

MODULE FOR POST-GRADUATE DIPLOMA IN EDUCATION

**2nd Semester
April, 2023**

**IoE/MoF/TUC/GHANA CARES TRAINING AND RETRAINING
PROGRAMME FOR PRIVATE SCHOOL TEACHERS**



Ministry of Finance



Trade Union Congress



Institute of Education, UCC

MS Excel

Lesson Objectives

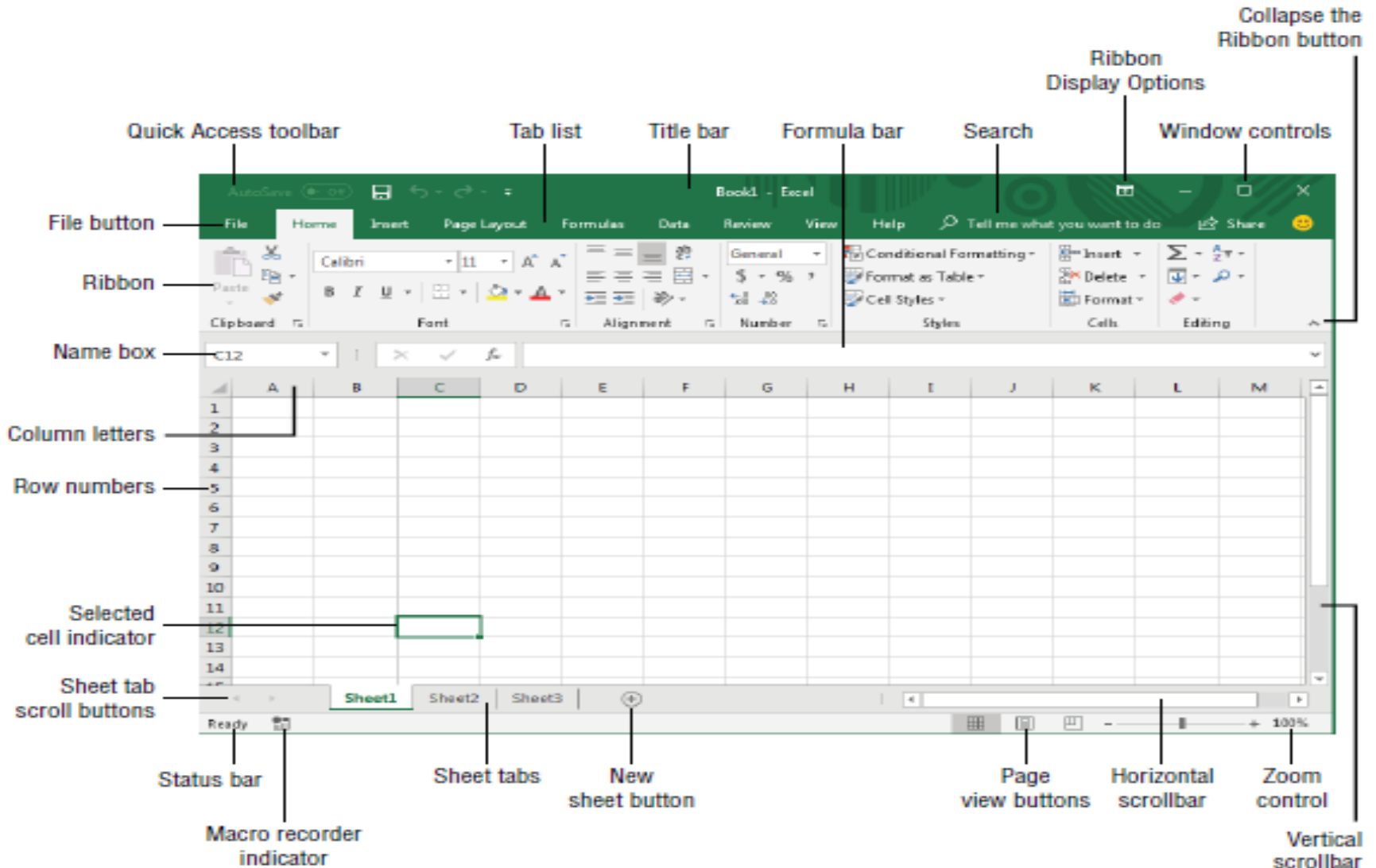
At the end of this lesson, you would be able to:

- Identify fundamental elements and data types of a spreadsheet
- Create, navigate, and manage worksheets
- Enter and edit cell data
- Address and reference cells
- Work with formulas and functions
- Create charts

Familiarization with the Excel Workspace

- Spreadsheets are displayed in a grid layout.
- Column headings = letters
 - To highlight an entire Column, click on any of the letters.
- Numbers = rows
 - The exact number of rows and columns are 1,048,576 rows and 16,384 columns.
- A Cell is a letter combined with a number. So if you combine the B column with Row 5, you get Cell B5.

Microsoft Excel's Opening Screen



Parts of the Excel Screen That You Need to Know

S/N	Name	Description
1.	Collapse the Ribbon button	Click this button to hide the Ribbon temporarily. Double-click any Ribbon tab to make the Ribbon remain visible. Ctrl+F1 is the shortcut key that does the same task.
2.	Column letters	Letters range from A to XFD—one for each of the 16,384 columns in the worksheet. You can click a column heading to select an entire column or click between the columns to change the column width.
3.	File button	Click this button to open Backstage view, which contains many options for working with your document (including printing) and setting Excel options.

Parts of the Excel Screen That You Need to Know Cont's

S/N	Name	Description
3.	Formula bar	When you enter information or formulas into a cell, it appears in this bar.
4.	Horizontal scrollbar	Use this tool to scroll the sheet horizontally.
5.	Macro recorder indicator	Click to start recording a Visual Basic for Applications (VBA) macro. The icon changes while your actions are being recorded. Click again to stop recording.
6.	Name box	This box displays the active cell address or the name of the selected cell, range, or object.

Parts of the Excel Screen That You Need to Know Cont's

S/N	Name	Description
7.	New Sheet button	Add a new worksheet by clicking the New Sheet button (which is displayed after the last sheet tab).
8.	Page View buttons	Click these buttons to change the way the worksheet is displayed..
9.	Quick Access toolbar	This customizable toolbar holds commonly used commands. The Quick Access toolbar is always visible, regardless of which tab is selected.
10.	Ribbon	This is the main location for Excel commands. Clicking an item in the tab list changes the Ribbon that is displayed.

