C-International Research Consultancy

Promoting integrity in research and mentoring researchers across the globe

Research Methodology Workshop

Module 2

Basic Skills in MS Excel

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Outline

- Features of MS Excel Workbook
- Entering Data
- Editing Data
- Formatting Data
- Formulas & Use of Functions
- Creating Charts in MS Excel
- Data Manipulation
- Generating Random Numbers and Randomization into Groups

FEATURES OF MS EXCEL WORKBOOK

Brief history

- In 1978, Havard Business School's student Dan Bricklin (the father of Modern Day Spreadsheets) had to do some analysis task for his case study.
- He had only two options, either to do it manually or use a clumsy mainframe program, and so he thought there must be a better way.
- He envisioned "an electronic blackboard and electric chalk in a classroom".
- By the fall of 1978, *Dan Bricklin* had programmed the first working prototype of his concept which he named **VisiCalc** (for visible calculator).
- It was a relatively small program with few basic capabilities. It could only calculate data within a matrix of 5 columns and 20 rows.
- He later hired *Bob Frankston* who made the program faster and with better arithmetic, and the program became an instant success.

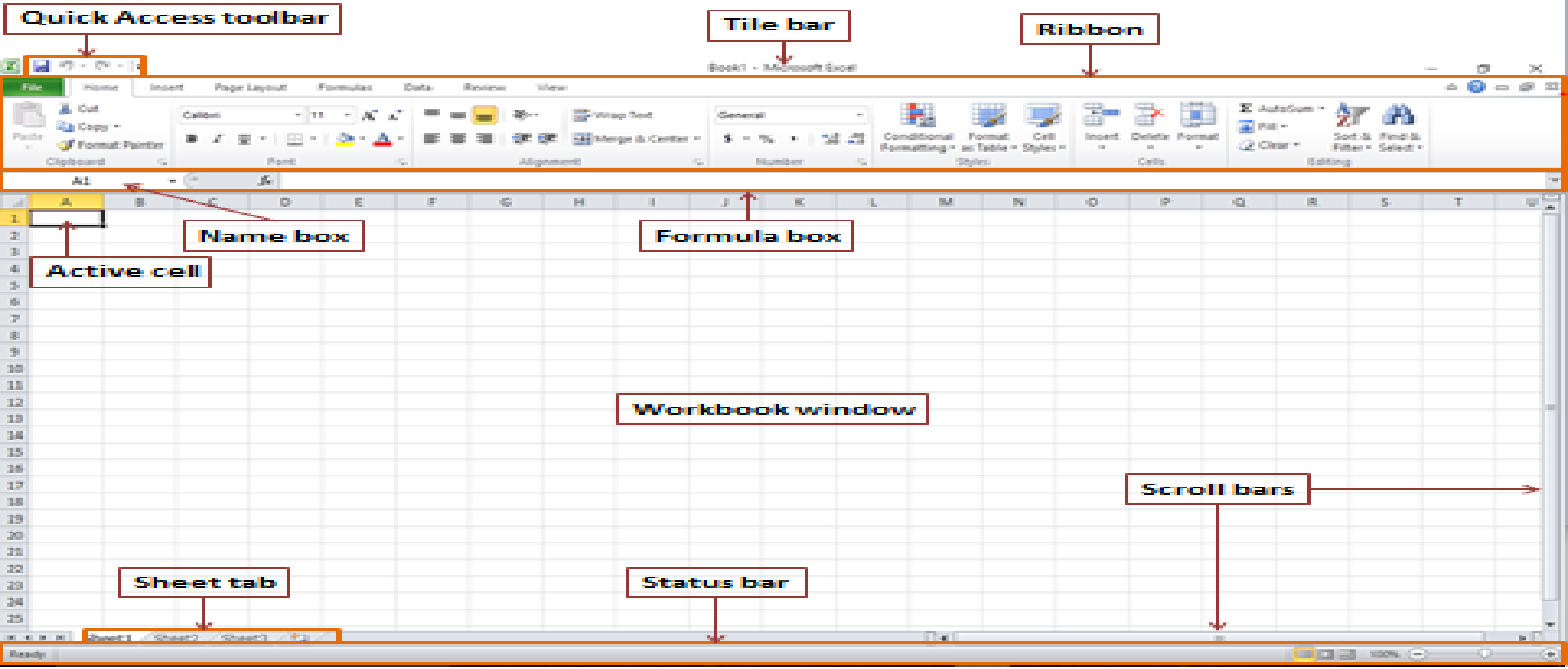
Brief history contd.

- In 1980, *Sorcium* developed a spreadsheet application called **SuperCalc**.
- In 1982, *Microsoft* developed a spreadsheet application called **Muliplan**. It differs from VisiCalc by using R1C1 addressing instead of A1 addressing used by VisiCalc.
- In 1983, a team headed by *Mitch Kapor* bought VisiCalc and developed a more sophisticated spreadsheet called **Lotus 1-2-3** (with charting, graphing and rudimentary database capabilities along with the basic arithmetic).
- Lotus 1-2-3 became a new favorite in the industry, and outshined Microsoft's Muliplan that was launched the previous year.
- In 1985, in annoyance *Microsoft* developed another spreadsheet program called **Microsoft Excel** (Excel 1.0), and periodically released newer versions(1987, Excel 2.0; 1990, Excel 3.0; 1992. Excel 4.0;…….Ms Office 2007, 2010, 2013, 2016) to maintain their lead in the industry.

