal
<>	not equal to
Logical Operators	
And	requires an entry to match both criteria
Or	requires an entry to match one criteria
Not	requires an entry not match the criteria

Operators

Complex queries often utilize wildcard characters to add additional complexity. Complex queries sometimes include the same field twice to accommodate additional criteria. In these situations, the Show checkbox is often cleared to prevent the field from display twice in the query results. The graphic above illustrates a query that includes AND and OR criteria, as well as wildcard characters. The results should produce a list of music CDs that include any Classic Rock CDs and any Country CDs from Artists that include the name "Brooks" in any combination. This would include an Garth Brooks CDs as well as any Brooks and Dunn CDs.

Field:	Artist	Title	Genre
Table:	Music	Music	Music
Sort:			Descending
Show:	☒	☒	☒
Criteria:			"classic rock"
or:	Like "**Brooks**"		"country"

Complex Query criteria

There are times when setting simple criteria won't generate the desired results , especially when working with numerical values. The objective may be to see the query results grouped or counted in some way. A **Totals query** uses a type of function called an aggregate function to sum the data in a query result set. Aggregate functions perform a calculation on a column of data and return a single value. Access provides a variety of aggregate functions, including **Sum**, **Count**, **Avg** (for computing averages), **Min** and **Max**. To sum data, add the Sum function to the query, to count data use the Count function, and so on. The following example will illustrate how many of various bakery menu items have been ordered. The query datasheet results at right display the quantity of various cakes ordered on separate order transactions.

Product Type	Product Name	Quantity
Cakes	Black Forest	1
Cakes	Black Forest	1
Cakes	Black Forest	1
Cakes	Black Forest	5
Cakes	Black Walnut	1
Cakes	Black Walnut	1
Cakes	Black Walnut	3
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	2
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Buche de Noel (Christmas Cake)- Winter	1
Cakes	Carrot Cake	2

Total Query Before

Creating a Total query will group all identical menu items from separate orders, and then by using the Sum function, Access will add values in the Quantity field to calculate the total number ordered for each menu item. To create the Total query, the first step is to



click the Totals button from the Show/Hide group of the Query Tools Design tab. This will add a Total: row to the query design grid.

Field:	Product Types	Product Name	Quantity
Table:	Categories	Products Table	Order Items
Total:	Group By	Group By	Sum
Sort:	Ascending	Ascending	
Show:	☒	☒	☒
Criteria:	"Cakes" Or "Pies"		
or:			

Total row query design grid

The default values in the row are set to Group By. Clicking the drop-down arrow in the Quantity column of the Total: row, and selecting **Sum** will accumulate (add) the quantities of products ordered. Executing the query by clicking the Run button will display the results in the query's datasheet view as shown above. Note the Quantity field name changes to SumOfQuantity.

Total Query After

In Access, queries can do a lot more than just displaying data. Through the use of assorted Action queries, Access can perform various actions on the database data. Microsoft Access provides 4 different types of Action Queries:

- **Append** – Retrieves data from one or more tables and adds the data to another table.
- **Update** – modifies or updates records. Criteria can be specified to limit which records are updated, but if no criteria is specified, all records will be updated.
- **Delete** – useful for quickly deleting a set of data on a regular basis.
- **Make-table** – retrieves data from one or more tables, and then loads the result set into a new table. That new table can reside in the database currently open, or a new database can be created.

Action queries change data based on some set of criteria. Action queries can delete records, update data, append data from one or more tables to another table, and make a new table. Users must be cautious because once the query is executed, the data is changed and cannot be undone. Experts advise to make a backup of the database before proceeding with significant action queries.

A **parameter query** retrieves information in an interactive manner by prompting the end user to supply criteria before the query is run. If a particular query is used often but modified slightly, a parameter query may be more efficient. When the query is run, the user is first prompted to enter a parameter (or multiple parameters). Once the parameter has been supplied, the query can return the results, based on the parameter provided. The key to creating parameter criteria is to enter the parameter prompt inside square brackets, such as: [What's your favorite color?]. The square brackets will cause a parameter dialog box to open when the user runs the query. The text inside the square brackets will be displayed to the user, and an input field will be displayed for their input. If the user enters purple in the prompt, all records in table that store the data: purple will be returned as the query results.

Parameter query criteria

In the example to the right, parameter criteria is entered in the Genre field's Criteria cell.

Parameter query prompt

When the query is executed, Access will display the following prompt: If the user were to enter the data: Pop in the prompt, the following results would be displayed the query datasheet view. (the data entered into the prompt is not case-sensitive)

Parameter query results

A **crosstab query** is a special type of query that calculates a sum, average, or other aggregate function, and then groups the results by two sets of values — one down the left side (row headings) of the datasheet and the other across the top (column headings)-much like an Excel spreadsheet. When building a crosstab query in Design view, use the **Total** and **Crosstab** rows in the design grid to specify which field's values will become column headings, which fields' values will become row headings, and which field's values to sum, average, count, or otherwise calculate.

Cross Tab query

In the following example, the Music database will calculate a Count on the number of CDs are possessed by Artist – using the Row Headings and by Genre – using the Column Headings. The Title field will serve as Value field. The data source is an existing query named Classic Rock CDs, which provides the fields necessary to create the cross-tab query. After executing the query the datasheet results appear similar to:

Figure 7.2.1: Copy and Paste Caption here. (Copyright; author via source)

A crosstab query does not always populate all of the fields in the result set because the tables used in the query do not always contain values for every possible data point. It is possible to enter an expression in the **Criteria** row to limit the results for the column heading field. However, using a criteria expression with the column heading field does not limit the number of columns returned by the crosstab query. Instead, it limits which columns contain data. For example, suppose you have a column heading field that has three possible values: red, yellow, and blue. If you apply the criterion =**'blue'** to the column heading field, the crosstab still displays a column for red and a column for yellow, but only the column for blue contains data.

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7.3: Sorting Queries

Sorting in Access is the process of rearranging records in a specific order. Sorting data can create a significant impact on the usability of Access queries and reports. Sorting can occur before or after executing a query. In the datasheet view, a query can be sorted after running the query by using the Sort Ascending and Sort Descending buttons in the Sort & Filter group of the Home tab.



Sort buttons

To create more complex sorting criteria, use the Query Design window to create multi-field sorts.

Data Types	Sorting Options
Date/Time	Chronologically sorts in Ascending (oldest to newest) or Descending (newest to oldest) order.
Number, Currency or AutoNumber	Numerically sorts in Ascending (lowest to highest) or Descending (highest to lowest) order.
Short Text or Long Text	Alphabetically sorts in Ascending (A to Z) or Descending (Z to A) order.
Yes/No	Ascending (yes values, then no values) or Descending (no values, then yes values) order.
Memo, OLE or Attachment	Cannot sort by these data types.

Sorting Rules

Multi-field sorting requires the use of primary, secondary and potentially, tertiary sorting fields. Using Access' Query Design View, fields can be arranged in any order to accommodate the desired order. It is important to comply with the sorting rules inherent with the various data types of each field (see table to the left). Access will sort the fields in the Query Design from left to right. However, this can be manipulated by adding duplicate fields to the grid, specifically for sorting purposes. The key to this strategy is to utilize the Show checkbox for these sort-only fields. Clearing the Show checkbox will prevent these fields from displaying the Datasheet results, but their sorting mission will still be accomplished! Using Query Design also affords the ability to sort one field in Ascending order and another in Descending order in the same sort process.

In the example below, the goal is to sort the records primarily by Last Name. However, some records might share the same Last Name. Therefore, if there are duplicates, the First Name field will serve as the secondary sort criteria. Furthermore, it is desired that the results set display the records with the First Name field to the left of the Last Name field. This necessitates the use of a duplicate First Name field that will only be used for sorting purposes. Also notice that the Show checkbox is cleared for this duplicate field, so as not to confuse the layout of the results set. Hiding a field, by clearing the Show checkbox, can also be used for applying Criteria restrictions on a field that is not desired to be displayed in the results set, but is needed to narrow the results. This is popular with the sensitive data, like Salary or Credit Limits.

Field:	Contact First Name	Contact Last Name	Contact First Name	City	State/Province	Telephone Number
Table:	Customers	Customers	Customers	Customers	Customers	Customers
Sort:		Ascending	Descending			
Show:	☒	☒	☐	☒	☒	☒
Criteria:					"ND"	
or:						

Access Sorting

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7.4: Access Reports

Utilizing Access to analyze data results in lots of information. This Information needs to be shared – often will people who do not, or should not, have rights to utilize the Access database. Access **reports** organize and present data in a reader-friendly, visually appealing format by using data from any queries or tables in the database. The tables or queries that provide the underlying data are also known as the report's **record source**. A report is a database object that comes in handy when you want to present the information in your database for any of the following uses:

- Display or distribute a summary of data.
- Archive historical information.
- Provide details about individual records.
- Create labels.

There are four different report views in Access. Two are essentially print views and the other two are report building views. As with all other Access objects, you can toggle the view using the buttons at the bottom right of the screen, or by using the View button on the Ribbon. The four views include:

- **Report view** – shows how a report would appear with dummy data using a continuous page layout.
- **Print Preview** – allows users to see what the report will look like when printed. This view can be used to change the page layout, including the report orientation.
- **Layout view** – allows users to edit the report design while it contains live data. Considered the most intuitive view to use for report modification, this view can be used for nearly all potential changes to a report in Access.
- **Design view** – allows users to view and change any aspect of the report structure, but not the data. This view displays any expressions that are used to generate content, and displays the header and footer bands for the report, page, and groups.. This is the preferred view for adding controls to the report, such as labels, images, lines and rectangles.

The design of a report is divided into sections that can be modified in the Design view. Reports created by using the Report button are plain and simple, and have several sections, as detailed in the table to the right. More complex reports created using the Report Wizard can also have multiple **group header** and **group footer** sections to print grouping details and summary information.

Report Section	Purpose
Report Header	Appears at the top of the first page and displays the report title. Displays only once in a report.
Page Header	Appears at the top of every page and displays the headings (field labels) for each column.
Detail Section	Appears between the page header and page footer and displays the records from the table or query. Can run across many pages dependent on the amount of data.
Page Footer	Appears at the bottom of every page and displays the page number and total number of pages.
Report Footer	This section is optional. Appears on the last page of the report and displays summary information such as grand totals. Displays only once in a report.

Report Sections

Reports can be designed and formatted in a similar way to forms. When you create a report, four new tabs appear in the Report Layout Tools section of the Ribbon specifically for working with reports.

- **Design:** Group and sort elements in the report, add text and links, insert page numbers, and modify the sheet's properties.

- **Arrange:** Adjust the table to be stacked, tabular, etc.; move rows and columns up and down or left and right; merge and split columns and rows; control the margins and bring elements to the “front” or “back” in a layering format.
- **Format:** Includes regular word processor formatting tools like bold, italic, underline, text and background color, number and date formatting, conditional formatting, etc.
- **Page Setup:** Allows adjusting of the page’s overall size and toggling between landscape and portrait.

Another popular approach to creating reports is to use the Access Report Wizard. The **Report Wizard** provides more flexibility than by simply using the Report button. The Report Wizard guides users through a series of questions and then generates a report based on these answers. Users can choose the tables and fields, group the data, sort the data, summarize the data, choose a layout and orientation, apply a style, and title the report. Grouping data puts all of the values in a field into a group based on the field’s value. By using the Report Wizard, users can create up to four sort levels. If the data has been grouped, the option exists to summarize the data by displaying the sum, average, and minimum or maximum value for each numeric field. Choose to have the report display just the summary data or each detail line and the summary data. Note: Users can also add grouping, sorting, or totals by using the Group, Sort, and Total pane while the report is open in Layout view or Design view.