Parts of the Excel Screen That You Need to Know Cont's

S/N	Name	Description
11.	Ribbon Display Options	A drop-down control that offers three options related to displaying the Ribbon.
12.	Row numbers	Numbers range from 1 to 1,048,576—one for each row in the worksheet. You can click a row number to select an entire row or click between the row numbers to change the row height.
13.	Search	The Search control is a magnifying glass with the caption “Tell me what you want to do.” Use this control to identify commands or have Excel issue a command automatically.
14.	Selected cell indicator	This dark outline indicates the currently selected cell or range of cells. (There are 17,179,869,184 cells on each worksheet.)

Workbooks and Worksheets

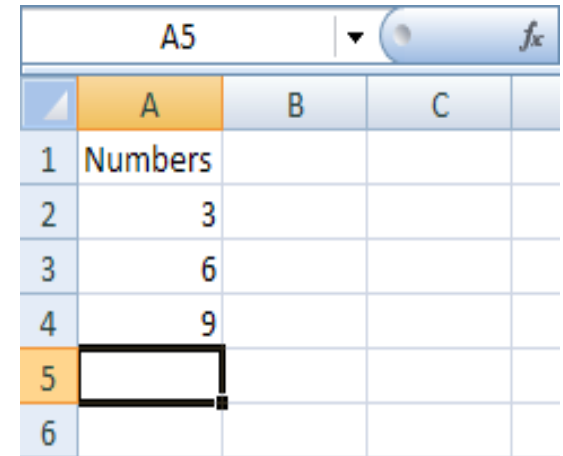
- **Workbook**: A workbook is another word for your Excel file. Excel automatically creates a blank workbook when you open it.
- A **worksheet** is a collection of cells where you keep and manipulate the data. By default, each Excel workbook contains three worksheets.
 - When you open Excel, Excel automatically selects Sheet1 for you. The name of the worksheet appears on its sheet tab at the bottom of the document window.

Managing Worksheets

- Rename a Worksheet
 - By default, the worksheets are named Sheet1, Sheet2 and Sheet3. To give a worksheet a more specific name, execute the following steps.
 - 1. Right click on the sheet tab of Sheet1.
 - 2. Choose Rename.
- Insert
- Move
- Rename
- Delete

How to Enter Text and Numbers in a Cell

- To make a start, we'll create this simple spreadsheet:
 - Type the word: Numbers
 - Hit the Enter key on your keyboard
 - The active cell will move down one, to cell A2
 - Type the number 3, and again hit the Enter key on your keyboard



A screenshot of a spreadsheet interface. The active cell is A5, indicated by a blue border and a small black cursor. The spreadsheet has columns A, B, and C, and rows 1 through 6. The data in column A is as follows:

	A	B	C
1	Numbers		
2	3		
3	6		
4	9		
5			
6			

Types of data

- In each cell there may be the following data types:
 - Labels -- (text with no numerical value)
 - Number data (constant values)
 - Formulas (mathematical equation used to calculate)

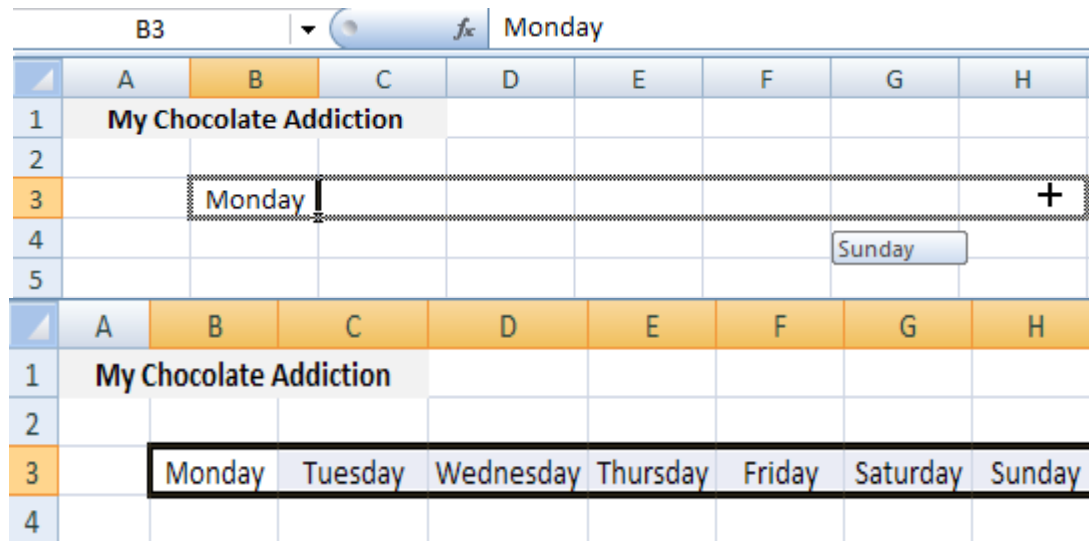
Data Types	Examples	Descriptions
LABEL	Name or Wage or Days	anything that is just text
CONSTANT	5 or 3.75 or -7.4	any number
FORMULA	=5+3 or = 8*5+3	math equation

Types of Data cont's

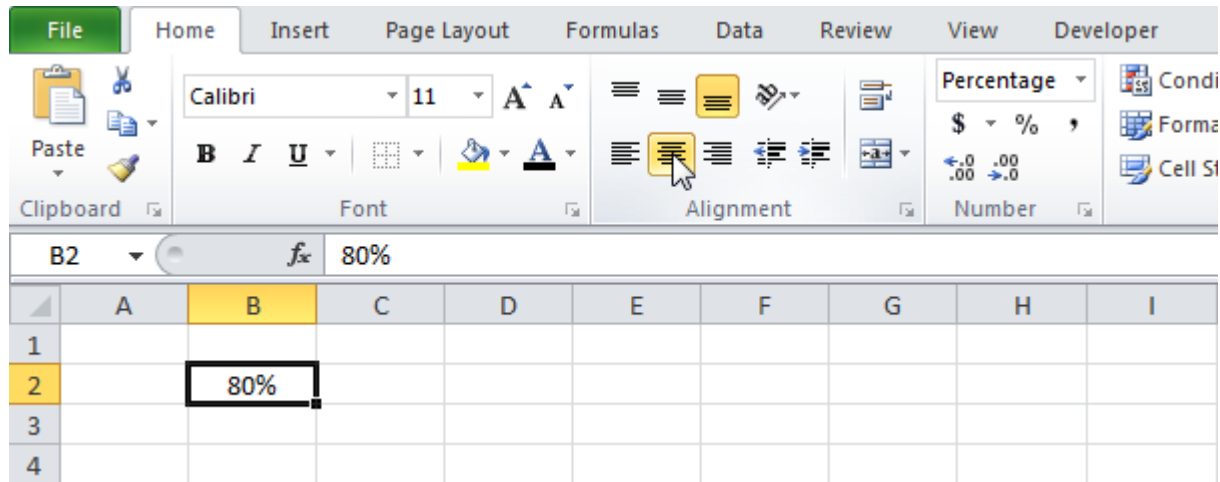
- Apply a number format
 - To distinguish between different types of numbers, add a format, like currency, percentages, or dates.
 - Select the cells that have numbers you want to format.
 - Click the Home tab, and then click the arrow in the General box.
 - Pick a number format.

