WHEATON
PUBLIC
LIBRARY
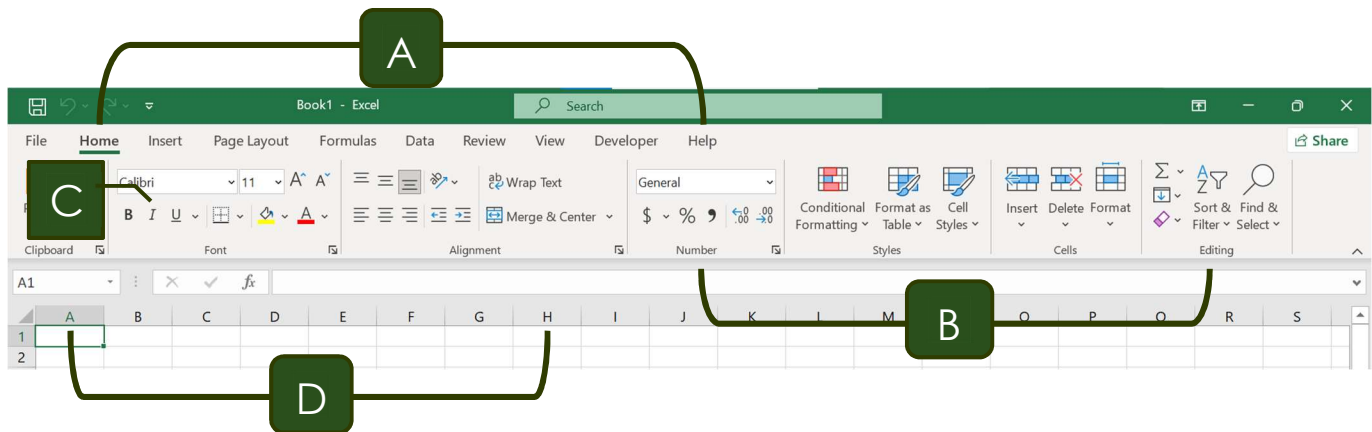
Microsoft Excel 2021 - Advanced

The Ribbon

A. **Tabs** – Provides access to commands and functions of Excel
B. **Group** – Within each tab, there are subtasks, organized by group.
C. **Command Buttons** – Each group contains several buttons, for carrying out commands or displaying menus.
D. **Row and Column Headings** – All cells in Excel are part of a worksheet (also called a spreadsheet). Each cell can contain data and is referred to by a letter and number. For example, the first cell is A1.

Named Ranges

Named Ranges can be made up of any group of cells that are given a name. Benefits include formulas that are easier to read and simplified navigation.

- To name a range, first select the cells to be included.
- Use the Name Box (top left corner) to assign a name to the range OR go to **Formulas → Defined Names → Define Name**
- Naming Requirements
  - o Must begin with a Letter, Underscore or Backslash
  - o No spaces or punctuation
  - o Can't conflict with cell references (A1, B12)
  - o Single letters are OK except R and C
  - o Not case sensitive
- For a list of all named ranges
  - o Click on the right side of the Name Box OR
  - o Go to **Formulas → Defined Names → Name Manager**

Name Box
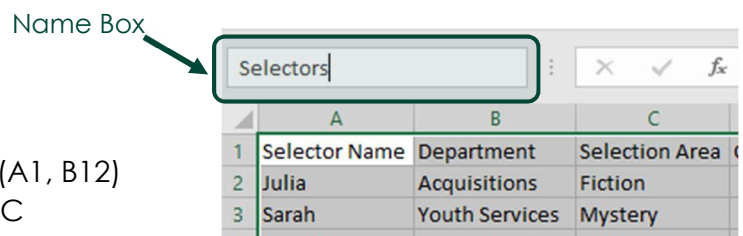
Tables

Tables are more structured than Named Ranges. They are dynamic, meaning you can easily add, remove, sort or filter the data; they can be pre-formatted; and can be named.

- Inserting a Table: Select the cells to be included in the Table, then go to **Insert → Tables → Table**, OR **Home → Format as Table**
- Naming a Table: Go to **Table Tools Design → Properties → Table Name**
  - No spaces, no cell references, each table name must be unique
- Removing a Table: Go to Table Tools Design → Tools → Convert to Range

Structured Reference Syntax

Formulas inside a table look very different than traditional cell range formulas. These formulas are called *Structured References*. Rather than referring to cell ranges or arrays, they use column headings and table names. Generally speaking, it is easier to use the mouse rather than typing the text strings when using Structured References, since they tend to be longer than cell range formulas.