Starting MS Excel

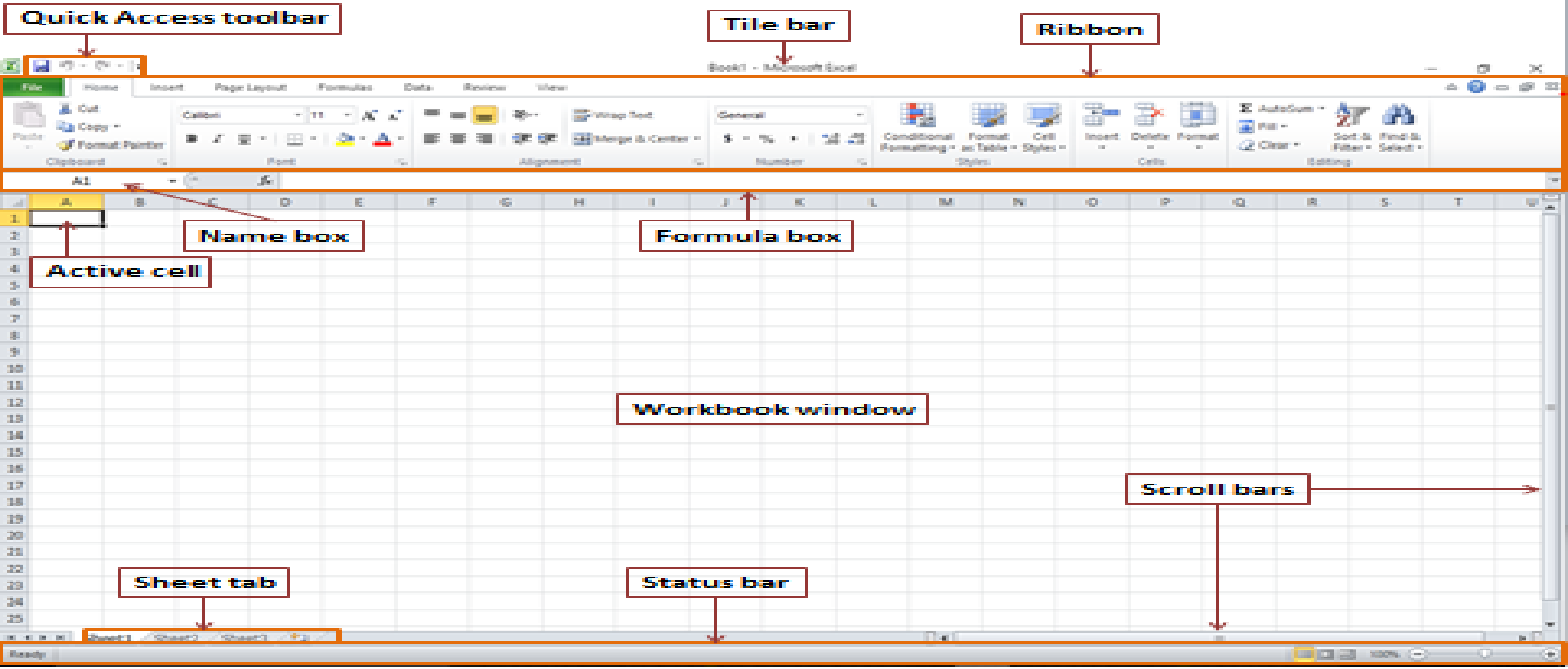
- Double click on the MS Excel icon (if you have it on your desktop).
- Alternatively, click the start button and then select:

  All programs > Microsoft Office > Microsoft Excel
- A new empty workbook (consisting of three worksheets) will be displayed on your screen (as shown in the next slide).



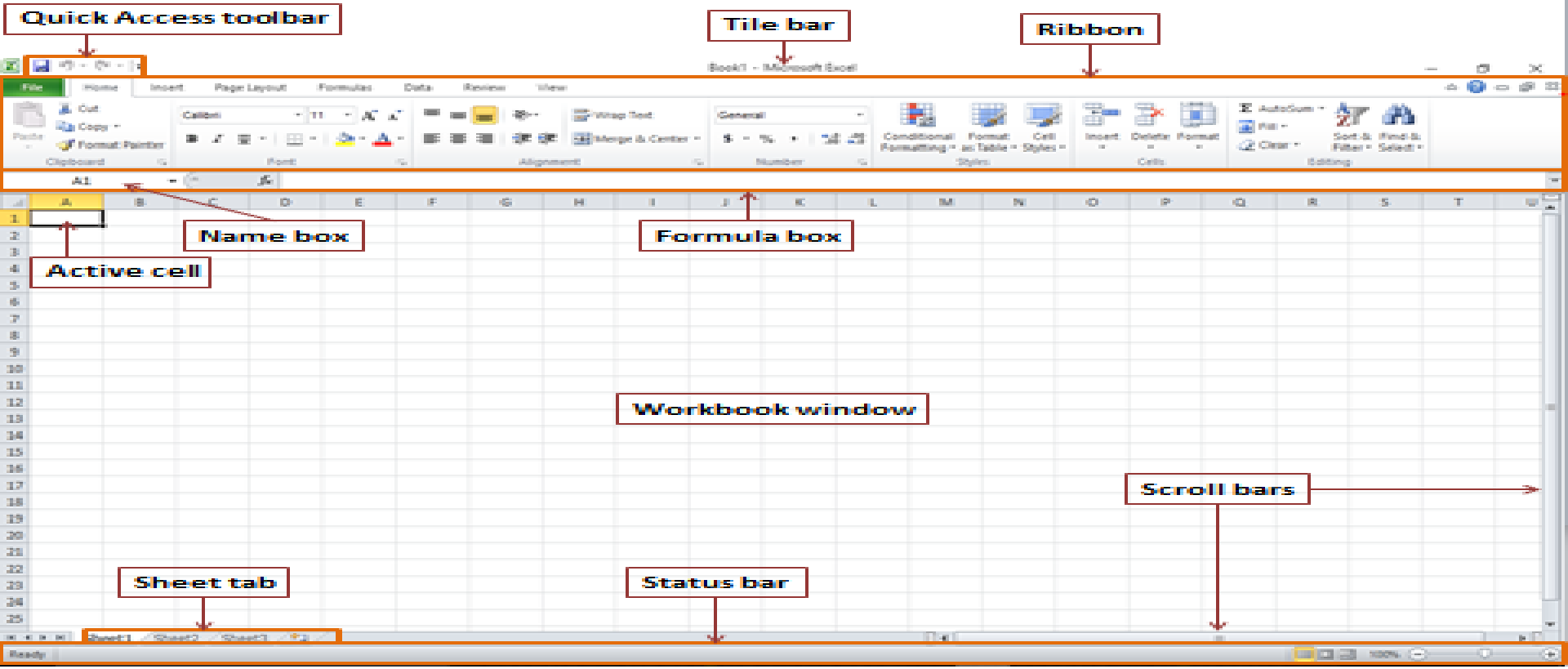
Features of MS Excel Workbook

- **Title bar**: Appears at the top of the program window and displays the name of the workbook and program. The buttons on the right side of the Title bar are used to minimize, restore and close the program window.
- **Quick Access toolbar**: Appears on the left side of the Title bar and contains frequently used commands that are independent of the tab displayed on the Ribbon.
- **Ribbon**: Extends across the top of the program window, directly below the Title bar, and consists of a set of tabs, each of which contains groups of related commands.