Auto complete, Auto fill and Auto correct

- When you can see the AutoFill cursor, hold down your left mouse button and drag to the right
- Drag your mouse all the way to cell H3, as in the following image:
- When your cursor is in the H3 cell, let go of the left mouse button
- Excel will now complete the days of the week:

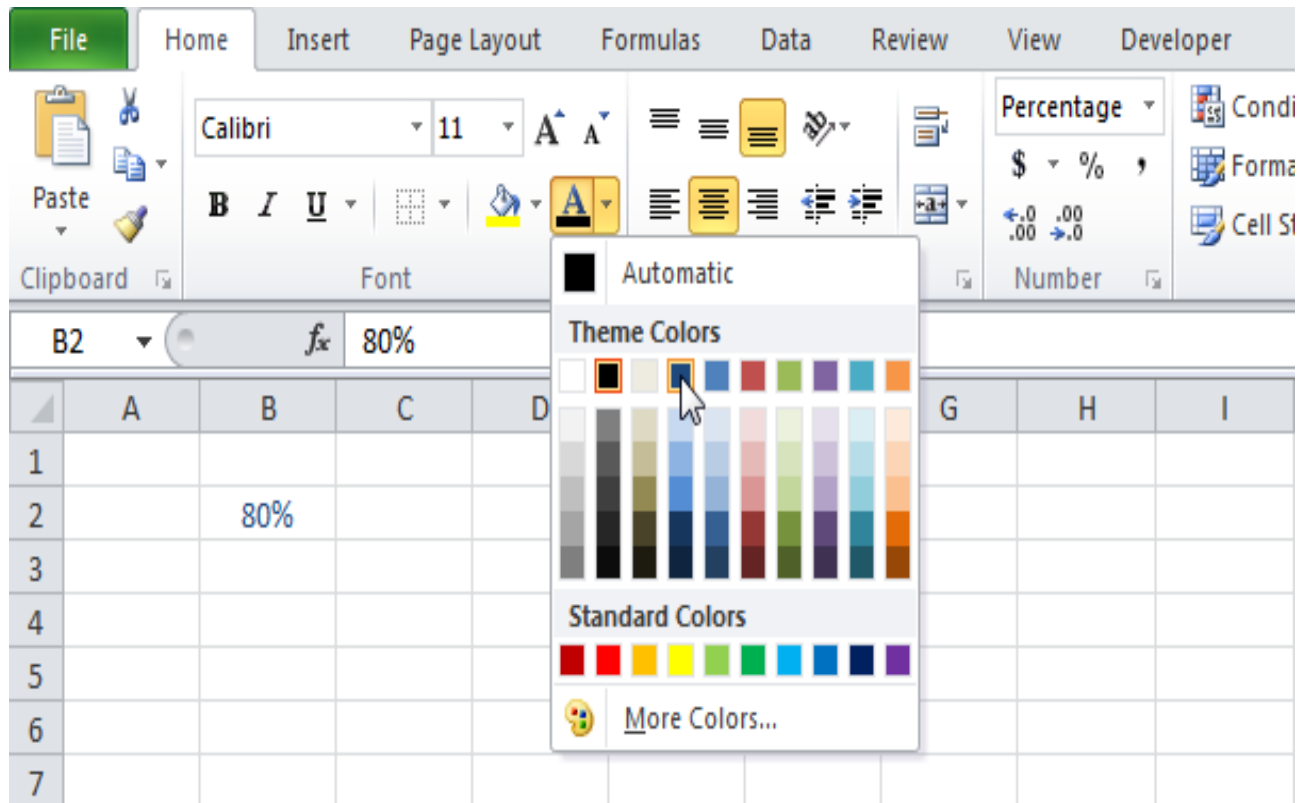


- On the Home tab, in the Alignment group, center the number.



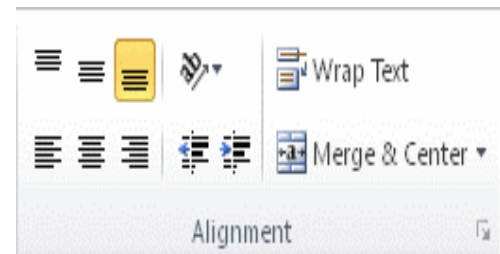
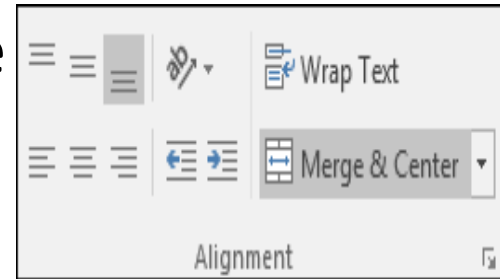
Text editing

- On the Home tab, in the Font group, change the Font color.



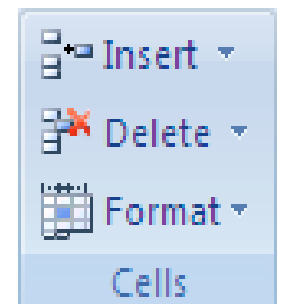
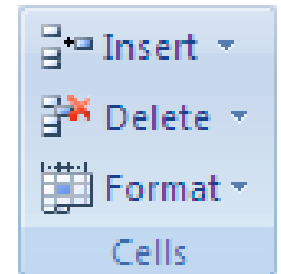
Formatting

- Cell merging: Home - Alignment - Merge and Center
- Orientation - Alignment
- Top Align
- Align Text Left
- Orientation then select the rotation option that you want.
- To wrap the text in a cell, click Wrap Text.
- To justify the text in a cell, on the Alignment tab, click the drop-down box under Horizontal, and then click Justify.