To print a report, right-click the report in the Navigation Pane and choose Print Preview from the shortcut menu. Print Preview command options include:

- Print the report
- Adjust page size, margins or orientation
- Zoom in or out, or view multiple pages at a time
- Refresh the data on the report
- Export the report to another file format.

To save paper, or to send a print job to a professional printer, or send the report via e-mail, you can create a .pdf or xps format of your report: On the **Print Preview** tab, in the **Data** group, click **PDF or XPS**. Reports can be saved as an object in the Navigation Pane, and at later date, updated and re-printed. Unlike Access queries, the page settings are maintained in Access reports when saved.

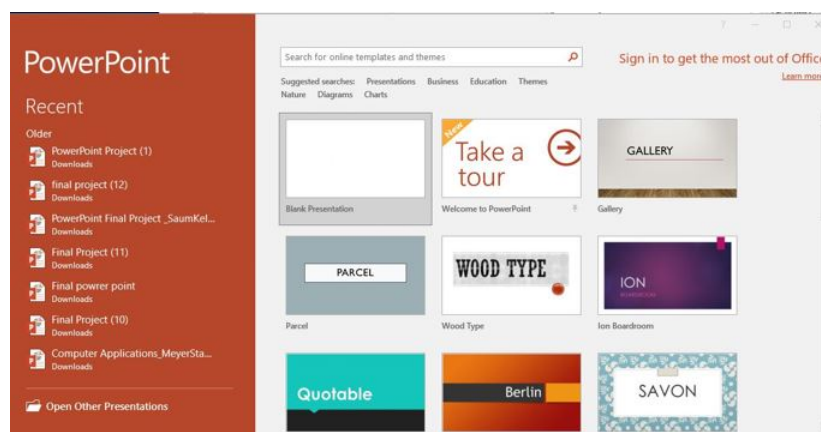
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CHAPTER OVERVIEW

8: PowerPoint Chapter I - Creating Presentations

Learning Objectives

- Planning a presentation
- Adding and deleting slides
- Adding slide text versus slide notes
- Creating bulleted and numbered lists
- Comparing presentation views
- Utilizing tables and charts
- Inserting and modifying graphics
- Creating a photo album
- Inserting and modifying shapes
- Utilizing WordArt
- Inserting SmartArt
- Inserting slide and handout footers
- Apply design themes
- Formatting the slide background
- Replacing text and fonts
- Printing a presentation



[8.1: Planning a Presentation](#)

[8.2: Adding and Deleting Slides](#)

[8.3: Adding Slide Text vs. Slide Notes](#)

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[8.5: Comparing Presentation Views](#)

[8.6: Utilizing Tables and Charts](#)

[8.7: Inserting and Modifying Graphics](#)

[8.8: Creating a Photo Album](#)

[8.9: Inserting and Modifying Shapes](#)

[8.10: Utilizing WordArt](#)

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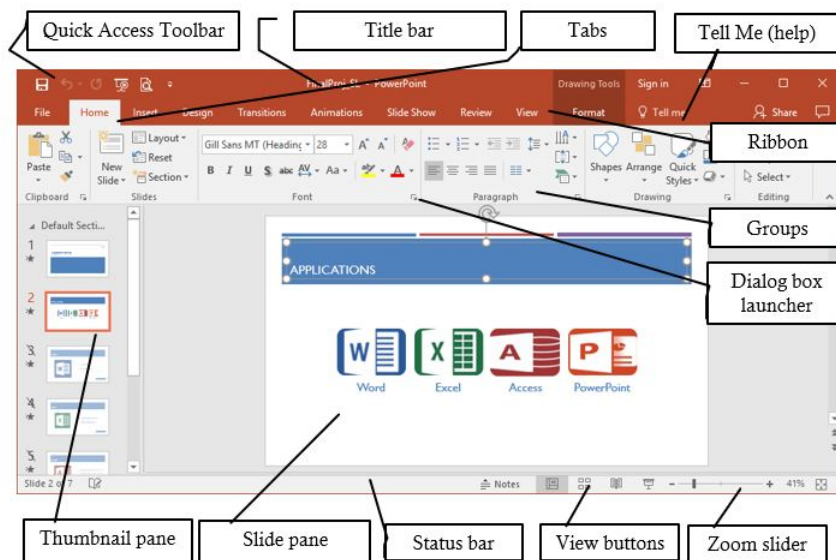
8.1: Planning a Presentation

Microsoft PowerPoint is a presentation software program used to organize and present information to others. PowerPoint is a popular presentation aid that utilizes visual and stimulating elements to accompany a presenter's communication through slides and multimedia tools. Planning a presentation necessitates defining the purpose of the presentation, identifying the target audience for the presentation, and deciding the type of output for the information.

The purpose of the presentation can generally be categorized into either of two general areas. The most common purpose for a presentation is to inform an audience by providing facts and figures. Informational presentations often include slides with tables, charts, graphics and text. Classroom lectures that utilize PowerPoint are typically information-type presentations. A secondary purpose of presentations is to persuade or sell the audience on an idea. Sales and political speeches fall into this category of persuasive presentations. Style is almost as significant as content for persuasive presentations. Therefore, design themes are important considerations for this type of presentation.

Another important consideration when planning a presentation is to determine the audience, including the venue in which the presentation will occur. The characteristics of the audience will help distinguish the type of vocabulary, font size, and design themes that would be appropriate. An audience of colleagues will allow more flexibility versus a group of customers, in terms of language and content. Understanding who the audience is, and why they are there can really influence the design and content of a presentation. The venue also influences the design of a presentation. A large room will require larger fonts and louder audio for the presentation to be understood by the audience. Conversely, a smaller room make necessitate a softer design. The presenter should also take time to ensure that the venue has ample and compatible audio-visual equipment (projector, cables, screen, speakers, etc.) to successfully run the presentation.

Get to know the elements of the Microsoft PowerPoint window! Note the similarities to Word and Excel!



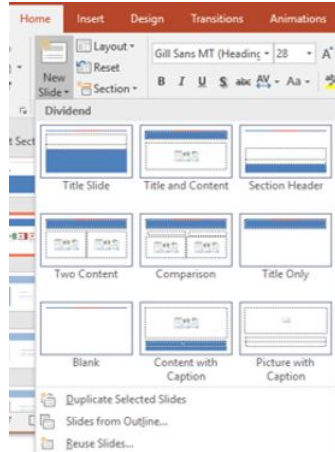
Annotated PPT main window

- The **Quick Access toolbar** contains one-click buttons for saving, undoing, redoing, and print previewing a presentation. You can easily modify this toolbar to add your most frequently used commands. Just click the down-arrow on the right edge to customize this toolbar!
- The **title bar** displays the name of current presentation, and the program. A new presentation will default with a temporary file name, such as Presentation1 until you save the file with a different name. The Minimize, Maximize and Exit buttons appear on the right edge of the title bar.
- The **Tell Me** tool is a new way to get assistance with specific tasks in PowerPoint. When the user starts typing, PowerPoint suggests commands that are related to your keyword(s). The tool is context sensitive, and integrated into your current presentation versus opening a separate window. Therefore, if you type *insert picture* into the field, and click the resulting command, PowerPoint will open the Insert Picture dialog window without explaining the navigation instructions.

- The **Ribbon** interface is a set of toolbars at the top of the window in Office programs designed to help you quickly find the commands that you need to complete a task. The ribbon displays a combination of **icons** and **tabs**. Commands are **grouped** under multiple tabs. Some commands are so extensive that they need additional windows to display their entire functionality. The dialog box launcher icon will open these windows. Contextual tabs will appear only when the user needs them, such as when a picture is selected, or a table is inserted.

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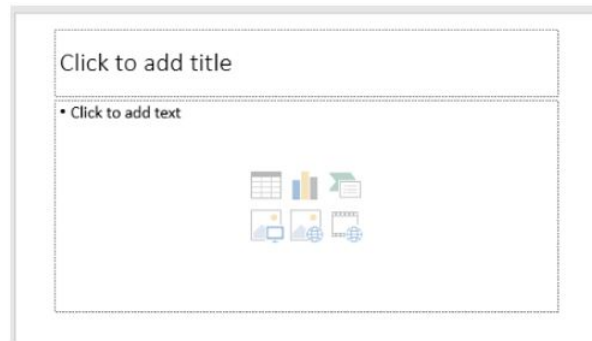
8.2: Adding and Deleting Slides



New Slide Gallery

New slides can easily be added to a presentation by clicking the bottom half of the New Slide button in the Slides group of the Home tab. If the top half of the New Slide button is clicked, the default slide layout (Title and Content) will be inserted into the presentation. By clicking the bottom half of the button, a gallery of several different slide layouts will appear.

The type of content the user intends to add will dictate which slide layout is selected. Most slide layouts include one or more placeholder to guide the user where to add content. Placeholders can contain different types of content, including text, graphics, tables, charts, and videos. Placeholders can be resized, reformatted or deleted. The most common slide layout (Title and Content) has two placeholders. The user simply needs to place the cursor inside the placeholder and begin typing to add text, or click an icon to add an object. PowerPoint automatically sizes the text as it is typed to fit within the placeholder.



Title & Content slide

The AutoFit icon  is displayed next to a placeholder when more text than can fit is typed.

How many slides is appropriate?

When planning a presentation, the number of slides is an important consideration. The attention span of the audience typically emphasizes the adage that “less is more”. The 10-20-30 Rule of PowerPoint, commonly attributed to entrepreneur Guy Kawasaki (guykawasaki.com/the_102030_rule), urges that presentations be limited to 10 slides, last less than 20 minutes in duration, and the font size of the text should be at least 30pt.

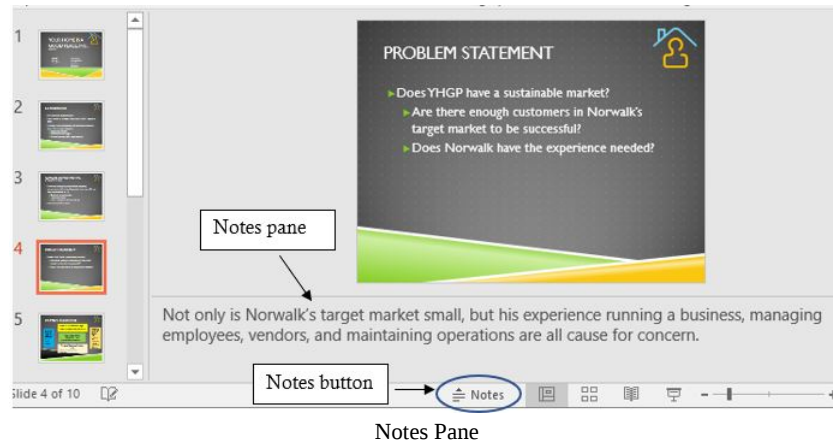
10-20-30 Rule

The alignment, font, size, and other formats can be applied to the selected text in a placeholder by using the Mini toolbar or the Home tab. A layout can be changed by clicking the Layout button to the right of the New Slide button, and choose a different layout. To delete a slide, right-click the slide in the thumbnail pane, and choose Delete Slide from the shortcut menu.