	A	B	C	D	E	F
1	Inventory					
2	Name	Sku	Bay Location	Shelf Location	Quantity Held	Minimum Stock
3	Crayons, 16 pack	400102	D	2	3537	50
4	Crayons, 24 pack	400103	D	3	2772	50
5	Crayons, 8 pack	400101	D	1	197	50
6	Crayons, 8 pack Wide	400104	D	4	1102	50
7	Dry erase markers, 4 pack assorted	500110	D	14	512	100

	I	J
	Sku	400101
	Shelf Location	1

Structured Reference =VLOOKUP(J3,Inventory[[#All],[Sku]:[Minimum Stock]],3,FALSE)

Cell Range Formula =VLOOKUP(J3,B2:F41,3,FALSE)

- **Table name:** INVENTORY is a table name. It references the table data, without header or total rows. Create a custom name, or leave the default (Table1, 2, 3)
- **#All:** The entire table, including column headers, data, and totals (if any).
- **Column specifier:** [SKU] and [MINIMUM STOCK] use the names of the columns they represent. They reference the column data, without header or total row. Always enclosed in brackets.
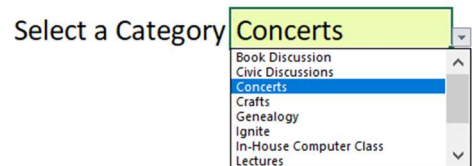
Additional Structured Reference Syntax

- **Item specifier:** Special item specifiers that refer to specific portions of the table, such as the total row.
- **Table specifier:**   Represent the outer portions of the structured reference. Outer references follow the table name, and you enclose them in square brackets.
- **#Data**   Just the data rows.
- **#Headers** Just the header row.
- **#Totals**   Just the total row. If none exists, then it returns null.
- **#This Row or @ or @[Column Name]** Just the cells in the same row as the formula.

Even more syntax can be found here: https://support.microsoft.com/en-us/office/using-structured-references-with-excel-tables-f5ed2452-2337-4f71-bed3-c8ae6d2b276e

Data Validation

Limits the type of information that a cell can contain, such as date or time, a pre-selected list, or a limited length to the cell contents.

Select a Category | Concerts

Book Discussion
Civic Discussions
Concerts
Crafts
Genealogy
Ignite
In-House Computer Class
Lectures

- Go to **Data → Data Tools → Data Validation**
- In **Settings → Allow**, select the type of Data Validation (e.g. Decimal, List, Time, etc.). Follow the instructions for each category
    - When creating a *List*, either select the correct range of data OR
    - Type each category separated by a comma (e.g. Book Discussion, Civic Discussions, Concerts, etc.)
- Click the **Input Message** tab to customize the Data Validation cell (e.g. "Click here to Select Program Category")
- Click the **Error Alert** tab to specify how to proceed if invalid data is entered (Stop, Warning, Information)

Lookup Functions

VLookup: stands for Vertical Lookup. Searches for a specific value in one column and retrieves corresponding data from any column to the right of the original.

Parts of the Formula:

=vlookup(lookup_value, table_array, col_index_num, range_lookup)

=VLOOKUP(J3,B2:F7,3,FALSE)

	A	B	C	D	E	F		J
1	Inventory							
2	Name	Sku	Bay Location	Shelf Location	Quantity Held	Minimum Stock	Sku	400101
3	Crayons, 16 pack	400102	D	2	537	50	Shelf Location	1
4	Crayons, 24 pack	400103	D	3	2772	50		
5	Crayons, 8 pack	400101	D	1	197	50		
6	Crayons, 8 pack Wide	400104	D	4	1102	50		
7	Dry erase markers, 4 pack assorted	500110	D	14	512	100		

Result of formula

- Lookup value: the cell reference or value text to find in the array
- Table array: the entire range of data to be included. NOTE: Lookup_value MUST be contained in the first column of data
- Column Index Number: the column number that contains the data
- Range Lookup: Exact (false) or Approximate (true) match. Defaults to *Approximate* match, though *Exact* is usually preferred.