Column and Row fitting

- Home - Cells group, click Format
- Cell Size, click AutoFit Column Width
- Select the row or rows that you want to change.
- On the Home tab, in the Cells group, click Format.
- Under Cell Size, click AutoFit Row Height.



Freeze, hide and split columns/rows (the Window menu)

- Freeze Top Row: View - Freeze Panes, Freeze Top Row.
- Split

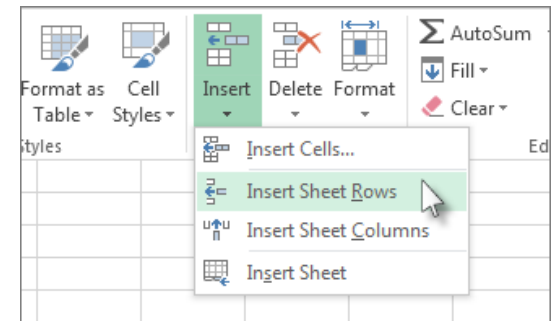
The screenshot shows the Microsoft Excel interface. The View ribbon is active, and the 'Freeze Panes' button is highlighted. A context menu is open over the 'Freeze Panes' button, showing three options: 'Freeze Panes', 'Freeze Top Row', and 'Freeze First Column'. The 'Freeze Top Row' option is highlighted by the mouse cursor.

The spreadsheet data is as follows:

	A	B	C	D	E	F	G	H	I	J
1	Age	Marital status	Address	Income	Car price	Education	Emply	Retired	Gender	Wire
2	55	1	12	72	37	1	23	0	f	
3	56	0	29	153	76	1	35	0	m	
4	28	1	9	28	13.9	3	4	0	f	
5	24	1	4	26	13	4	0	0	m	
6	25	1	2	23	11.3	2	5	0	m	
7	45	0	9	76	37.3	3	13	0	m	
8	44	1	17	144	72.1	2	23	0	m	
9	46	1	20	75	37.1	1	29	0	m	
10	41	0	10	26	13	1	8	0	m	
11	29	0	4	19	9.6	2	10	0	f	
12	34	0	0	89	44.4	3	12	0	m	

Insert, Delete Rows, Columns

- Home- Cells - Insert, - Insert Sheet Rows.
- Home - Cells - Delete:
 - Delete Cells.
 - Delete Sheet Rows.



- If you are deleting a cell or a range of cells, in the Delete dialog box, click Shift cells left, Shift cells up, Entire row, or Entire column.
- If you are deleting rows or columns, other rows or columns automatically shift up or to the left.

Basic Formulas

- **Formulas** are math equations that CALCULATE a value to be displayed.
- You must have an equals sign (=) as the first character in a cell that contains a formula.
- The = sign tells excel that the contents of the cell is a formula
- Without the = sign, the formula will not calculate anything. It will simply display the text of the formula.

Order of Operations

- Excel applies the rules of mathematics to determine how formulas are calculated. The following is the order in which arithmetic operators are applied:

1. Negative number (–)
2. Percent (%)
3. Exponentiation (^)
4. Multiplication (*) and division (/) (left to right)
5. Addition (+) and subtraction (–) (left to right)

- For example, consider the original formula:

$$7 + 8 * 3 / 2 - 4 = 15$$

Explicit values and cell references

You can use both explicit values and cell references in a formula:

– Formula with only cell references: $=a1*b1$

– Formula with only literal values: $=100/27$

– Formula with both cell references and literal values:

$=a1/100$

Relative, Absolute and Mixed References

- By default, all cell references are **relative references**.
- When copied across multiple cells, they change based on the relative position of rows and columns.

The screenshot shows the Microsoft Excel interface. The ribbon includes File, Home, Insert, Page Layout, Formulas, Data, and Review. The Home ribbon is active, showing options for Cut, Copy, Paste, and Format Painter. The formula bar displays the formula `=B3+500-100`. The spreadsheet grid shows columns A through F and rows 2 through 5. Row 2 is highlighted in green and contains the header 'Expense Category' with sub-headers for the months 'Jan', 'Feb', 'Mar', 'Apr', and 'May'. Row 3 contains the value '1200' for 'Rent' in all months. Row 4 contains the value '40' for 'Renter's Insurance' in all months. Row 5 contains the value '500' for 'Furnishings' in January. Cell B3 is highlighted with a blue border.

	A	B	C	D	E	F
2	Expense Category	Jan	Feb	Mar	Apr	May
3	Rent	1200	1200	1200	1200	1200
4	Renter's Insurance	40	40	40	40	40
5	Furnishings	500				

Entering a relative cell reference

Cell B3 is highlighted and surrounded by a blue border.

Relative, Absolute and Mixed References

- Relative references are especially convenient whenever you need to **repeat** the same calculation across multiple rows or columns.

Relative, Absolute and Mixed References

- Sometimes you do not want a cell reference to change when you move or copy it. To make an **absolute cell reference**, use the dollar sign (\$) before the column and row of the cell you want to reference.

\$A\$2	The column and the row do not change when copied
A\$2	The row does not change when copied
\$A2	The column does not change when copied

Relative, Absolute and Mixed References

- absolute cell reference

		= \$B\$3+500-100			
	A	B	C	D	E
2	Expense Category	Jan	Feb	Mar	Apr
3	Rent	1200	1200	1200	1200
4	Renter's Insurance	40	40	40	40
5	Furnishings	500			
6	Miscellaneous				
7	Utilities				
8	Electricity	180	180	180	150
9	Gas	120	120	110	90
10	Water	35	35	35	35
11	Garbage Service	50	50	50	50
12	Phone	50	50	50	50
13	Internet	65	65	65	65
14	Cable TV	135	135	135	135
15	Monthly Subtotals	2375	1875	1865	1815
16	Utilities Subtotals	635	635	625	575
17					
18	January Rent plus Deposit, minus Discount	1600			
19	Annual Rent per Lease	14400			
20	Average Electricity	175.833			
21		1600	1600		
22					

An absolute cell reference contains two dollar signs.