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8.3: Adding Slide Text vs. Slide Notes

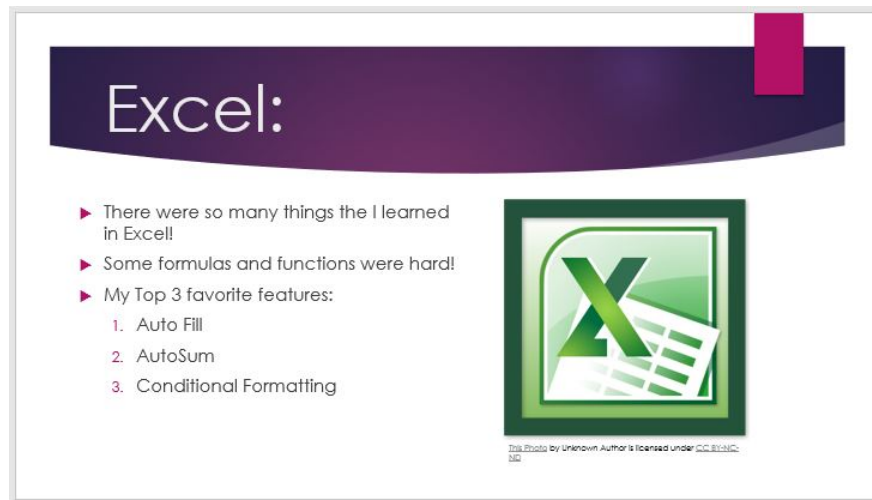
While text can be added to slides via placeholders in various slide layouts, text can be added directly to the Notes pane to create speaker notes for the presenter of the slide show. Maintaining a minimal number of slides requires that each slide only contain summary text, not details. The details need to be added orally through the presentation speaker. The data in the Notes pane does not appear in Slide Show view. The Notes pane can be opened or closed by clicking the Notes button on the status bar.



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8.4: Creating Bulleted and Numbered Lists

The Title and Content slide layout is both the default and the overwhelming most popular slide layout for most slides in a presentation. This the root cause of why so many PowerPoint presentations bore their audiences with mundane amounts of text. The worst offense is when users simply write sentence upon sentence of text, which often gets read to the audience by the presenter. (Not a crowd favorite!) A better approach is to create presentations which utilize bulleted and numbered lists to help organize text, or show sequential processes. Too many slides of the same format can exhaust the audience, so use lists in moderation. However, when used with animation (discussed in the next chapter), lists can really help manage the flow of information by synchronizing the visual elements of the slide show with the verbal accompaniment of the speaker.



Bullets and Numbers PPT slideBullets and Numbers PPT slide

As defined in the Word chapters, bulleted lists differentiate from numbered lists in that numbered lists demonstrate sequencing, whereas bulleted lists simply imply that each item is part of a non-ordered group. Bullets and numbers can be formatted using custom symbols and number formats to synchronize with the presentation design.



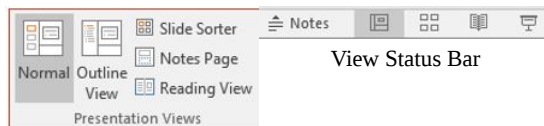
Paragraph Group

Bullets and numbers can also be indented to create sub lists. The Paragraph group contains the commands to increase and decrease the indentation of bullets and numbers.

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8.5: Comparing Presentation Views

PowerPoint can display its slides in several different views, which can be accessed from the View tab, the Status bar, or the Slide Show tab. Each has its own unique purpose as described in the table below.



Presentation Views

PowerPoint offers a variety of views to display content depending on the situation. Some views help create a presentation, while others help deliver a presentation. Choose wisely!

View	How to Use
Normal	The default view. Used most commonly for editing slide content. Displays the slide pane and the thumbnails pane simultaneously. Clicking the Notes button on the Status bar adds/removes a third pane, which can be used to add and view speaker notes.
Outline View	Similar to Normal view, except that the thumbnails pane is replaced by an outline pane which displays the text from each slide. Graphics do not display in the Outline pane. Text is editable in the Outline pane. Not accessible via the Status bar.
Slide Sorter	Displays only thumbnails of each slide in horizontally sequential order. Slides can be dragged and dropped to be rearranged, and any slide transition timings can be viewed.
Notes Page	Only accessible from the View tab, this view displays a smaller image of the current slide above a large text box placeholder which can be edited to insert speaker notes. Increase the Zoom percentage to make the text box more user-friendly.
Slide Show View	Used to display the slide presentation to an audience. Displays a full-sized screen and hides the PowerPoint window. All inserted multimedia is functional in this view. Navigation can be controlled by a mouse or the keyboard (arrow keys are the easiest). Can be launched from the Status bar, pressing the F5 key, or the Slide Show tab (recommended). Click the Esc key to exit this view.
Reading View	Similar to the full-screen Slide Show view without the overhead of presenter view controls. The title and status bars remain on screen, and navigation is simpler than Slide Show view. The Windows task bar is also accessible.
Presenter View	Accessible by clicking the  icon during Slide Show view, and then choosing Show Presenter View. Allows the presenter to view speaker notes on one display (monitor) while the audience views only the slide show on another display (projector).

Presentation Views

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8.6: Utilizing Tables and Charts

The organization of a PowerPoint presentation necessitates that the presentation be concise and meaningful. Tables and charts represent an opportunity to present a lot of data in an organized, structured graphic. Tables can be created and inserted into a slide in

a similar process as Word tables. Tables can be inserted from the Insert tab, or by clicking the Table icon  from a Content layout placeholder. Two contextual tabs are available for formatting the table, similar to Word. Adding table styles that match the theme of the presentation is desirable. Creating tables through this process is ideal for tables full of text, such as the table in the illustration below. Tables can also be created in Word, and then copy and pasted into PowerPoint. Either way, tables are a great way to consolidate a lot of information into a single slide.

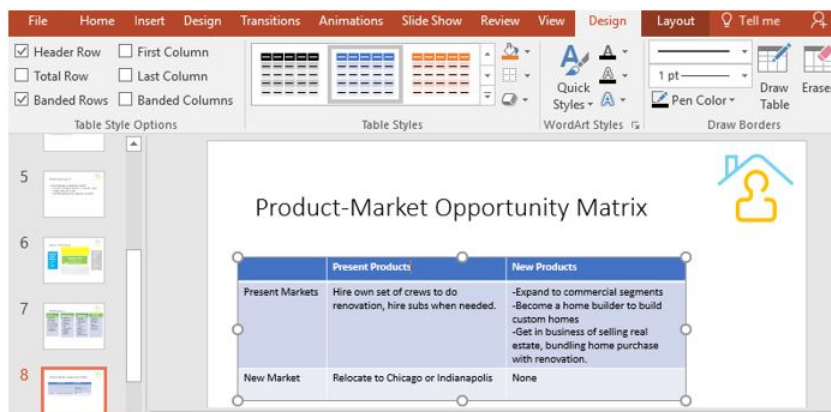


Table Slide

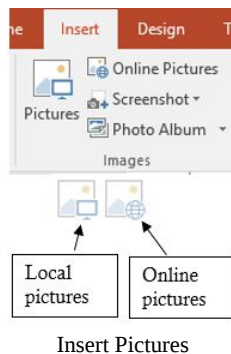
If the table contains a lot numerical data, it might make more sense to create the table in Excel, and paste it into PowerPoint. Data can be edited in PowerPoint using Excel formatting tools. Data can even be linked so that when the Excel file is updated, the PowerPoint slide is also updated. If the data is not linked, it is considered to be an embedded object. Embedded objects become part of the PowerPoint file and, after they are inserted, they are no longer part of the source (Excel) file.

Charts are used to illustrate numerical data, which can help the audience visualize patterns, relationships, or trends in data. The decisions about linking or embedding a table are very similar to the decisions regarding inserting charts. Charts can be created in PowerPoint or Excel, but most are typically already created in Excel and simply need to be pasted into PowerPoint. Then comes the decision about embedding or linking the chart. When a chart is selected on a slide, options on the Chart Tools Design and Format contextual tabs can be used to modify the look of the chart.

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8.7: Inserting and Modifying Graphics

Graphics can be utilized to make a presentation more interesting and informative. If the PowerPoint developer is trying to keep the length of a presentation to ten or fewer slides, keep in mind that many believe that a picture is worth a thousand words! Sometimes graphics can be more informative than words and enhance a presentation by evoking emotion in the audience. PowerPoint graphics typically refer to pictures, and pictures can take the form of digital photographs, clip art, or computer-generated imagery (CGI). **Digital photographs** are realistic images captured with a digital camera or scanned to a file by a scanner. **Clip art images** are line-based drawings that are intentionally non-realistic. An example of computer-generated image is a logo, typically produced in a software program such as Adobe Illustrator, or a 3-D graphic, such as an avatar.



Inserting graphics into PowerPoint is very similar to Word. However, in addition to using the Images group options on the Insert tab, users can also insert a graphic via an icon in a content placeholder. Graphics can either be inserted from the user's own device, or from online sources.

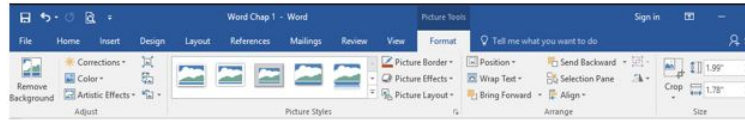
Each type of graphic has its pros and cons. Clip art can be popular because their simplicity results in a compact file size, which can be increased or decreased without distortion. Additionally, the unrealistic nature of these images makes them appropriate for representing sensitive topics that require anonymity. Digital photos are very realistic, which inspire authentic reactions. However, these images result in large files that can be difficult to transfer among devices. Additionally, resizing a digital photo can create undesirable pixilation.

Caution should be used to ensure that graphics are used appropriately by only including images that are relevant to the message being advanced. Graphics usage should also obey applicable copyright laws, especially when downloading images from Internet sources. According to the U.S. Copyright Office, a **copyright** is a form of protection for "original works of authorship", and is usually identified by the © symbol. Photos and high-quality artwork that has been self-produced are not at odds to copyright infringement, but images downloaded from online sources should be credited, purchased or defined as royalty-free or be accessed through a Creative Commons (CC) license. By default, Microsoft's Bing Image search engine will only return images licensed under Creative Commons when utilizing the Online Pictures command in PowerPoint.



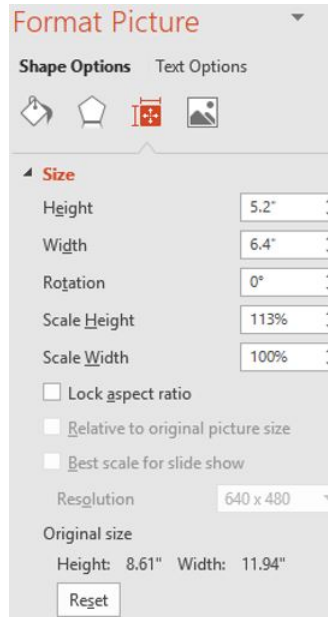
Bing Search Results

The robust photo-editing functionality within PowerPoint makes it easy to manipulate the size, location, and look of inserted graphics. After selecting the graphic, sizing handles will appear around the graphic, and the Picture Tools contextual tab will appear to offer a plethora of image formatting features.