XLookup: Searches for a specific value in one column and retrieves corresponding data from any other column in the array or table. **NOTE: Only available in Excel 365 or Excel 2021.**

Parts of the Formula [elements in brackets are optional]

=xlookup(lookup_value, lookup_array, return_array, [if not found], [match mode], [search mode]

=XLOOKUP(J3,B2:B7,D2:D7,"not found",0,1)

	A	B	C	D	E	F		I	J
1	Inventory								
2	Name	Sku	Bay Location	Shelf Location	Quantity Held	Minimum Stock		Sku	400101
3	Crayons, 16 pack	400102	D	2	3537	50		Shelf Location	1
4	Crayons, 24 pack	400103	D	3	2772	50			
5	Crayons, 8 pack	400101	D	1	197	50			
6	Crayons, 8 pack Wide	400104	D	4	1102	50			
7	Dry erase markers, 4 pack assorted	500110	D	14	512	100			

Result of formula

- Lookup Value: the cell reference or value text to find in the array
- Lookup Array: the array or range to search
- Return Array: the array or range to return
- [If not found]: text returned if no match is found ("not found")
- [Match mode]: Specifies the how the search is performed. Default is Exact (0)
  - 0: exact
  - 1: if none found, return the next larger item
  - -1: if none found, return the next smaller item
  - 2: wildcard
- [Search mode]: Specifies where the match starts. Default is 1
  - 1: start searching at the first item
  - -1: start searching at the last item (reverse search)
  - 2: binary search reliant on lookup sorted in ascending order
  - -2: binary search reliant on lookup sorted in descending order

Index/Match: INDEX and MATCH are two separate formulas that work well together. To create the lookup, MATCH and INDEX are nested. MATCH returns a column number (1,2,3, etc.), then INDEX replaces that column number with the actual value.

> **Parts of the Formula [elements in brackets are optional]**
> =index(array, row_num, [col_num], [area_num])
> =match (lookup_value, lookup_array, match_type)
> Combined: =INDEX(array, MATCH (lookup_value, lookup_array, match_type))

=INDEX(**D2:D7**,MATCH(**J3**,**B2:B7**,0,))

	A	B	C	D	E	F		I	J
1	Inventory								
2	Name	Sku	Bay Location	Shelf Location	Quantity Held	Minimum Stock			
3	Crayons, 16 pack	400102	D	2	3537	50		Sku	400101
4	Crayons, 24 pack	400103	D	3	2772	50			
5	Crayons, 8 pack	400101	D	1	197	50			
6	Crayons, 8 pack Wide	400104	D	4	1102	50			
7	Dry erase markers, 4 pack assorted	500110	D	14	512	100			

Result of formula

INDEX: returns the specific value in a one-dimensional range

  - Array: the array or range to search
  - Row Num: selects the row in the array or range
  - [Col Num]: selects the column in the array or range

- MATCH: returns the position of value in the range (1, 2, 3, 4, 5). **NOTE: When using INDEX/MATCH, the result of the MATCH formula *becomes* the Row_Num argument in the INDEX formula.**
  - o Lookup Value: the cell reference or value text to find in the array
  - o Lookup Array: the array or range to search
  - o Match Type (the default is 1)
    - ▪ -1: if none found, returns the smallest value greater than the lookup
    - ▪ 0: exact match
    - ▪ 1: if none found, return the largest value less than the lookup

Filter: extracts row data from a range or array, using criteria you select. **NOTE: Only available in Office365 or Office 2021.**

> **Parts of the formula [elements in brackets are optional]**
> =filter(array, include, [if empty]

=FILTER(A1:D20,B1:B20=B23,"no orders")

- **Array**: the table or group of columns and rows
- **Include**: equation to look for the filtered results (B1:B20=b23; b1:b20= "Youth Services")
- **[if empty]**: specialized messages for when no results are available
- *Make sure you have enough empty cells for all the filtered data. Otherwise, you may get a #SPILL error.*

Which Lookup Function Should You Use?