Cells B21 and C21 show the results of the same absolute cell reference.

Relative, Absolute and Mixed References

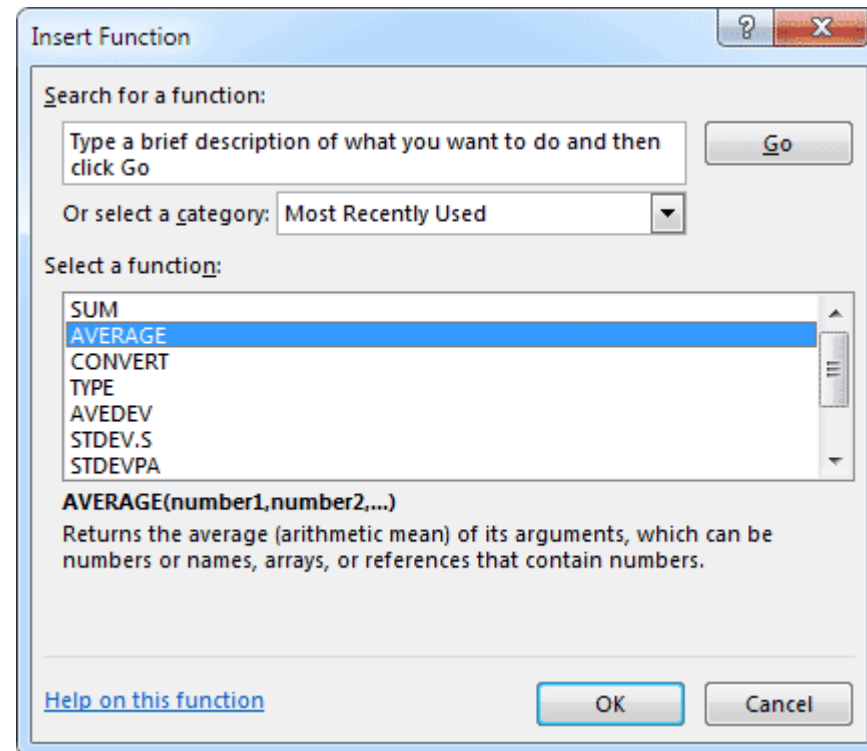
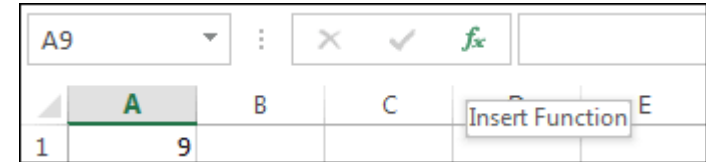
- You can also create a **mixed reference** in which a column or a row is absolute, and the other is relative.
- For example, if the cell reference in a formula is \$A5 or A\$5, you would have a mixed reference in which one component is absolute and one is relative.

Functions

- A formula is an expression which calculates the value of a cell.
- Functions are predefined formulas and are already available in Excel.
- Most often used functions:
 - SUM
 - AVERAGE
 - COUNT
 - MAX, MIN

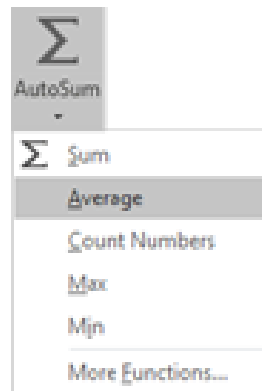
Entering a Function 1

- Next to the formula bar, you'll see an FX button. This is the Formula Wizard:
- When you click the FX button, you'll see the **Insert Function** dialogue box appear:



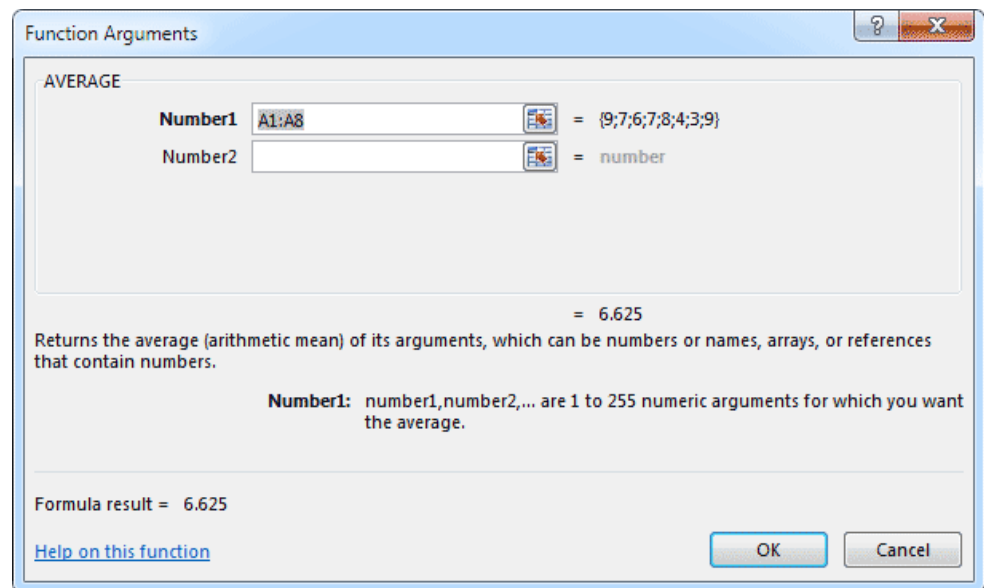
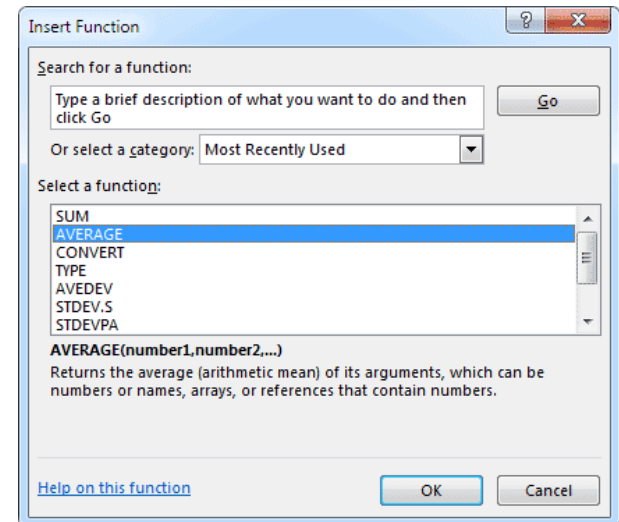
Entering a Function 2