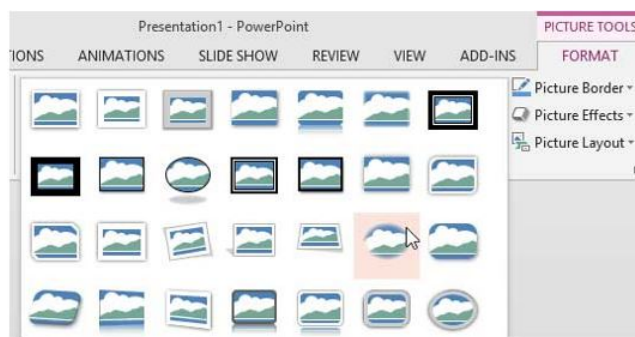
Picture Tools tab

Some of the most commonly used picture formatting tools include:



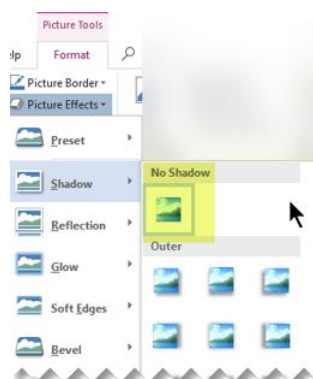
Format Picture

1. **Resizing and cropping.** The easiest way to resize a graphic is to drag the sizing handles. The corner handles will increase or decrease the image's size proportionally, whereas the middle or top/bottom handles can distort the image's size. Specific height and width measurements can be defined in the Size group. Click the launcher to open the Format Picture pane. Clearing the Lock Aspect Ratio checkbox will allow the user to define specific sizes for the height or width without proportionally resizing the other dimension. Cropping an image results in a part of the image being removed. This is useful when an image has a lot of unwanted content that can distract from focusing on a certain aspect of an image. An image can even be cropped to fit into a specific shape. To reduce the file size of the presentation, use the Compress Pictures feature, in the Adjust group, to permanently delete the cropped portion of the image. Clicking Reset in the Format Picture pane or Reset Picture in the Adjust group will return the image to its original size.
2. **Corrections and Color adjustments.** If an inserted picture is too dark, the Corrections feature allows the user to edit the picture's brightness and contrast. The picture can be softened or sharpened as well to make the picture blurry or distinct. Color adjustments can also be applied to change the saturation (how vivid the colors are) and tone (the temperature – cool or warm) of a picture. Colored filters can also be overlaid to recolor a picture to fit the presentation's theme.



Picture Styles

3. **Picture styles.** Applying a picture style or effect from the numerous preset gallery options can visually enhance the way a picture appears. Picture styles make the picture look more stylish by applying a combination of borders, 3-D rotations, shadow effects or frame shapes. After selecting the picture, hover the cursor over any of the gallery choices, and PowerPoint will display a live preview of the style applied to the image. Clicking a selection will apply the picture style settings.



Picture Effects

4. **Picture effects .** Users can enhance a picture by adding effects, such as Shadows, Reflections, Glows, Soft Edges, Bevels or 3-D Rotations. To fine-tune the effect, click Options at the bottom of any effect menu. Multiple effects can be applied to the same picture, such as an outer shadow, an angle bevel and a contrasting right, perspective 3-D rotation.

Practice 5: The Solar System – Part 4

1. Plan your presentation. Your goal is to create a slide show to accompany your presentation regarding the planet Earth. The content will include slides with text, a table and some photos of various continents. The design will be basic. The audience is your fellow classmates.
2. Open the recently edited data file *Continents.pptx* from your data files.
3. View the presentation in Slide Sorter view, and then revert back to Normal view.
4. In the title slide, add your name to the subtitle placeholder.
5. Insert a new Title and Content slide after the title slide (slide 1). Add the title: Earth's Continents, and then add seven bullets to the Content placeholder with the text: North America, South America, Europe, Africa, Asia, Australia, Antarctica. Make the title font 54pt.
6. In slide 3 (North America), add an online picture of North America to the content placeholder using the Online Pictures icon.
7. In slide 4 (South America), change the size of the graphic to have a height of 4.5". Let PowerPoint adjust the width proportionately.
8. In slide 7 (Africa), apply a Brightness +20%, Contrast -20% correction adjustment.
9. In slide 8 (Oceania/Australia), apply a Metal Oval picture style, and a Glow 18pt, blue picture effect, as well as a Perspective: Turned Left, Tilted Up 3-D Rotation picture effect.

Oval Picture Style

10. Add the following speaker not to the Oceania/Australia slide: Talk with an Aussie accent!

11. Change the layout of the Oceania/Australia slide to a Title and Two Content layout. In the new content placeholder, add the following text bullets by referring to the illustration to the right:
12. Save the presentation with the file name My Continents.pptx to your default local folder.

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8.8: Creating a Photo Album

If your presentation's purpose is more slanted towards entertaining versus educating, then a photo album is a popular feature that might facilitate that entertainment. PowerPoint's **photo album** allows users to load a bunch of digital photos into a single file, one photo per slide, formatted consistently, with a variety of formatting options. Photo album is a great tool for creating self-running presentations that display photos from an event or a family memory (graduation, wedding anniversary, funeral, etc.) PowerPoint creates a new presentation file when a user chooses to create a photo album.

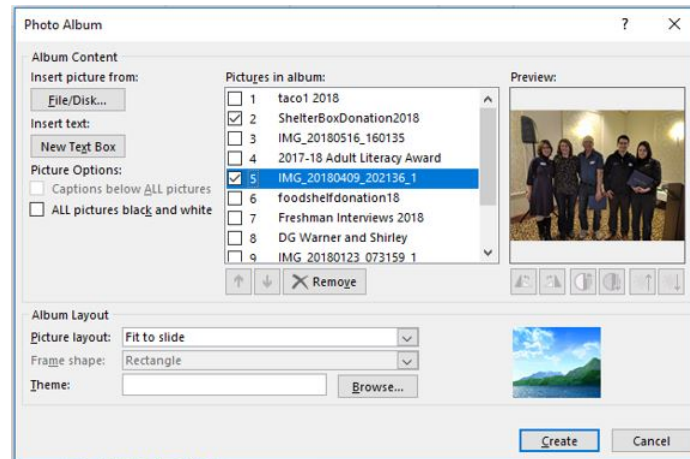


Photo Album

To start, take note of where the photos you want for the album are located (preferably on a local device). Then go to the Insert tab and click the Photo Album button. Once the Photo Album window opens, the next step is to insert the pictures from your device by clicking the File/Disk... button. The Insert New Pictures dialog window will appear. The user should then navigate to where the photo files reside on their device, then select multiple picture files (remember to use the Ctrl button to select multiple non-consecutive files) and choose Insert. The selected files will appear in the Pictures in Album scrolling-window in the Photo Album window. The order of the slides can be rearranged in this window or in the main PowerPoint window.

The more important decisions that should be determined before clicking the Create button pertain to the Album Layout and Picture Options. Notice how the Captions below ALL pictures option is disabled? This is due to the Picture layout currently being set to the Fit to Slide option. Choosing any other Picture layout will enable this option. **Captions** are a great way to add accompanying text to each slide in the album and provide explanation for the photos when no presenter is present. If this feature is skipped and needs reversing, choose the Insert tab, click the Photo Album drop down arrow, and select Edit Photo Album. The picture layout, frame shape, theme and picture options can all be redefined, and pictures can be added or deleted as well. The Insert Text Box is an alternative way to add manually add text to a separate slide versus the captions, which defaults with the operating system's file name as the slide caption. This data can be edited for each slide via the normal PowerPoint view. Photo albums can become even more entertaining when additional (yet to be explained) functionality is added. However, these features, which demand a lot of creative attention, can become very time-consuming! The Photo Album feature was designed to work with the Windows operating system. Therefore, this feature is not available for Mac users.

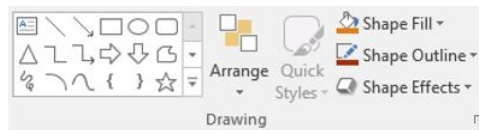
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8.9: Inserting and Modifying Shapes

Many different types of shapes can be inserted into a PowerPoint slide to help illustrate concepts and draw attention. Want to emphasize a certain focal point on a slide? Draw an arrow and add a custom format! The basic shapes are found in the Drawing



group of the Home tab, but more extensive selections exist from the Shapes drop-down list from the Insert tab. Shape categories include lines, geometric figures, arrows, stars, callouts, and banners. Once a shape is selected from the gallery, a cross-hair pointer allows the user to draw the shape on a slide. Shapes can be filled, stacked, aligned, grouped and merged using advanced formatting.



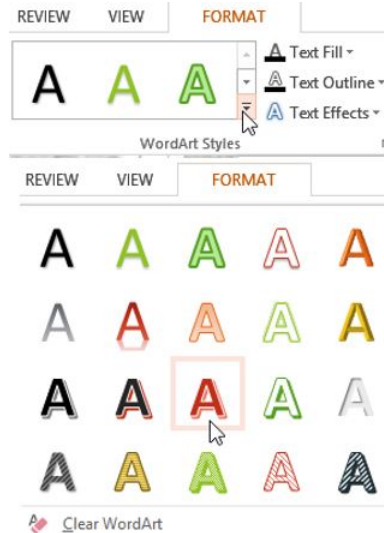
Drawing group

Many aspects of each shape can be further modified, including its line gradient, line color, fill color, weight, outline, shadow and other 3-D effects. Similar to other graphics, like clip art or a photo, a shape can be resized, relocated and reset to complement the design of the presentation. Text can be added to further annotate a shape and explain a concept.

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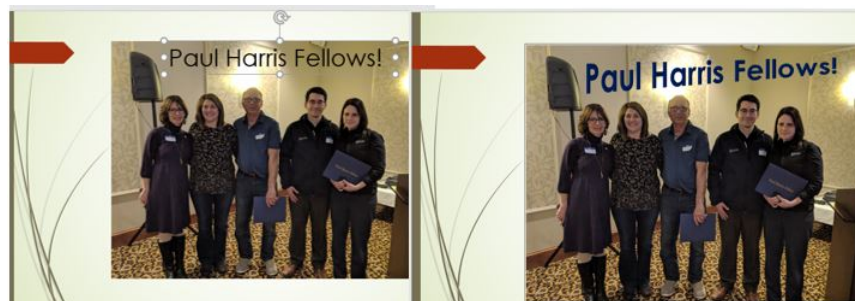
8.10: Utilizing WordArt

Keeping the audience's attention requires using non-standard text in order to maintain interest in the presentation. Strong visual elements help hold the audience's attention. As discussed in the Word chapters, **WordArt** is a feature that applies decorative text styles and text effects to any text object in order to attract the audience's attention. Features such as shadows, outlines, colors, glows, bevels, gradients, and 3-D effects can convert ordinary text into something extraordinary! The easiest way to utilize WordArt is to select an existing text object, then from the Drawing Tools contextual Format tab, click a predefined WordArt style from the gallery of choices. Clicking the More drop-down arrow will expand the gallery. After selecting a style, the text will appear in the selected style, and can be further customized by choosing text fill, outline or effect options.



WordArt gallery

WordArt is a great replacement for title text. Notice the difference between the two titles with normal text versus WordArt with text fill color, and a transform 3-D text effect.