Features of MS Excel Workbook contd.

- **Formula bar**: Appears below the Ribbon and displays the data or formula stored in the active cell. It can also be used to enter or edit a formula, a function, or data in a cell.
- **Name box**: Appears on the left side of the Formula bar and displays the active cell address or the name of the selected cell, range , or object.
- **Workbook window**: Appears below the Formula bar and displays a portion of the active worksheet.



Features of MS Excel Workbook contd.

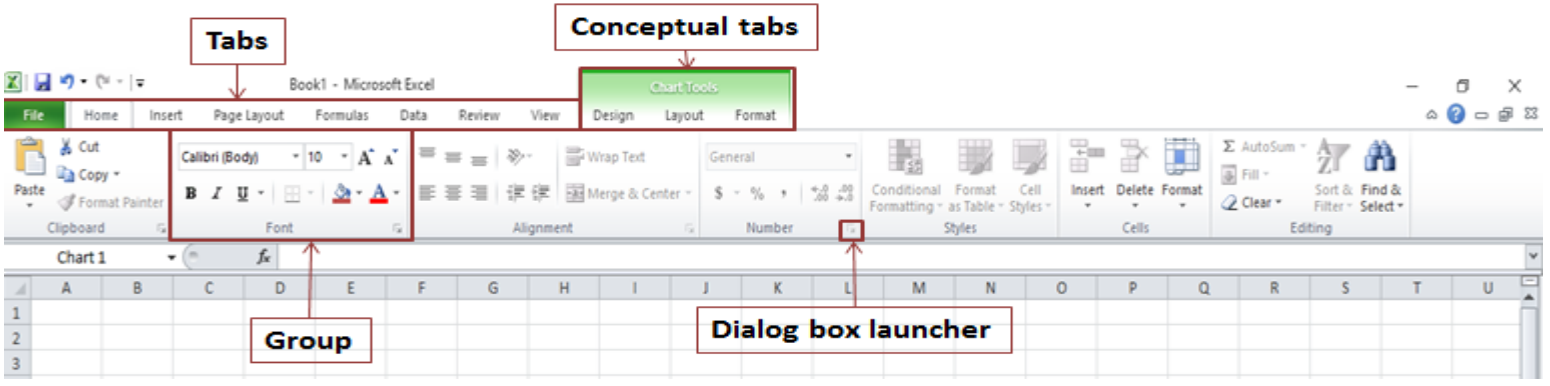
- **Sheet tab**: Each tab represents a different worksheet in the workbook. A workbook can have any number of worksheets, and each worksheet has its name displayed on its tab.
- **Scroll bars**: Appear along the right side and bottom of the workbook window and enable you to scroll through the workbook.
- **Status bar**: Appears at the bottom of the program window and displays various messages. The tools on the right side of the Status bar can be used to display the worksheet in a variety of views and to change the magnification of the worksheet.

Quick Access toolbar

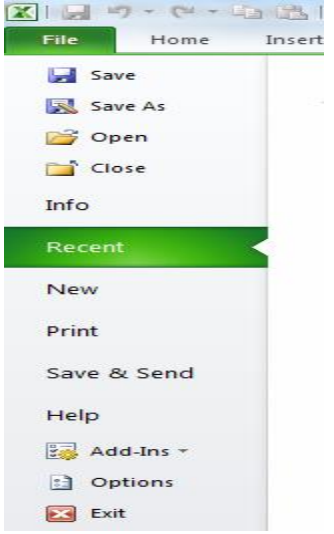
- The Quick Access toolbar provides one-click access to commonly used command and options.
- By default, it is located on the left side of the Title bar and displays the Save, Undo, and Redo buttons.
- ***To add a command to the Quick Access toolbar***:
  On the **Ribbon**, right-click the command that you want to add, and then click **Add to Quick Access toolbar** on the shortcut menu.
- ***To remove a command from the Quick Access toolbar***:
  On the **Quick Access toolbar**, right-click the command that you want to remove, and then click **Remove from Quick Access toolbar** on the shortcut menu.
- ***To customize the Quick Access toolbar***:
  On the arrow on the right side of the **Quick Access toolbar**, a menu which Includes additional commands and options that can be used to customize the toolbar is displayed. Select the item(s) of your choice.

Ribbon

- The Ribbon is designed to help you quickly find the commands that you need to complete a task.
- It consists of a set of task-specific tabs. The main tabs are visible at all times; other tabs, known as contextual tabs, appear only when you create or select certain types of objects (e.g., images, tables, charts). These tabs are indicated by colored headers and contain commands that are specific to working the selected object.
- Clicking a tab displays a set of related commands that are organized into logical groups.
- A dialog box launcher appears in the lower-right corner of most groups on the Ribbon. Clicking it opens a related dialog box or task pane which offers additional options or more precise control than the commands available on the Ribbon.
- If a command on the Ribbon appears dimmed, it is unavailable.