- The second way to enter a Function in Excel is through the panels on the Ribbon.
- Click inside cell B9 on your spreadsheet. This is where we'll place the Average for the cells A1 to A8.
- Click the **Formulas** menu at the top of Excel
- Locate the **Function Library** panel.
- As you can see, in Excel functions are split into categories. The Average function is in a few places. The easiest way to use Average is with AutoSum. Click the down arrow on AutoSum to see the following:



AVERAGE

When you click the FX button, you'll see the **Insert Function** dialogue box appear:



MAX, MIN

- These functions (max and min) return the maximum and minimum number from an array/table

TRUE, FALSE, IF function

- The IF function allows you to make logical comparisons between a value and what you expect.
- IF(Something is True, then do something, otherwise do something else)
- So an IF statement can have two results. The first result is if your comparison is True, the second if your comparison is False.
- TRUE and FALSE is automatically calculated by Excel:
- =A1=B1 - if the cells contain the same value → TRUE, - if the cells contain different value → FALSE

Other examples involving operations

Boolean logic allows us to understand **if a statement is true or false**.

While our first example of TRUE and FALSE in action was high level, let's look at a simpler example.

For instance, we can type a logical expression into a cell as a formula and **Excel will return either true or false**.

	A	B	C	D	E
1					
2		Expression	Result	Formula	
3		2=2	TRUE	=(2=2)	
4		1>0	TRUE	=(1>0)	
5		"a"="b"	FALSE	="a"="b")	
6		(1+1)=(2+1)	FALSE	=(1+1)=(2+1)	
7		(1+1)=(3-1)	TRUE	=(1+1)=(3-1)	
8					
9					

Using Count IF function

- The COUNTIFS function counts the number of cells within a range that meet multiple criteria. The syntax is COUNTIFS(Criteria_range1, Criteria1, *Criteria_range2, Criteria2, ...*).
- You can create up to 127 ranges and criteria.

Using Count IF function cont's

The screenshot shows an Excel spreadsheet titled "10 Fabrikam Sales Solution.xlsx". The active cell is H11, containing the formula `=COUNTIFS(F5:F16,">=60")`. The spreadsheet displays a table of property sales data for December. The table has columns for Agent, List Price, Sale Price, Difference, Percentage Difference, and Days on Market. The data is as follows:

Agent	List Price	Sale Price	Difference	Percentage Difference	Days on Market
Richard Carey	\$ 290,000	\$ 275,000	\$ 15,000	5.2%	60
David Ortiz	\$ 129,000	\$ 125,000	\$ 4,000	3.1%	75
Kim Akers	\$ 225,000	\$ 209,000	\$ 16,000	7.1%	25
Nicole Carson	\$ 259,500	\$ 258,000	\$ 1,500	0.6%	39
Ryan Calafato	\$ 155,000	\$ 145,700	\$ 9,300	6.0%	75
David Ortiz	\$ 200,000	\$ 189,500	\$ 10,500	5.3%	45
Richard Carey	\$ 375,000	\$ 359,500	\$ 15,500	4.1%	90
Ryan Calafato	\$ 180,000	\$ 175,000	\$ 5,000	2.8%	45
Ryan Calafato	\$ 260,000	\$ 250,000	\$ 10,000	3.8%	65
Nicole Carson	\$ 200,000	\$ 195,600	\$ 4,400	2.2%	76
David Ortiz	\$ 205,000	\$ 200,000	\$ 5,000	2.4%	80
Kim Akers	\$ 315,000	\$ 305,600	\$ 9,400	3.0%	90
Total Sales	\$ 2,793,900	\$ 2,687,900	\$ 105,600		

The 'Function Arguments' dialog box for COUNTIFS is open, showing the following arguments:

- Criteria_range1: F5:F16 (Range: [60,75,25,39,75,45,90,45,65,76,80,90])
- Criteria1: ">=60" (Range: ">=60")
- Criteria_range2: (empty)
- Criteria2: (empty)

The dialog shows the formula result as 8. A callout box explains: "Number of properties listed 60 days or more and list price reduced by 5% or more".

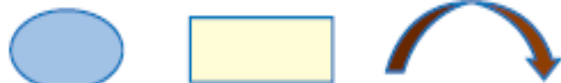
Preview formula result. Watch this change as each criterion is added.

VLOOKUP & HLOOKUP

- The “V” in VLOOKUP stands for vertical. This formula is used when the comparison value is in the first column of a table.
- Excel goes down the first column until a match is found and then looks in one of the columns to the right to find the value in the same row.
- The VLOOKUP function syntax is `VLOOKUP(lookup_value, Table_array, Col_index_num, Range_lookup)`.

Using VLOOKUP

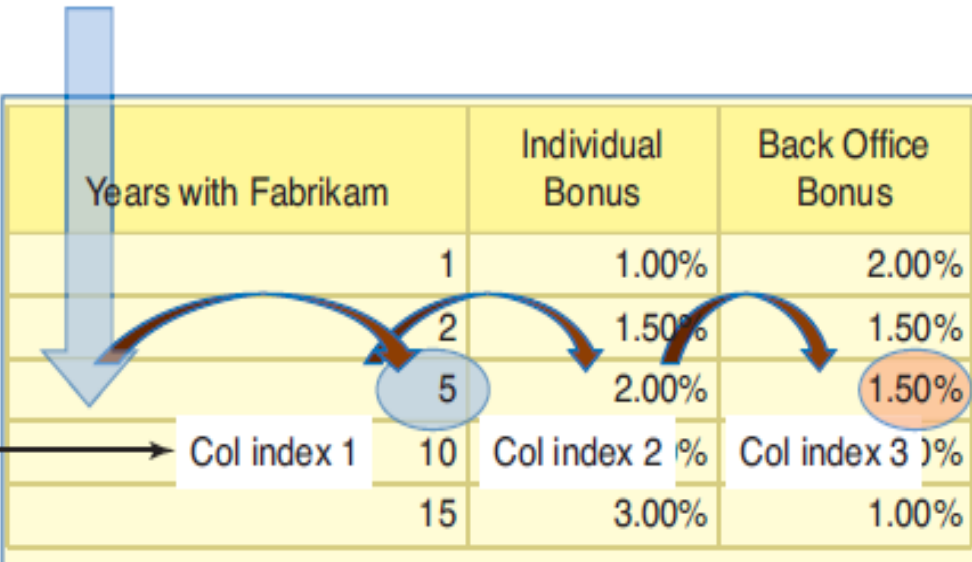
1) VLOOKUP goes vertically down first column until there is a match with lookup_value