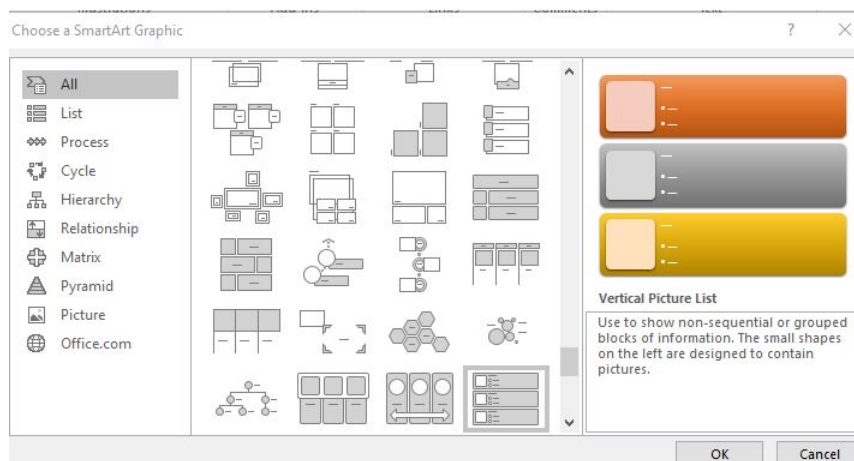
3D WordArt

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8.11: Inserting SmartArt

Like WordArt, SmartArt is a cross-application feature that adds appeal, design and intrigue to an Office file. A **SmartArt** graphic is a professional-quality diagram that visually illustrates text using a variety of shapes. Like WordArt, a SmartArt graphic can be

created from scratch or text can be converted with a few simple clicks. Converting a bulleted list to a SmartArt list is very easy! To create a SmartArt diagram from scratch, click the icon on the Insert tab. A gallery of graphics will appear.



SmartArt gallery

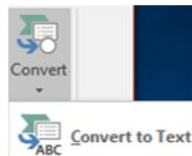
Users can choose from among many different layouts to effectively communicate a complex concept. Categories range from process and cycle diagrams to list and relationship graphics. Choosing the appropriate graphic is key, because some of these diagrams are complex, and therefore, can be more confusing than informative. Other considerations when choosing to use a SmartArt graphic include the amount of text that will be included with the shapes versus the amount of legible space available on a slide. Too many shapes can easily overcrowd a slide to the point that it is illegible. Users can quickly and easily switch layouts, so try different layouts (across types) until you find the one that best illustrates your message.

After selecting a SmartArt graphic, the diagram will replace the content placeholder of the slide. New [Text] placeholders will appear to allow the user to customize the diagram. Alternatively, a Text pane should appear to the left of the graphic to ease the insertion of text. If the pane does not automatically appear, click the arrow control on the left side of the SmartArt graphic.



SmartArt slide

After adding text, and possibly photos, additional formatting is available from the SmartArt Tools contextual Design and Format tabs. The Change Colors and SmartArt Styles options offer radical format changes. A **SmartArt style** is a preset combination of numerous effects, such as line style, bevel, or 3-D, which can be applied to a SmartArt graphic to create a unique and professional design.



Convert to Text

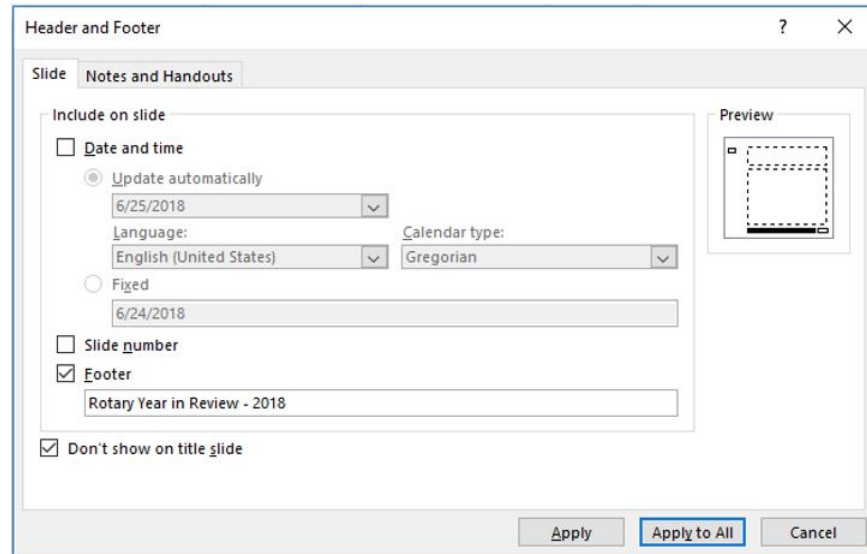
To create a SmartArt graphic from existing text on a slide, place the cursor inside the text, click the Convert button from the SmartArt Tools Design tab, and then choose the Convert to Text option. This is a great way to liven up basic bulleted lists to eye-popping information!

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8.12: Inserting Slide and Handout Footers

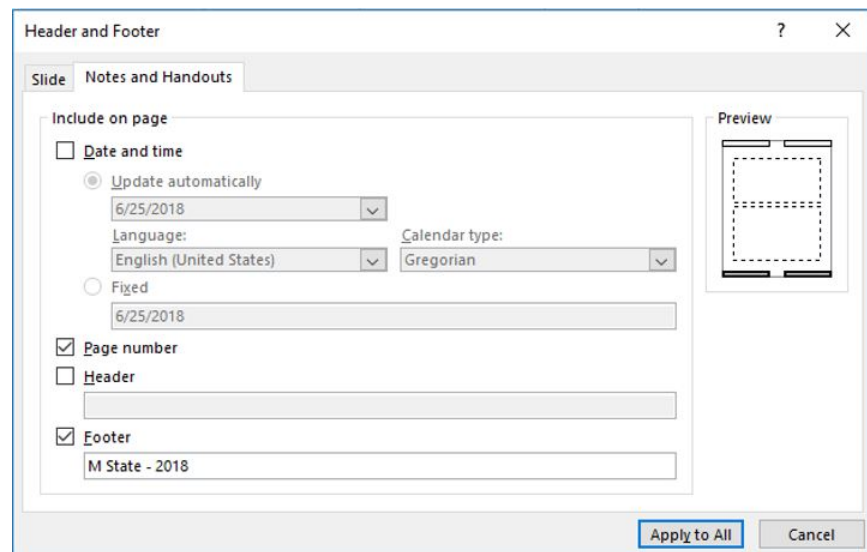
Slide footers represent another way to further customize the look of the presentation. Slide footers are typically displayed at the bottom of the slide, depending on the presentation's theme. Several fields are available to be added to each slide, including the date,

a slide number or a customizable text field. A combination of these fields can be included or excluded. From the Insert tab, choose the Header & Footer option from the Text group to open the Header and Footer window.



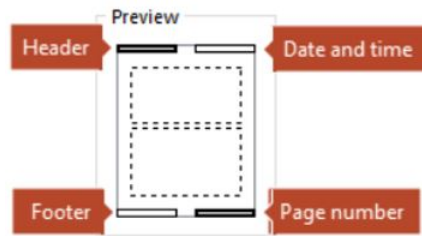
Header and Footer dialog

Two options that often get overlooked are the Don't show on title slide checkbox, and the Apply versus Apply to All buttons. The Don't show on title slide option is usually selected to prevent the footer from appearing the title slide. To assign the footer options to the current slide, choose the Apply button. Alternatively, the Apply to All button assigns the footer options to all slides, except the title (if the Don't show on title slide checkbox is marked).



Notes and Handouts Header and Footer

Slide footers are different than handout footers. Both can exist in the same presentation, but each has their own uses. While the slide footers appear on screen during slide shows, the Notes and Handout footer is designed for hard copy printouts. Similar fields are available as the Slide Footer, although the Header text box represents a new option, and only the Apply to All button exists, since the header and/or footer will appear on all pages of the handouts/notes pages.



Header Footer diagram

The Header and Footer fields often contain data like company or author names, copyright notices, and keywords like Confidential, Sample, Draft, etc.

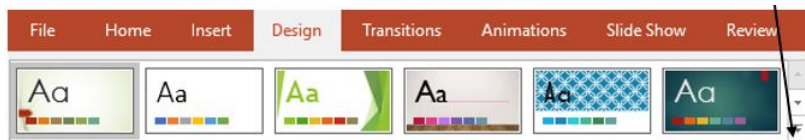


To delete any header and footer information from the Notes and Handouts printouts, open the Header & Footer window, click the Notes and Handouts icon, and clear all fields and checkboxes before clicking the Apply to All button.

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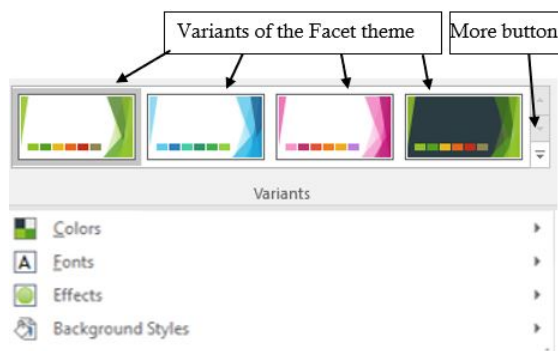
8.13: Apply Design Themes

The most significant way to add visual impact to a PowerPoint presentation is to apply a design theme. A **design theme** is a named combination of formats that comprise of colors, fonts, backgrounds, and other effects. Themes exist throughout Microsoft Office so that files created in one application tie together with files created in other Office applications. While the default Office theme is plain and boring, users can choose from a gallery of other themes to give the presentation a new look and feel. To change the theme, select a theme from the Themes group on the Design tab. More themes are available by clicking the More button.



Design themes more button

Hover over a theme thumbnail to see the theme name. It's also easy to quickly change the look and feel of a theme by using variants in PowerPoint. Each theme has its own Variants that apply some predefined color and effect variations. Variants appear to the right of the themes in the Design tab. Variants can be further customized by clicking the More button to modify the theme colors, fonts, effects or background styles. To further customize a design theme, it is easy to apply a new variant while everything else about the theme remains the same.



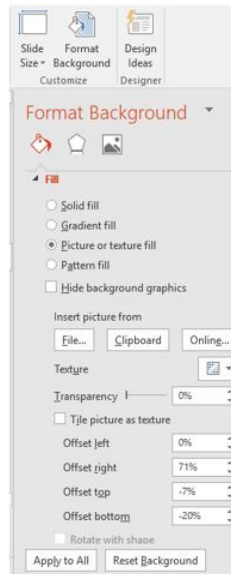
Theme Variants

Many organizations have a standard, recognizable theme that should be consistently used to follow the organization's branding standards. While a theme can be applied to individual slides, it is advisable to apply one theme to an entire presentation, which creates a uniform, professional look.

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8.14: Formatting the Slide Background

While each design theme has its own background colors, patterns or images, every slide in a PowerPoint presentation can modify a background by changing colors, gradient fills, or adding/subtracting graphics. The **background** is the area behind the text and graphics on a slide.



Format Background

To customize the presentation's background, click the Format Background button in the Customize group of the Design tab. The Format Background pane will appear to the right of the slide pane. When choosing a different color or gradient fill for the slide background, consider ensuring that a proper contrast between the font colors and the background make the presentation easy to read for your projected audience. A dark background might be appropriate with good lighting, but a dark room might necessitate using a light background color. The Transparency slide bar can mute the color by increasing the transparency percentage. A graphic can be inserted and strategically located to the side of the content placeholder by adjusting the Offset percentages.