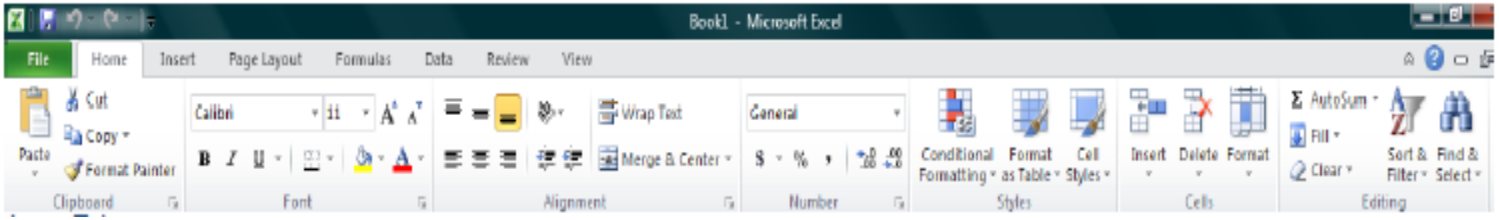
Ribbon tabs



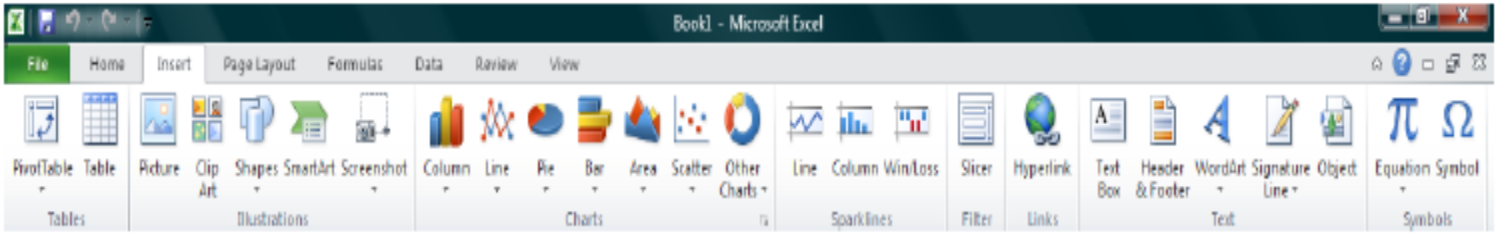
- **File tab**: This tab displays the backstage view which contains commands related to managing files and customizing the program. The File tab replaces the Microsoft Office button and File menu used in earlier releases of Microsoft office.

  Clicking on the File tab displays a dialog box which contains options such as Save, Save As, Open, Close, Info, Recent, New, Print, Save & Send etc.

- **Home tab**: This is the most used tab; it incorporates all text and cell formatting features such as font and paragraph changes. It also includes basic spreadsheet formatting elements such as text wrap, merging cells and cell style.

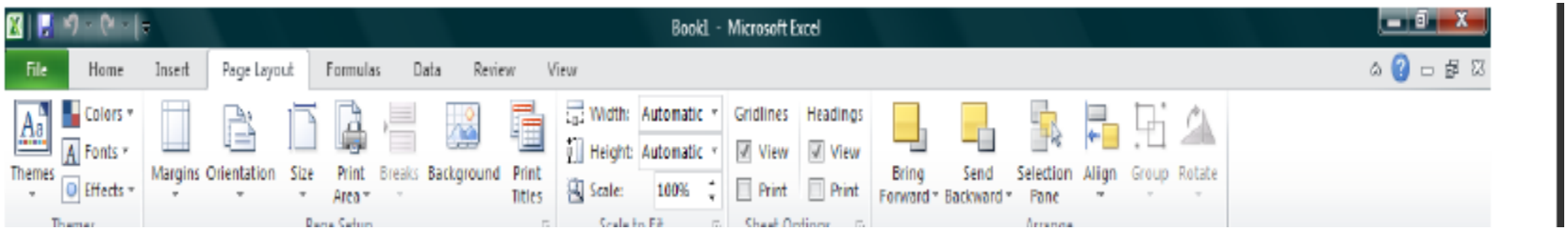


- **Insert tab**: This tab allows you to insert a variety of items into a document from pictures, clip art, and headers and footers.

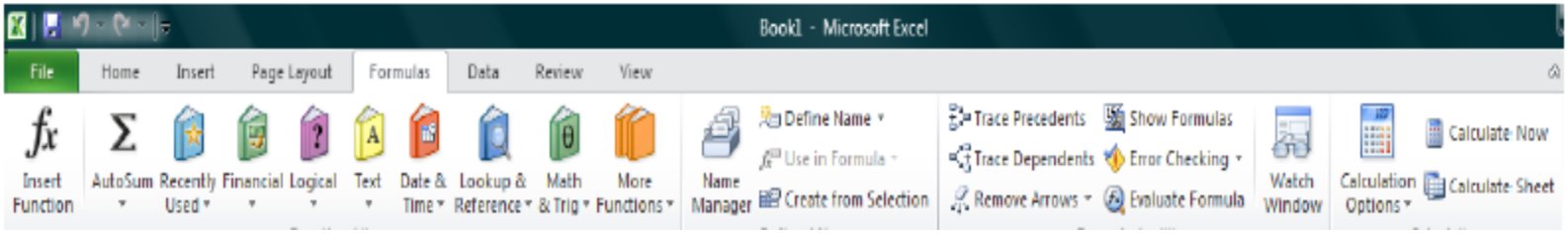


Ribbon tabs contd.

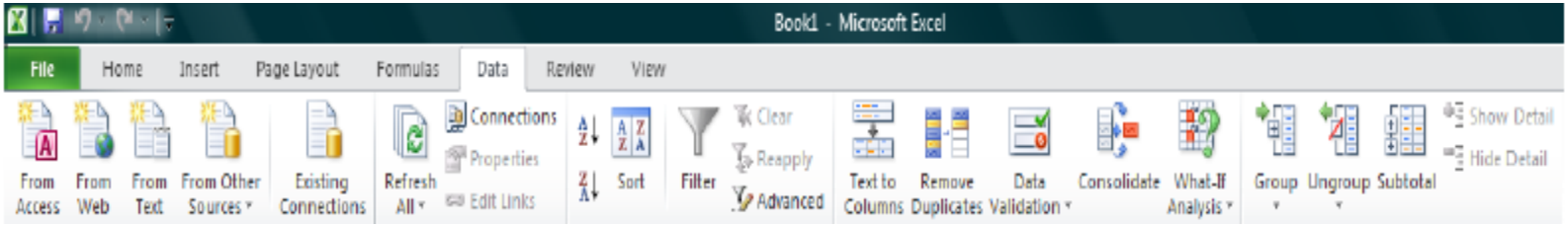
- **Page Layout tab**: This tab has commands to adjust page such as margins, orientation and themes. The commands affect the overall appearance of a worksheet.



- **Formulas tab**: This tab has commands to use when creating formulas. The tab has an immense function library which can assist when creating any formula or function in your spreadsheet.