 VLOOKUP(lookup_value, table_array, col_index_num)
 VLOOKUP(5, Commission, 3) = 1.50%

1 is first column →

Years with Fabrikam	Individual Bonus	Back Office Bonus
1	1.00%	2.00%
2	1.50%	1.50%
5	2.00%	1.50%
10	3.00%	1.00%
15	3.00%	1.00%

Col index 1 Col index 2 Col index 3



Table_array is range called
Commission

2) Then goes over to the col_index_num

VLOOKUP & HLOOKUP cont's

- The “H” in HLOOKUP stands for horizontal. HLOOKUP searches horizontally for a value in the top row of a table or an array and then returns a value in the same column from a row you specify in the table or array.
- Use HLOOKUP when the comparison values are located in a row across the top of a table of data and you want to look in a specified row

Using HLOOKUP



HLOOKUP(lookup_value, table_array, row_index_num)
HLOOKUP("Feet", Properties, 3) = 1000

1) HLOOKUP goes horizontally across first row until there is a match with lookup_value

	Beds	CO2	Exits	Feet
1	1	1	2	500
2	1	1	2	1000
3	2	2	2	1500
4	2	2	3	2000
5	3	3	3	2500
6	3	3	3	3000

2) Then goes down to the row_index_num

1 is first row

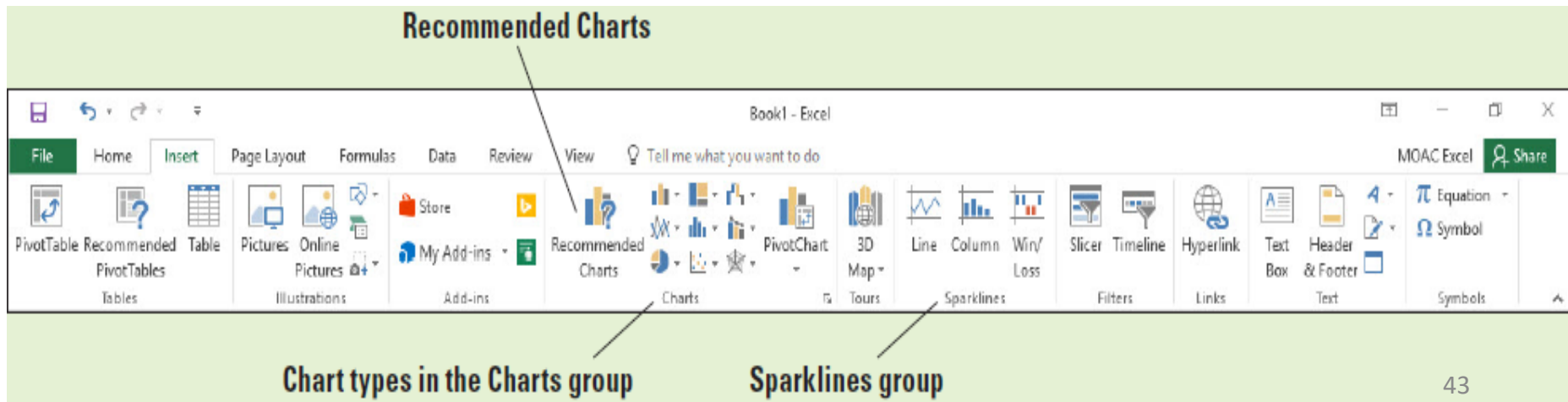
2 is second

3 is third row

Table_array is range called Properties

Creating Charts

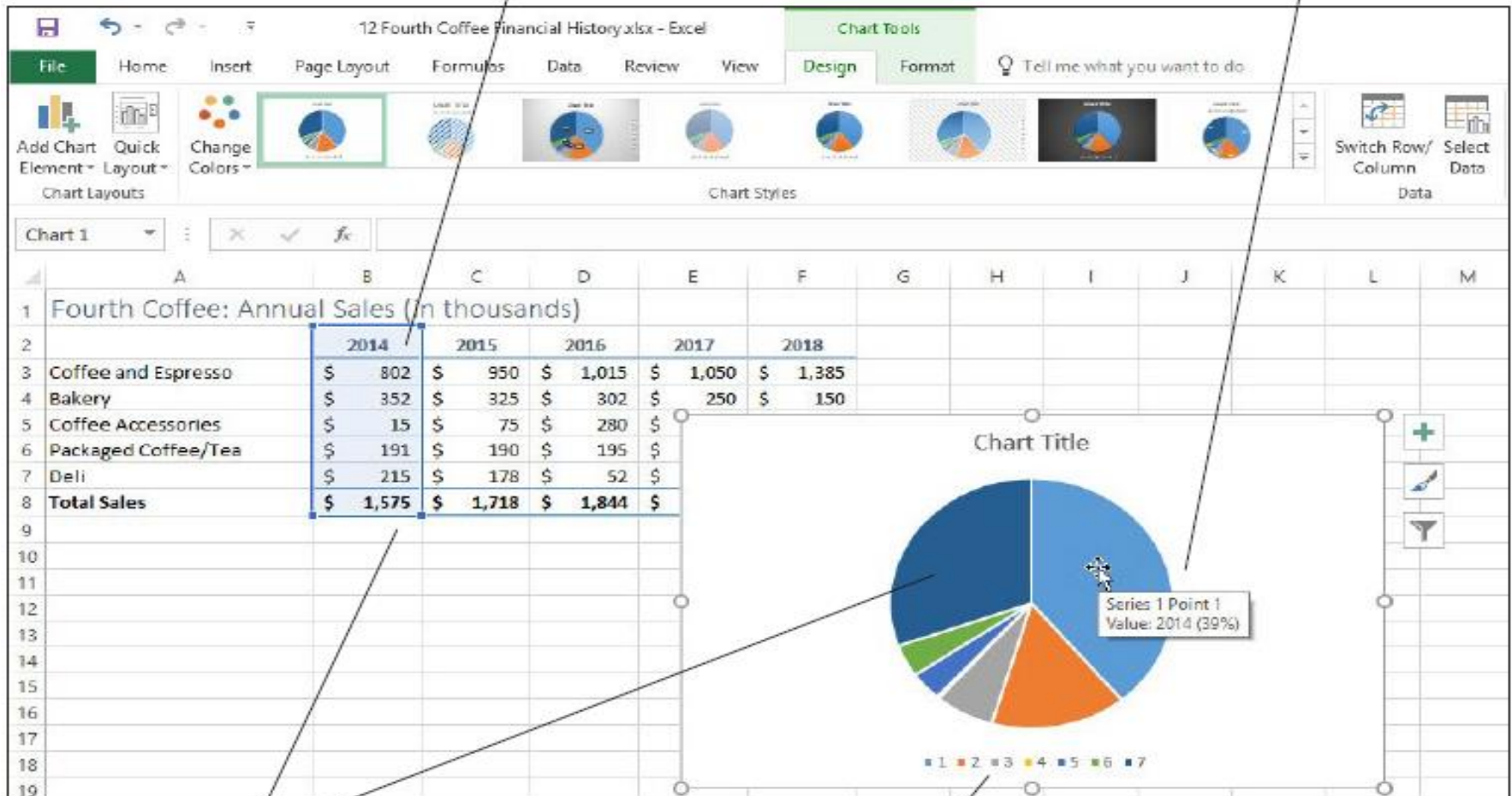
- A **chart** is a graphical representation of numeric data in a worksheet. Data values are represented by graphs with combinations of lines, vertical or horizontal rectangles (columns and bars), points, and other shapes.
- The Insert tab contains the command groups you'll use to create charts in Excel