After defining all background settings, click the Apply to All button to update all slides with the new background. The slide illustrated below has the Facet theme with a custom background and a graphic offset to appear to the left of the content placeholder.

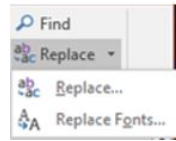


Facet theme slide

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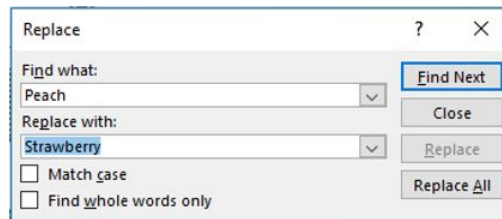
8.15: Replacing Text and Fonts

Popular presentations that get used over extended periods of time often need updating due to product, personnel or company name changes. This is particularly the case in technology companies. Instead of relying on manual editing to find specific words that need to be changed, the Find or the Find & Replace features can be much more accurate to accomplish the same goal.



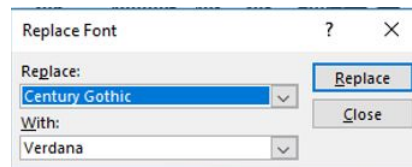
Find Replace

In the Editing group of the Home tab, click the Replace drop-down list, and choose Replace ... to open the Replace window. Use the Find what: and Replace with: fields to update the presentation by replacing certain text with new text. Exact case settings can be required to ensure words like Mark versus mark are not replaced inadvertently.



Replace

Sometimes a new design requires that a font be changed throughout the entire presentation. Changing fonts throughout a presentation is very similar to changing certain text throughout a document or throughout a presentation. In the Editing group of the Home tab, click the Replace drop-down list, and choose Replace Fonts... to open the Replace Font window. In the Replace: drop-down list, choose the existing font that needs to be replaced, and then in the With: drop-down list, select the new font that should appear instead.



Replace Font

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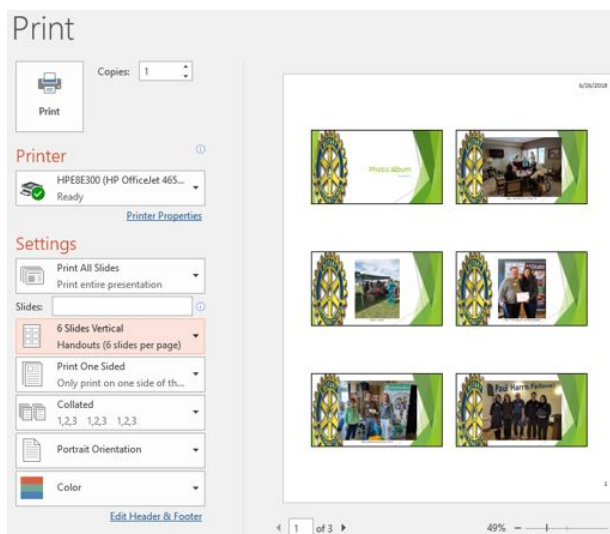
8.16: Printing a Presentation

A hard copy of a presentation may be printed for a variety of reasons. A copy might be printed to provide an editor to review and edit. A second reason might be to generate speaker notes for the presenter. A third reason might be to produce handouts for audience members. Whichever reason is chosen, previewing the printout in Print Preview can resolve a lot of unforeseen issues before wasting a lot of time, paper and ink/toner.



Print Preview icon

It is recommended to add the Print Preview icon to the Quick Access Toolbar to make it easy to review the presentation's accuracy and organization.

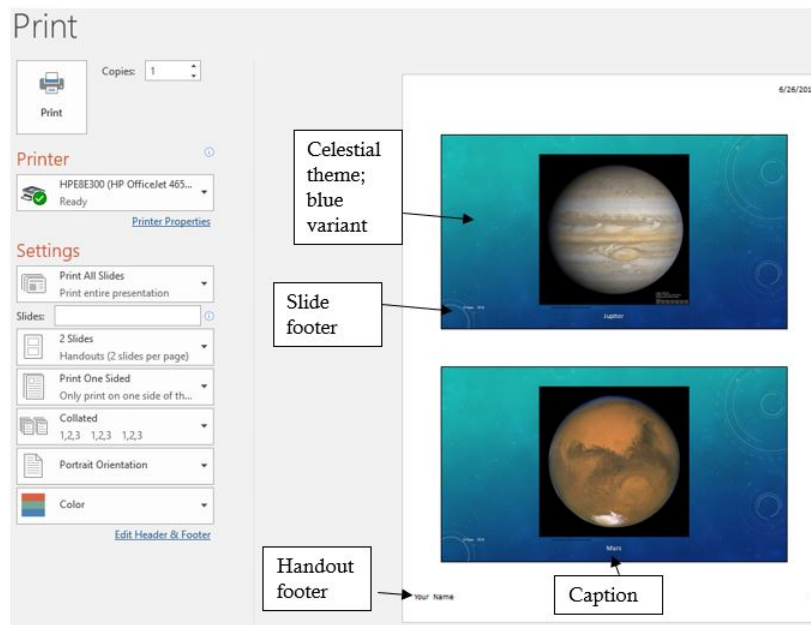


PPT Print Preview

The most common reason to print a PowerPoint file is to produce handouts, but this objective demands further consideration. How will the audience use the handouts? Will they use them as a reference, or will they be used to take notes? The answer to this decision will affect the first option under the Slides setting. The default is Full Page Slides, which is rarely the preferred selection since each slide is printed on its own sheet. Notes Pages should be the option if the intent is to generate speaker notes. The Outline option will print the presentation in outline format which prints text, but no graphics, tables or photos. This option is popular if saving paper is a goal. The nine different Handouts options offer various numbers of thumbnail versions of each slide per sheet of paper. Three slides is appropriate if it is desired to give the audience room to take notes, whereas six slides is suitable if the goal is simply to provide reference materials. Once the print options have been selected, click Print or the Print icon to print the presentation.

Practice 6: The Solar System – Part 5

1. Download the *Planets.zip* file from the Course Data Files. Extract the files to a location on your device where you save files for this course.
2. Open a new, blank presentation in PowerPoint.
3. Insert a new photo album using the eight photos unzipped from step 1. Choose the 1 picture, Picture layout. Include captions below all pictures.
4. Apply the Celestial theme, along with the blue variant.
5. Change the title text to Our Planets, then change the text to WordArt with the Lime, Accent color 1 Pattern fill.
6. Insert a slide footer with M State – 2018 on all slides except the title slide. Include a handout footer with your name.
7. Capture a screenshot of Print Preview displaying handouts, 2 Slides per page in full color.
8. Compare your results with the screenshot below. Cancel the printing and save the file as Our Planets.pptx.



Our Planets Print Preview

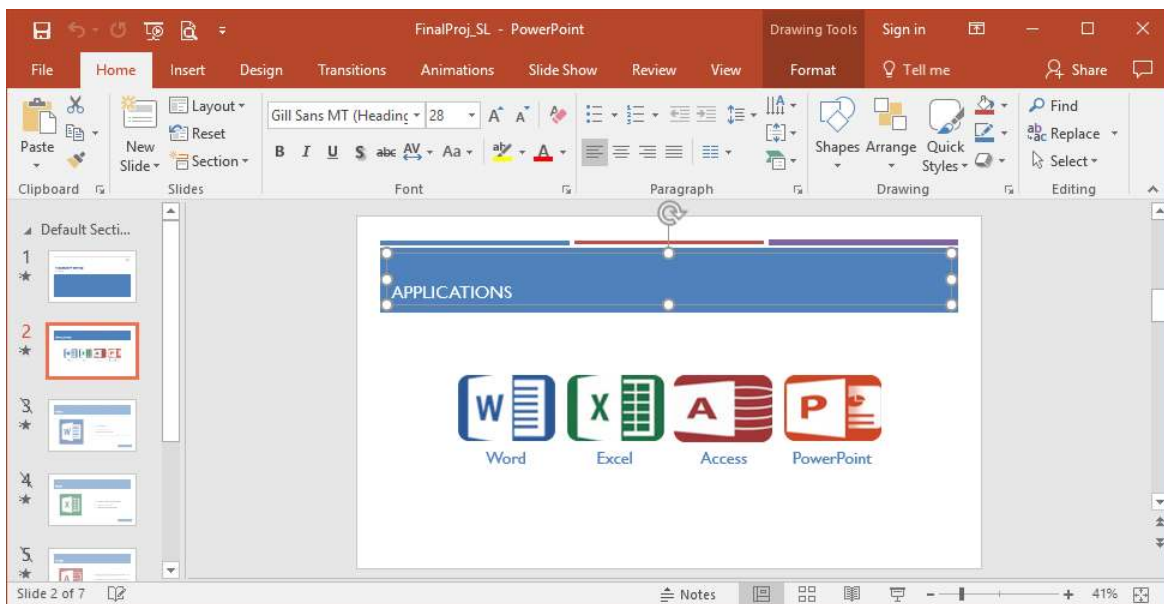
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CHAPTER OVERVIEW

9: PowerPoint Chapter II - Enhancing Presentations

Learning Objectives

- Adding slide transitions
- Apply animations to slide content
- Adding and modifying audio
- Adding and modifying video
- Inserting and modifying hyperlinks
- Utilizing templates and slide masters
- Employing proofing tools
- Saving files in alternative file formats



9.1: Adding Slide Transitions

9.2: Apply Animations to Slide Content

9.3: Adding and Modifying Audio

9.4: Adding and Modifying Video

9.5: Inserting and Modifying Hyperlinks

9.6: Utilizing Templates and Slide Masters

9.7: Employing Proofing Tools

9.8: Saving Files in Alternative File Formats

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9.1: Adding Slide Transitions

No one wants to watch a PowerPoint presentation that is neither interesting or entertaining. Without certain design elements, many audience members will consider PowerPoint to be boring. In fact, some audiences sarcastically suffer “Death by PowerPoint” when the presenter and presentation are not stimulating. Don’t be like Dwight Schrute of “The Office”, and start a fake fire to get your co-workers’ attention, because you don’t know how to create a great PowerPoint presentation! One way to add appeal to your presentation is to use multimedia elements.

Motion and multimedia can evoke emotion in the audience, and can be applied in a variety of ways. **Slide transitions** are the visual and audio effects that occur when the presentation moves from one slide to the next while in slide show view. By default, no transitions exist in a newly created presentation. However, applying transitions can be easy and effective.

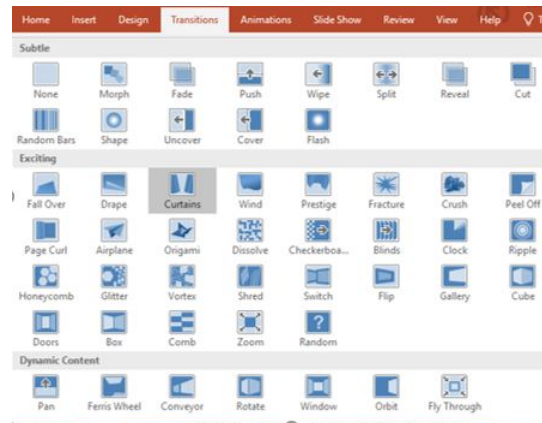
Users can control the speed, add sound, and customize the properties of transition effects. When used effectively, transitions can add a professional feel to a presentation. However, inconsistent and inappropriate transitions can distract from the purpose of the presentation, so careful consideration should be taken to ensure that a transition effect complements the goals of the presentation. While transitions can be applied to individual slides, consistency across all slides is considered a “best practice”.