VLookup	XLookup	Index/Match
Return array must be to the right of the Lookup array	Return array can be to the left or right	Return array can be to the left or right
Return array is expressed as the number of columns to the right of the lookup	Highlight the return column	Return array is expressed as a combination of the number of columns/rows and the lookup value
For approximate values, lookup array must be in ascending order	Lookup array does not need to be sorted	Lookup array does not need to be sorted
Cannot do a horizontal lookup (use HLookup instead)	Works horizontally or vertically	Works horizontally or vertically
Defaults to approximate match	Defaults to exact match	Defaults to approximate match
Available in all versions of Excel	Only available in 365 or 2021	Available in all versions of Excel

Data Visualization

Craft Programs had peak attendance in February 2022

VS
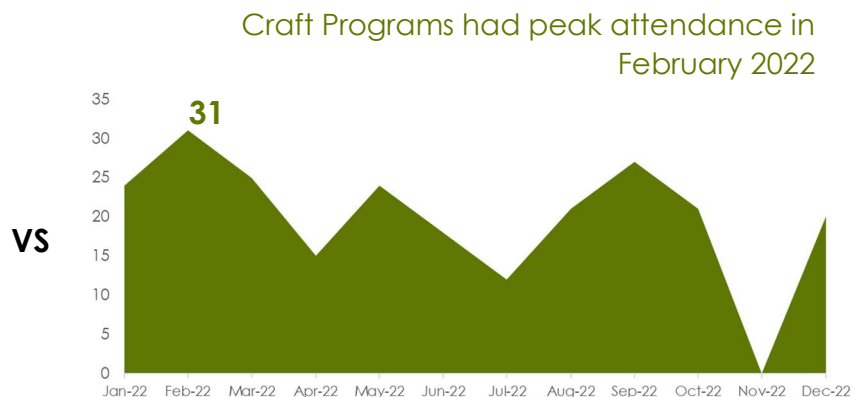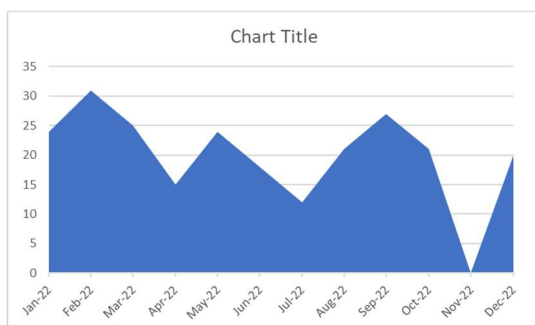
- Use **Page Layout → Themes → Colors** to add brand colors or create your own scheme
- Declutter the chart area by removing unnecessary elements (axis lines, chart border, etc.). **Right-click on Chart → Format Chart Area**
- Increase font size of axes and Data Table to increase readability.
- Replace Chart Title with brief description of the "story" you want to tell.

Excel Keyboard Shortcuts

Selecting

Select the entire worksheet	Ctrl + A
Select all non-blank cells on the right	Ctrl + Shift+ →·
Select all non-blank cells on the left	Ctrl + Shift + ←·
Select the column from the current cell to the last non-blank cell in the same column	Ctrl + Shift + ↓·
Select all the cells above the selected cell	Ctrl + Shift + ↑·
Select the column from the current cell to the last non-blank cell in the table	
Select the entire row	Shift + Space
Select the entire column	Ctrl + Space
Select from the Current Cell to the last cell with data	Ctrl + Shift + End
Select the Adjacent Cell	Shift + →←↓↑·

Navigation

Go to the First Cell of your worksheet	Ctrl + Home
Go to the Last Cell of your worksheet	Ctrl + End
Move to the next worksheet	Ctrl + Page Up/Page Down
Start a new line in a formula	Ctrl + Enter
Toggle between displaying cell values and formulas	Ctrl + ` (single quote, top left of keyboard)
Repeat the last action performed in the formula bar	F4

Copy and Paste

Cut	Ctrl + X
Copy	Ctrl + C
Paste	Ctrl + V
Copy the contents and format of the first cell in a select range into the cells below	Ctrl + D
Copy formula from cell above	Ctrl + ' (Apostrophe, to the left of the Enter key)
Paste Special	Ctrl + Shift + V

Extras

Repeat/Redo the last action	Ctrl + Y
Enter the current date	Ctrl + ;
Enter the current time	Ctrl + Shift + ;
Insert Function	Shift + F3
Flash Fill	Ctrl + E