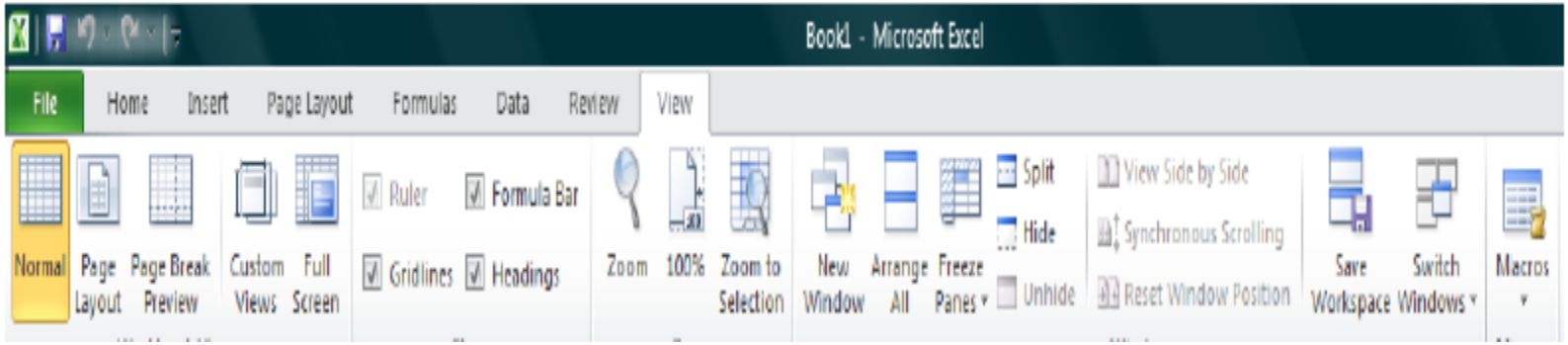
- **Data tab**: This tab allows you to modify worksheets with large amounts of data by sorting and filtering as well as analyzing and grouping data.



Ribbon tabs contd.

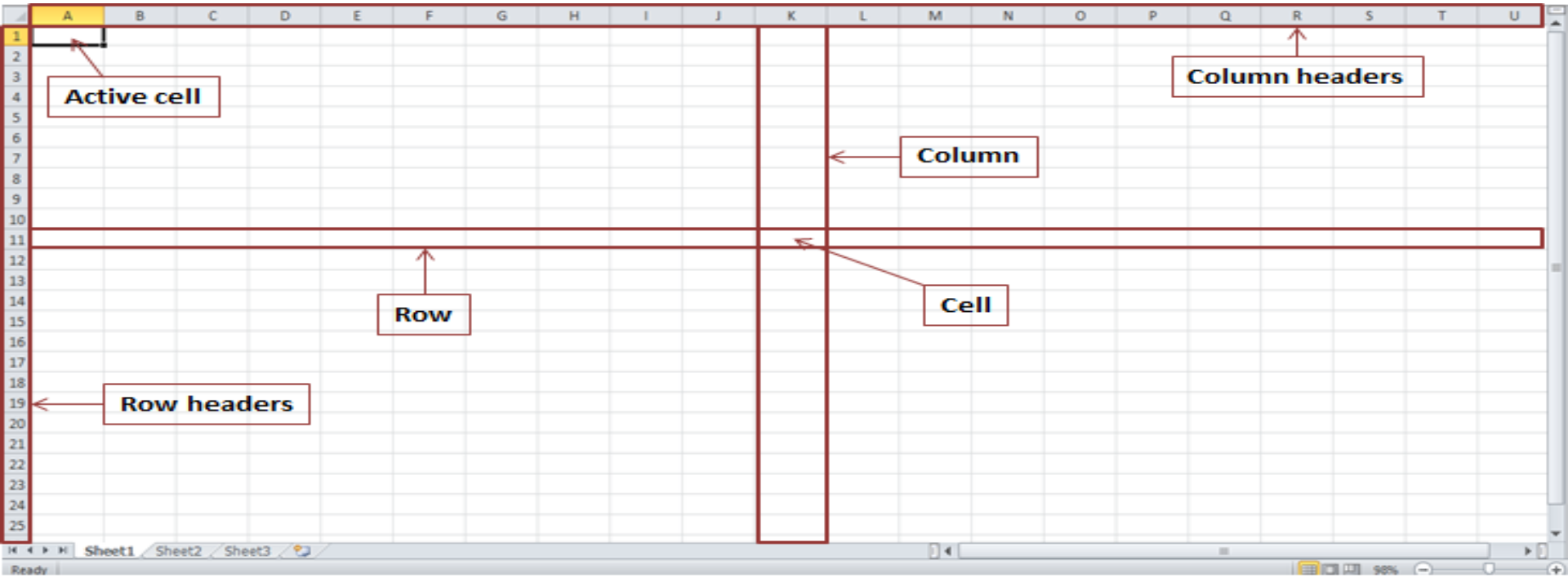
- **Review tab**: This tab allows you to correct spelling and grammar issues as well as set up security protections. It also provides the track changes and notes feature providing the ability to make notes and changes to someone's documents.

- **View tab**: This tab allows you to change the view of your document including freezing or splitting panes, viewing gridlines and hide cells.



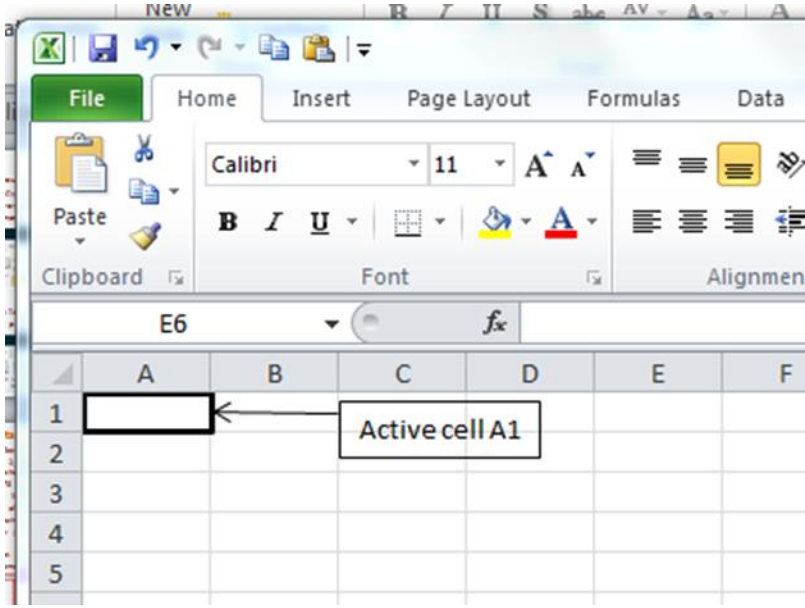
Workbooks / Worksheets

- An Excel file is called a workbook. Each new workbook contains three blank worksheets (named Sheet 1, Sheet 2, and Sheet 3); you can insert additional worksheets or delete existing worksheets as needed.
- Each worksheet consists of 1,048,576 rows (numbered 1 through 1,048,576) and 16,284 columns (labelled A through XFD).
- The box formed by the intersection of a row and a column is called a cell.