Applying a transition can be accomplished by clicking a slide thumbnail in the left pane, and then clicking the Transitions tab on the ribbon. This is the slide that will appear after the transition. The user can click on any of the transition icons to see a preview of how the visual and audio effects will display during slide show view.



Transitions tab

Clicking the More button will display a gallery of transition choices. There are three categories of transition types: Subtle, Exciting, and Dynamic Content.



Transitions types

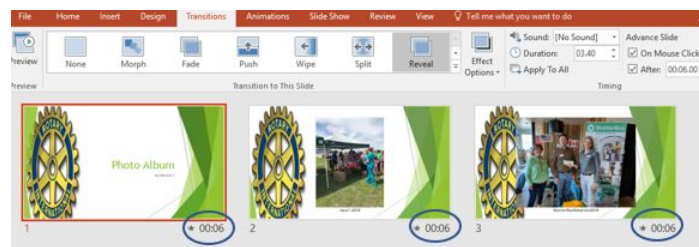
While simplistic, Subtle transitions are popular because they are effective. Their effectiveness is partly due to their lack of distraction. Exciting transitions and Dynamic Content, which use more complex animations, can be overkill if not used in moderation. Any slide transition usage needs to remember the purpose of the presentation, and not distract from that objective.



Effect Options

To customize the look of a transition, users can utilize the Effect Options command to change the direction of a specific transition. These options will vary depending on the selected transition. To remove a transition, apply the None option to a slide.

After a transition is selected, enter a time in seconds in the **Duration** field. This controls how fast the transition occurs; a larger number makes it go slower. From the **Sound** drop-down menu, a sound effect can be added. Caution! – sound effects can quickly become annoying if not used sparingly, and many of these affects are a little cheesy! Under the Advance Slide label, choose either or both of the On Mouse Click or After checkboxes to determine how to trigger the transition effects. The **On Mouse Click** option is popular for presentations with a live speaker in control of the presentation's pace. The **After** combo field is necessary for self-running presentations, and presentations that need to be conducted in a specific time-frame. Precise duration's of time (usually in second-equivalents) can be specified for each slide using the After-combo field.



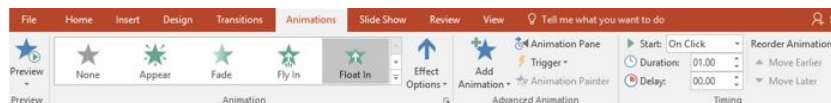
Transition Timings

To apply the same transition and settings to every slide, click **Apply to All** to maintain consistency. Otherwise, select different slides and repeat this process to apply a different transition to each. The specific timings for each slide are best displayed in Slide Sorter view. Note: clicking the Apply to All option will override any existing transition settings already defined on other slides.

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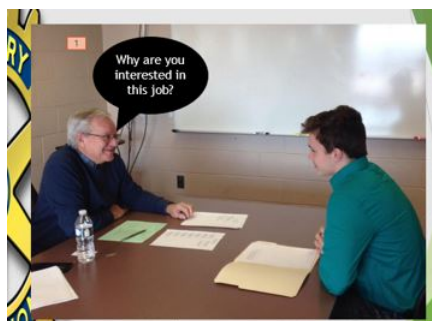
9.2: Apply Animations to Slide Content

Animations refer to the movement of objects and text on a slide during slide show view. Animations can help make a PowerPoint presentation more dynamic, more memorable, and more interesting. Animations affect the individual objects on a slide, including bullets, text, and graphics. Each effect can be timed to appear on a slide, in a specific sequence, using either Entrance, Emphasis and/or Exit effects. **Entrance animation** effects occur as the object initially appears on a slide, whereas an **exit animation** effects transpire as the object leaves the slide. Entrance animation is very popular for introducing bulleted text one bullet at a time, which prevents viewers from advancing their attention beyond the current topic. **Emphasis animation** occurs after the object has displayed on the slide. It can be useful to draw attention to a specific object on a busy slide by adding motion or highlights.



Animations Toolbar

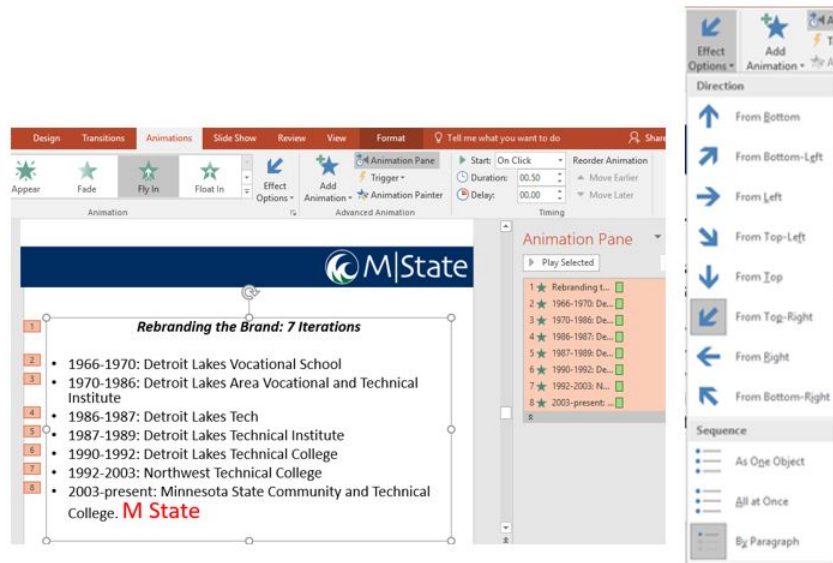
To apply an animation, select an object on a slide, and then choose an animation icon from the Animations tab. In the photo below, a callout shape was added, formatted and filled with text, before a Float In entrance animation effect was applied.



Callout animation

Additional animations can be added to text or objects by clicking the Add Animation button in the Advanced Animation group. If an attempt is made to add an animation without first clicking “Add Animation” it will replace the existing animation instead of adding to it. This step can be repeated multiple times to add as many animations to an object as desired.

Clicking the Animation Pane, located in the Advanced Animation group of the Animations pane, is a useful tool for organizing multiple animations on the same slide. The Animation Pane lists the objects on a slide that have animation applied. It can be used to reorder the animation sequence and choose options for the animations. Effect Options can be applied to change the direction of the animation. To adjust the order of the animated objects, select an option in the Sequence category in the Effect Options gallery. The By Paragraph Sequence is very popular with bulleted text paragraphs. Notice that numbers are assigned to each element to help identify the order each occurs on the slide.



Animation Effect Options

Transitions and animations have many settings, with opportunities to apply multiple actions to a single slide. To maintain a professional design, it is important to maintain consistency with transitions, animations, and other multimedia, including audio and visual effects.

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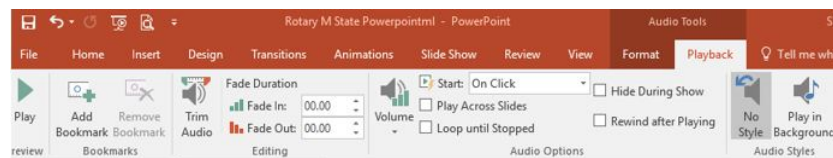
9.3: Adding and Modifying Audio

An audio file can be added to a slide and played during a slide show. Audio files can be music, voice narration, or sound bites. To record and hear any audio, the computer must be equipped with a sound card, microphone, and speakers. Typical audio file formats include .mp4, .mp3, .wav, and .wma files. To insert a multimedia file (audio, video or screenshot), click the Media button on the Insert tab.



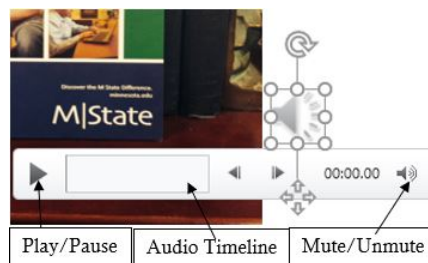
Insert Media

When a sound file is inserted, a sound icon  is added to the slide and the Audio Tools contextual tab appears to provide options to format how the audio plays on a slide.



Audio Tool Playback toolbar

After the audio file is inserted, and a sound icon appears on a slide, several formatting decisions should be addressed regarding how the audio sounds during playback. The sound can be previewed by clicking the Play/Pause button in the Audio Control Bar.



Audio Playback

The Audio Timeline can be dragged to the left or right to advance the audio to the desired start location. If hiding the icon from displaying on screen during Slide Show View is desired, clear the Hide During Show checkbox in the Audio Options group. If the audio file is hidden during playback, the Start drop-down list selection should be set to Automatically, since the On Click option is only available if the icon is visible so it can be clicked. The Play Across Slides option is great if the file is long enough to play as background music for many slides. This is a popular choice to complement photo albums.

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9.4: Adding and Modifying Video

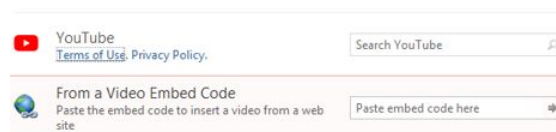
Video is even more engaging than audio because it adds visual appeal in addition to audio sensory stimulation. An appropriate video can provide a lasting memory for the audience, and provide compelling evidence to influence and educate. Videos offer a lot of upside, but they require also require a lot of resources and careful consideration. The overall length of the presentation needs to be considered when deciding to utilize videos with a slide presentation. Videos tend to be lengthy and the presentation should stay focused and on time. Additionally, video file sizes are enormous. Therefore, storage and portability are often major issues to consider if embedding videos into a presentation.



Insert Video

There are a couple of ways to add video to a PowerPoint presentation. You can add a video from your hard drive, embed one from YouTube, or simply linking an image to the video's location. Inserting a video is very a similar process to inserting an audio file. When clicking the Video drop-down list, decide between inserting a Video on My PC... or Online Video... Either option will open a dialog window to allow the user to navigate to the location of the video file. Like audio files, many media files are available to download royalty-free from online sites like freemusicarchive.org or videvo.net.

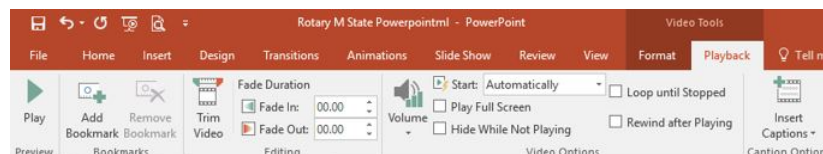
Insert Video



Insert Online Video

To insert a link to a YouTube site, or embed a YouTube video code, choose the Online Video... option. The link to YouTube option will require a strong Internet connection during playback, however this will control the size of the PowerPoint file.

Once inserted, ensure that the video is moved and resized to be legible for the audience during playback. With the video object selected, a new contextual Video Tools tab will appear with Formatting and Playback options. The Playback tab offers many ways to customize the impact of the video.