Creating Charts

Selected data range

2014 should be a label instead of a pie slice



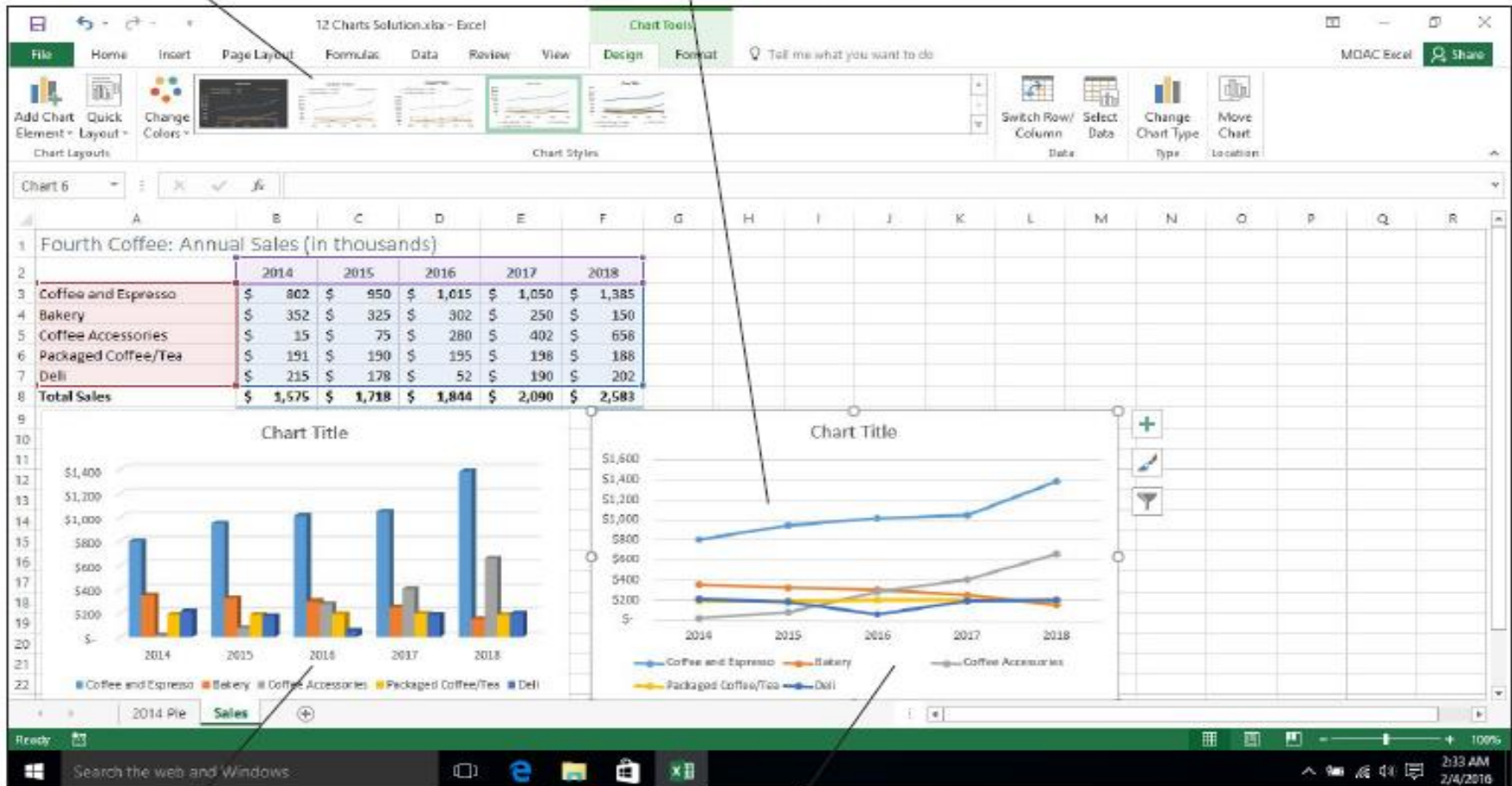
1575 is a total and should not be a slice

Numbers identify pie slices

Creating Charts

Tools on Design tab change to show options for line chart type

Line chart emphasizes trends



Column chart emphasizes differences between columns

Active line chart

Sources

- Bucki, L. A. (2013). *Microsoft® Word® 2013 Bible*, John Wiley & Sons: Inc. Indianapolis, IN
- Michael Alexander, M. & Kusleika, D. (2019). *Excel® 2019 BIBLE*, John Wiley & Sons Inc.: Indianapolis, IN
- **Free Computer Tutorials:**
<http://www.homeandlearn.co.uk/excel2007/Excel2007.html>
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<https://support.office.com/>