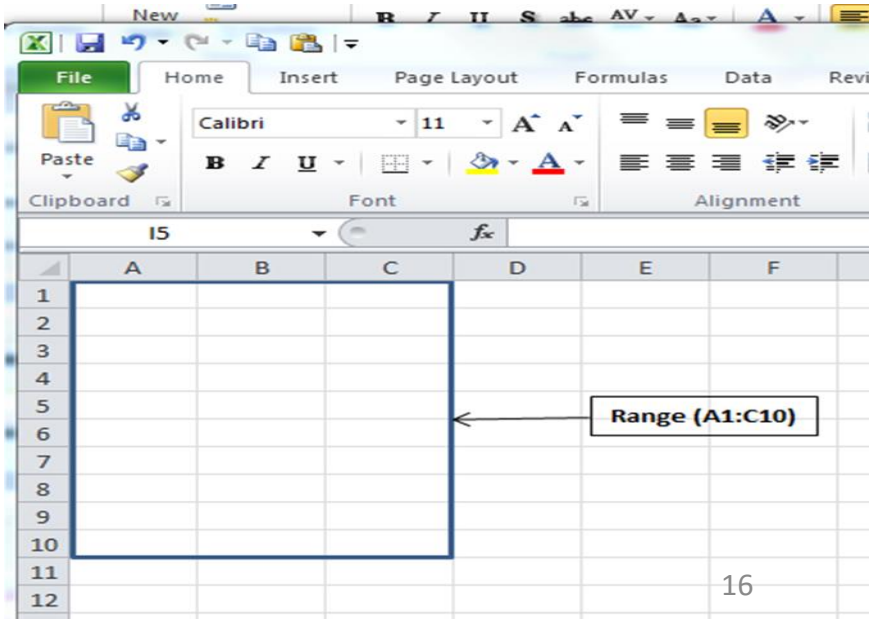


Workbooks / Worksheets contd.

- Cells are used to store data, and each cell is identified by its address which consists of its column letter and row number (e.g., cell A1 is the cell in the first column and first row).
- Only one cell can be active at a time. The active cell has a thick black border around it and its address appears in the Name box on the left side of the Formula bar.



- A group of cells is called a range.
- A range is identified by the addresses of the cells in the upper-left and lower-right corners of the selected block of cells, separated by a colon (e.g., A1:C10).



Navigating within a worksheet

- Use the arrow keys, or [PAGE UP] and [PAGE DOWN], to move to a different area of the screen.
- [CTRL] + [HOME] will take you to cell A1.
- [CTRL] + [PAGE DOWN] will take you to the last row (i.e., 1048576) on the worksheet, and [CTRL] + [PAGE UP] will bring you back to the first row.
- **To go to a specific cell**:

  Press [F5], the 'go to dialog box' will appear, type in the address of the desired cell, and click OK.

  Alternatively, type the cell address in the name box above column A and press [ENTER].

To select cells

- Use the arrow keys to move to the desired cell.
- To select multiple cells, hold down the [SHIFT] key while the first cell is active, and then use the arrow keys to select the rest of the range.

Selecting rows

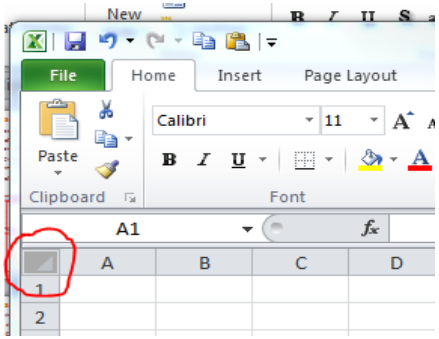
- To select all the cells in a particular row, just click on the row number (1,2,3, etc.) at the left edge of the worksheet.
- Hold down the [SHIFT] key and then use the arrow keys to select multiple adjacent rows.
- Hold down [CTRL] key if you want to select a set of non-adjacent rows.

Selecting columns

- To select all cells in a particular column, click on the column heading (A,B,C, etc.) at the top edge of the worksheet.
- Hold down the [SHIFT] key and then use the arrow keys to select multiple adjacent columns.
- Hold down [CTRL] if you want to select a set of non-adjacent columns.

To select all the cells in a worksheet

- Click on the square to the immediate left of Column A heading (just above the label for Row 1).
- Alternatively, you can also press [CTRL] + [A]



Closing MS Excel

- Click the **File** tab, and then click **exit**, or click on the **Close Window button** in the upper right corner of the program window. If you have unsaved data you will be prompted to save the changes before exiting.

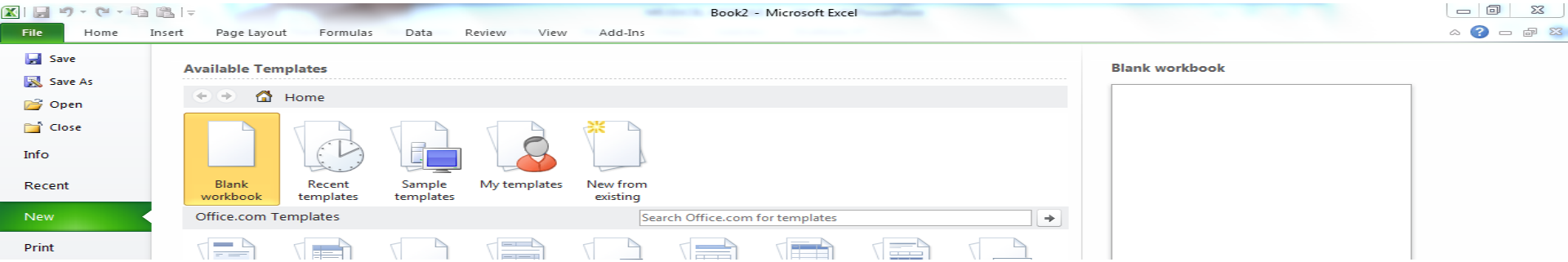
ENTERING DATA

Get a workbook

- Before you start entering data, you need to decide whether this is a completely new project deserving a workbook of its own, or whether the data to be entered relates to an existing workbook.