Insert Video Toolbar

The first, and most important decision, is to decide whether the video should play Automatically once the slide appears or until a mouse click triggers the playback. A lot of time can be taken to trim and adjust the fade of a video, which can be useful to ensure a snippet of a video plays instead of the entire video file, which can often be too lengthy. There is no denying the impact of videos in today's multimedia rich world. Nonetheless, careful planning and design is necessary to ensure that the investment of time and resources are worthwhile for use in a PowerPoint presentation. Some common video and audio file formats are listed below.

Extension	Supported Video File Formats
<u>.asf</u> , <u>.avi</u>	Windows Video file
<u>.mp4</u> , <u>.m4v</u> , <u>.mov</u>	MP4 Video file
<u>.mpg</u> <u>.mpeg</u>	Movie file
<u>.swf</u>	Adobe Flash Media
<u>.wmv</u>	Windows Media Video file

Extension	Supported Audio File Formats
<u>.mid</u> <u>.midi</u>	Midi file
<u>.mp3</u>	MP3 Audio file
<u>.mp4</u> <u>.m4a</u>	MPEG-4 Audio file
<u>.wav</u>	Windows Audio file
<u>.wma</u>	Windows Media Audio file

Audio and Video file formats

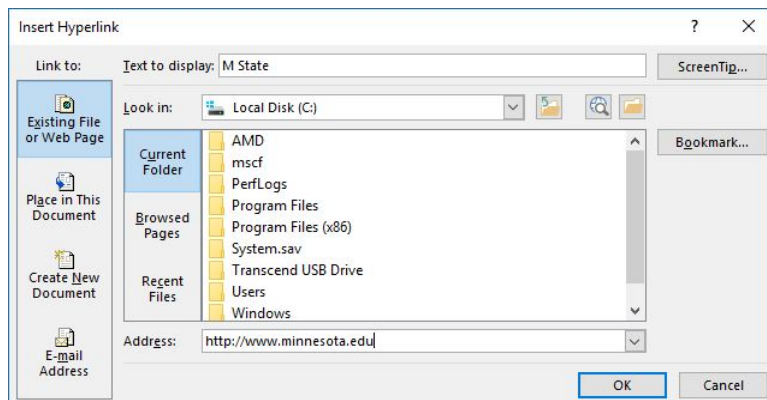
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9.5: Inserting and Modifying Hyperlinks

Hyperlinks make a presentation dynamic by allowing connections to other slides, documents and/or web pages. A **hyperlink** is an object which when clicked, jumps to another location in the current file or opens another file, or address on the web. Hyperlinks have two parts: the address (of the web page, e-mail address or file location), and the display text (or graphic image). For example,

the text: M State, could be linked to the web site www.minnesota.edu. Likewise, the logo  can also be linked to www.minnesota.edu. To insert a hyperlink, right-click the selected text and choose Hyperlink... from the shortcut menu, or select

the text and click the  button on the Insert tab.



Insert Hyperlink

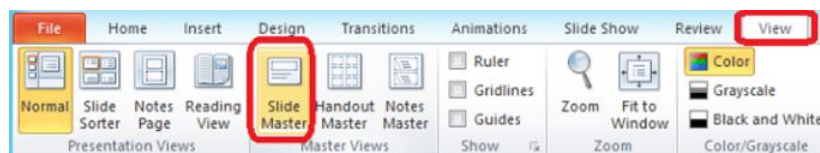
Select a type of link from the Link to sidebar, and then type a label in the Text to display field. A link could open a file on from the Current Folder, a recently Browsed Page from the Internet or a Recent File that was opened on your computer. For web pages, type a URL in the Address: box, or for an E-mail Address, type the e-mail syntax into the E-mail address field. Choose the Place in This Document option to redirect PowerPoint to a designated slide when the link is clicked. For all options, use the ScreenTip... button to add text that displays on-screen when the cursor hovers over the hyperlink. Make sure to test the inserted links by using Slide Show view and clicking each link.

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9.6: Utilizing Templates and Slide Masters

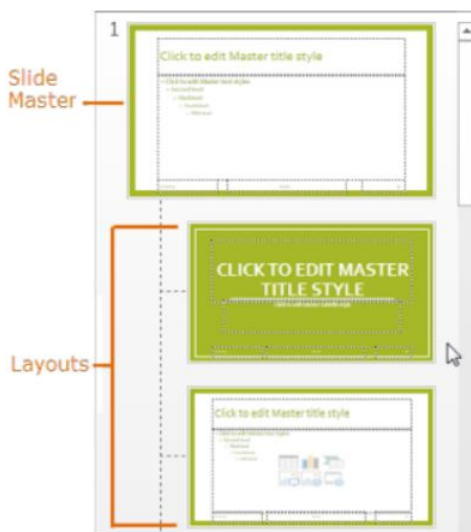
Consistency is an important quality to maintain a marketing brand. Corporate presentations should maintain consistency when utilizing certain PowerPoint functionality, particularly features like transitions, themes, fonts, etc. Two ways to maintain consistency in a PowerPoint presentation is to use templates or slide masters. A PowerPoint **template** is a replica of a slide that is saved as a .potx file. A template usually contains consistent layouts, fonts, colors, designs and even related content. Templates are a popular starting point for creating new presentations, in part because they save time, and maintain consistency. However, don't be afraid to change designs add additional slides to these templates to make the presentation your own. Many organizations create an organization template that maintains the branding of the organization when employees create corporate presentations. Microsoft has hundreds of free downloadable PowerPoint and other Office templates available on Office.com. Existing and custom-created personal template files are typically found on your hard drive at:

C:\User\<UserName>\AppData\Roaming\Microsoft\Templates.



View ribbon

A **slide master** is the template that applies to all slides in a presentation. When all slides need to contain the same fonts, font sizes, and images (such as logos); a user can make those universal changes in one place—the Slide Master, and they'll be applied to all the slides.



Slide Masters

To open Slide Master view, on the View tab, select Slide Master. The left pane will display thumbnails of the slide master and of all the slide master layouts. Hovering the pointer over a slide layout displays the layout name and indicates which slide in the presentation utilize that layout. The top icon in the left pane will display the slide master. Any modifications (formatting or added logos) to the slide master will apply to all slides in the presentation. Formatting applied to a slide layout master only affects slides that use that specific layout. To return to the normal slide view, click the Close Master View button on the Slide Master tab.

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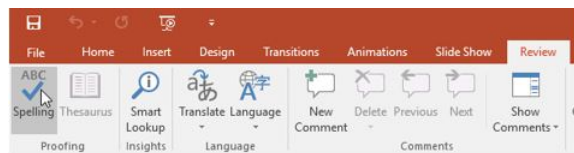
9.7: Employing Proofing Tools



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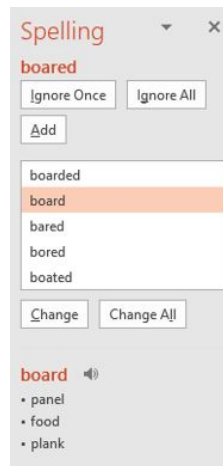
Grammer

In today's social media/texting communication environment, punctuation, spelling and grammar have begun to lose its luster. While this cavalier attitude might be acceptable for personal communications, professional communication still demands proper attention to details. Why is it such a big deal to proofread a PowerPoint presentation? Well, if you make an error in a Word document, one or perhaps a couple of people will notice. However, a presentation is usually given to a large audience, so any spelling, grammar or punctuation error will be magnified by multiples.



Review tab

PowerPoint provides users with several proofing features – including the Spelling and Grammar tool – that can help create professional, error-free presentations. From the Review tab, clicking the Spelling button will open the Spelling pane to the right of the slide pane.



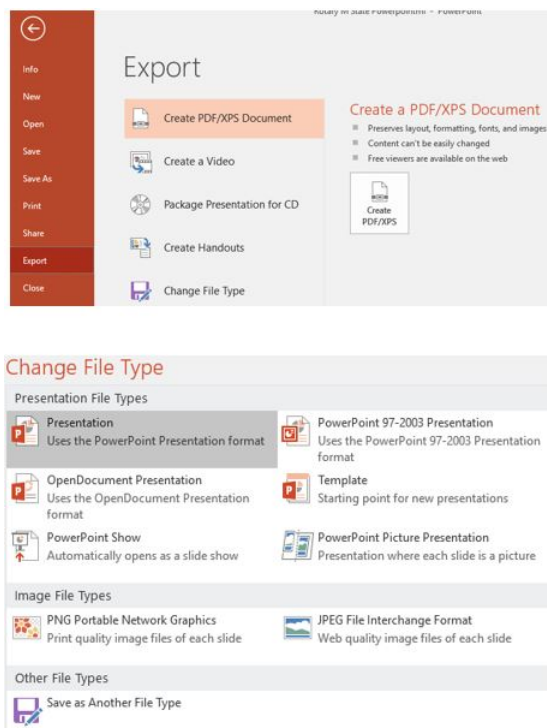
Spelling task pane

For each error in the presentation, PowerPoint will offer one or more suggestions, which can be ignored or selected by clicking the Change button. The Spell Checker only recognizes misspelled and unknown words, not misused words, so proofreading a presentation is still important. The Thesaurus is a fun tool for suggesting synonyms for over-used words. Reusing the same words too often reduces the readability and professionalism of a presentation, so try out the Thesaurus! It is also a great resource for solving crossword puzzles!

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9.8: Saving Files in Alternative File Formats

The default file extension for a PowerPoint file is .pptx. Various alternative formats exist depending on how the file needs to be saved. The biggest factor will be the audience's needs. In special circumstances, when it is necessary to share sensitive or legal information with others, it may be prudent to save the presentation file in a fixed layout format that locks the file from being edited. The PDF and XPS formats are two popular fixed layout formats.



PPT Export window

From the File tab on the ribbon, click Export and choose the Create PDF/XPS Document button to open the Publish as PDF or XPS dialog window. Publishing a file in a fixed layout format requires appropriate viewer software, such as Adobe Reader, which opens PDF files. Adobe Reader is a free program downloadable from Adobe's web site. If the audience does not have access to a computer with PowerPoint installed, saving the file as a video or PDF format could be an easy solution. Other file formats are available from the Export window by clicking the Change File Type option. Alternative formats include a PowerPoint Show, or an Image File type which can be optimized for hard-copy printouts or web sites.

Practice 7: The Solar System – Part 6

1. Open the file Our Planets.pptx.
2. Press the F12 key and save the file as Our Planets – FINAL.pptx.
3. Via the slide sorter view, rearrange the slides in order closest to furthest from the sun.
4. Apply the Vortex slide transition to all slides in the presentation.
5. Add the From Bottom Effect Option and a 5:00 (second) duration to Apply to All slides.
6. At the end of the presentation, add a new Title and Content slide with the following text:
 - o Title: The Dwarf Planets
 - o Content: (each as its own paragraph)
 - Pluto
 - Ceres
 - Eris
7. Change the font size of the title text to 44pt and the three paragraphs to 32pt.
8. Apply the Zoom animation scheme (By Paragraph) to the three paragraphs.

9. Change the slide layout to Two Content and in the new placeholder, click the Insert Video icon, and add the SolarSystemVid file from the Course Data Files. Ensure that the video starts automatically.
10. On the first slide, insert the audio file *The Cavern* from the Course Data Files. Ensure the audio starts automatically, and does not appear during playback, but does play across all slides.
11. Add a hyperlink to the Pluto text on the last slide to the web site: theplanets.org/pluto/.
12. Save the file, then save a copy in PDF format.



Dwarf Planets slide

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