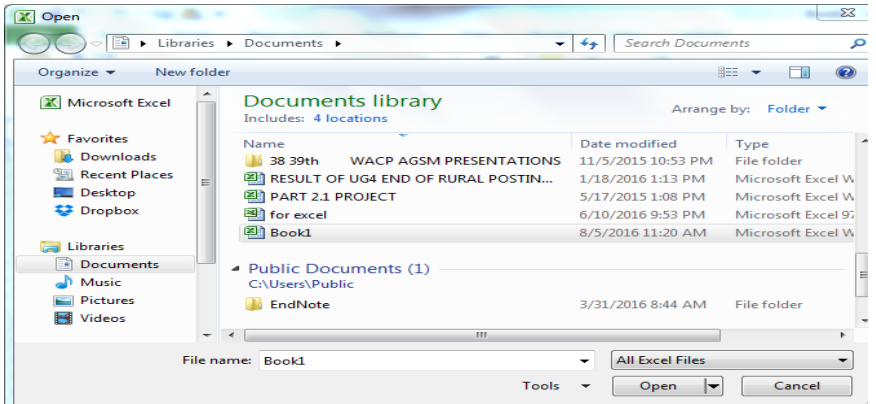
To create a new workbook from inside Excel:

- Click on the **File** tab, select **New** and then double click **Blank workbook**.
- ***Sheet 1*** of a new workbook will be displayed on your screen, with cell A1 active



To open an existing workbook from inside Excel:

- Click on the **File** tab, click **Open**, and then navigate to the drive and folder containing the file you want to open.
- Double-click on the required file name (or click **Open**).

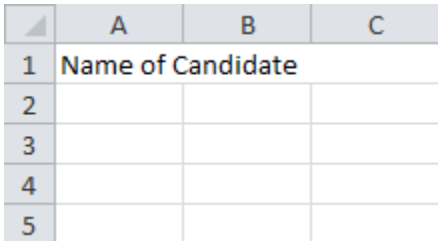


Types of data /Entering text

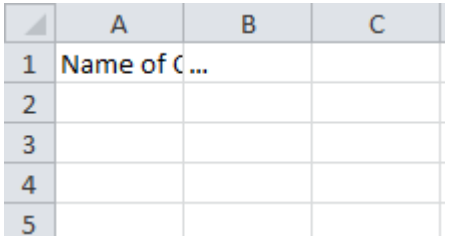
- Different types of data can be entered into the cells on a worksheet. these include text, numbers and dates.

Entering text:

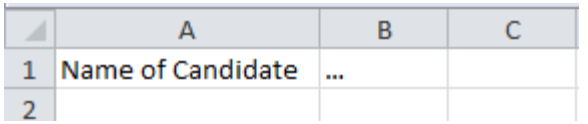
- You can enter text in a worksheet to serve as label for values, headings for columns, or instructions about the worksheet.
- Text is defined as any combination of letters (i.e, alphabets) and numbers.
- Text automatically aligns to the left in a cell.
- If you enter text that is longer than its column's current width, the excess characters appear in the cell to the right, as long as the cell is empty.



- If the adjacent cell is not empty, the long text entry appears truncated at the cell border.



- The characters are not actually deleted and will appear if the width of the column is adjusted to accommodate the long text entry.



Entering text contd.

To enter text:

- Select the cell in which you want to enter text.
- Type the desired text.
- Press [ENTER] to move to the next row, or [TAB] to move to the next column.

  Until you've pressed [ENTER] or [TAB], you can cancel the entire data entered into the cell by pressing [ESC], or cancel the data one by one by pressing [BACKSPACE].

To enter a line break in a cell:

- Select the cell and type the desired text in the first line
- Press [ALT] + [ENTER] and type the desired text in the next line, and then continue like that for the subsequent lines.

	A	B	C
1	Name of Candidate	Date passed Primary Exam: Date passed Part I Exam: Date passed Part II Exam:	
2			

Entering text contd.

- In addition to alphabetic characters and numbers, text can also include punctuation marks and special characters (like check marks).

	A	B	C	D
1	Name of resident	E-mail Address	Attended computer skills tutorial	
2	Dr New Resident	drnew2016@gmail.com	√ (or Yes)	
3	Dr Old Resident	drold2014@yahoo.com	x (or No)	
4				

- Text fields are not included in numeric calculations.
- If you want Excel to treat a number as text, then you should precede the number with a single quotation mark (‘). This can be useful when entering for example a phone number that starts with 0, since leading zeros are not displayed for Excel numbers.

	A	B	C	D
1	**Name of resident**	**GSM number**		
2	Dr New Resident	01034447022	←	**(') inserted before the numbers: the numbers were recognized as text and aligned to the left, the number 0 before 1 was retained**
3	Dr Old Resident	1034447011	←	**(') not inserted before the numbers: the numbers were recognized as numbers and aligned to the right, the number 0 before 1 was not retained**
4				

Entering numbers

- Numeric entries contain only numbers and are automatically aligned to the right in a cell.
- Numbers can exist as independent values, or they can be used in formulas to calculate other values.
- You can enter whole numbers (such as 1, 10, or 100),decimals (such as 0.1, 0.5, or 0.9), negative values (such as -1, -10, or -100), percentages (such as 10% or 50%), and currency values (such as ₦500, or ₦1000).
- Numbers automatically aligns to the right in a cell.
- A number that does not fit within a column is displayed as "#######" or displays the first few digits and indicate that there are still other digits not displayed e.g., "9.91E+10"

	A	B	C
1	Name of Student	Adm No:	
2	Sule Ishola Chukwuemeka	9.91E+10	
3			

To accommodate the number, increase the column width.

	A	B	C
1	Name of Student	Adm No:	
2	Sule Ishola Chukwuemeka	9911700760	
3			

- .

Entering numbers contd.

To enter a number:

- Select the cell in which you want to enter the number.
- Type the desired number.
- Press [ENTER] to move to the next row, or [TAB] to move to the next column.
  Until you've pressed [ENTER] or [TAB], you can cancel the entire data entered into the cell by pressing [ESC], or cancel the data one by one by pressing [BACKSPACE].

To enter a line break in a cell:

- Select the cell and type the desired number in the first line
- Press [ALT] + [ENTER] and type the desired number in the next line, and then continue like that for the subsequent lines.

	A	B
1	Name of Student	Scores
2	Sule Ishola Chukwuemeka	CAT 1: 67 CAT 2: 51 CAT 3: 60 CAT 4: 56
3		

Entering Dates and Time

- Excel treats dates and time as special type of numeric values.

To enter a date:

- Select the cell in which you want to enter the date.
- Type the day, month, and year, with each number separated by a forward slash (/) or a hyphen (-), and then press the **Enter** key.

To enter a time:

- Select the cell in which you want to enter the time.
- Type the hour, a colon (:), and the minutes, press the **Spacebar**, type **a** for A.M. or **p** for P.M., and then press the **Enter** key.

	A	B	C	D
1	RECORDS OF ECLIPSE OF THE SUN			
2	Date	Time		
3	23/02/1960	1:35 AM		
4	15/06/1975	3:15 PM		
5	28/11/2001	2:40 PM		
6	14/05/2011	5:25 AM		
7	13/10/2015	9:15 PM		
8				

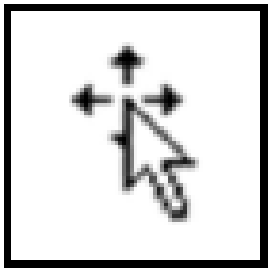
Deleting data

To delete data that's already entered into a worksheet:

- Select the cell or cells containing the data to be deleted.
- Press the [DELETE] key on the keyboard.
- The cells remain in the same position as before but their contents are deleted

Moving data:

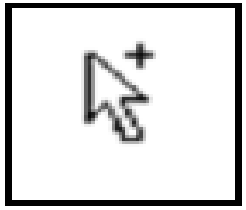
- To move an already entered data to a different area of the worksheet.
- Select the cells to be moved (they will become highlighted).
- Move the cursor to the border of the highlighted cells. When the cursor changes from a white cross to a four-headed arrow (the move pointer), hold down the left mouse button.
- Drag the selected cells to a new area of the worksheet, then release the mouse button.



Copying data

To copy existing cell content to another area of the worksheet:

- Select the cells you want to copy (they will become highlighted)..
- Move the cursor to the border of the highlighted cells while holding down the [CTRL] key. When the cursor changes from a white cross to a hollow left-pointing arrow (the copy pointer), hold down the left mouse button.



- Drag the selected cells to a second area of the worksheet (where you want to paste the cells), then release the mouse button.

You can also copy the selected data using the **copy** option on the **Home** tab or [CTRL] + [C]. Then click in the top left cell of the destination area and paste the data with the **paste** option or [CTRL] + [V].

Copying data contd.

To copy the contents of one cell to a set of adjacent cells:

- Select the initial cell and then move the cursor over the small square in the bottom right-hand corner (the fill handle). 

- The cursor will change from a white cross ✚ to a black cross ✚.
- Hold down the left mouse button and drag to a range of adjacent cells. The initial cell contents will be copied to the other cells.
- If the original cell contents end with a number, the number will be incremental in the copied cells.

	A	B	C	D	E	F	G
1	RECORDS OF ECLIPSE OF THE SUN						
2	Date	Time					
3	23/02/1960	1:35 AM	2:35 AM	3:35 AM	4:35 AM	5:35 AM	6:35 AM
4	15/06/1975	3:15 PM					
5	28/11/2001	2:40 PM					
6	14/05/2011	5:25 AM					
7	13/10/2015	9:15 PM					
8							

Copying data contd.

Using AutoFill:

- This makes it easy to repeat a data series (such as the days of the week, months of the year, or a numbers series such as odd numbers) over a range of cells.
- Enter the start of the series into a few adjacent cells (enough to show the underlying pattern).
- Select the cells that contain series data.
- Move the cursor over the small square in the bottom right-hand corner of the selection (the fill handle). Hold down the left mouse button and drag to a range of adjacent cells.
- The target cells will be filled based on the pattern of the original series cells.

Saving the workbook:

- Click the **File** tab and select **Save**, or click the Save icon on the Quick access toolbar. If the workbook has been saved before, the workbook will be saved again with the same name and location.
- If it's the first time of saving the workbook, then the **Save As** dialogue box will open.
- Click the drop-down arrow next to **Save In** to select the desired drive and folder.
- Type the new file name in the **File name** field.
- Click the **Save** button.

EDITING DATA

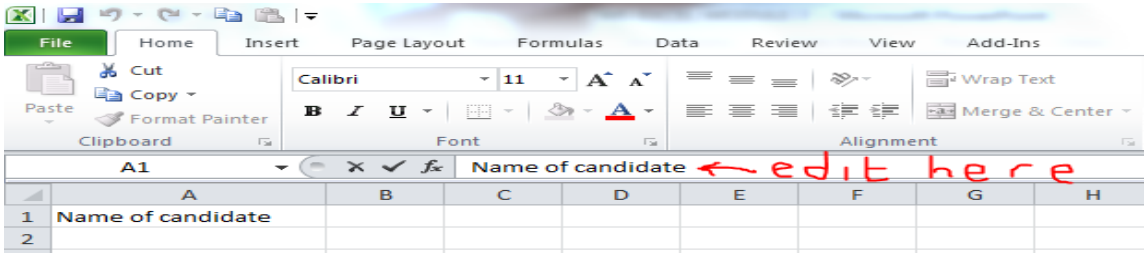
Editing cell contents

- In data entry mode, when you move the cursor to a new cell, anything you type replaces the previous cell contents.
- Edit mode allows you to amend existing cell contents without having to retype the entire entry.
- While in the edit mode, many of the Ribbon commands are disabled.

To enter edit mode:

The ways to enter edit mode include:

- Double-click (with the left mouse button) on the cell whose contents you want to edit.
- Click to select the cell you want to edit and press [F2] key.
- Click to select the cell you want to edit, and then click anywhere in the formula bar. Edit the cell contents as displayed in the formula bar.



Editing cell contents contd.

To edit cell contents:

- To delete characters, use the [BACKSPACE] key to delete the cell contents to the left of the cursor; or [DELETE] key to delete the cell contents to the right of the cursor.
- To insert characters, click where you want to insert them and type.
- To force a line break within the current cell contents, press [ALT] + [ENTER].

To exit edit mode:

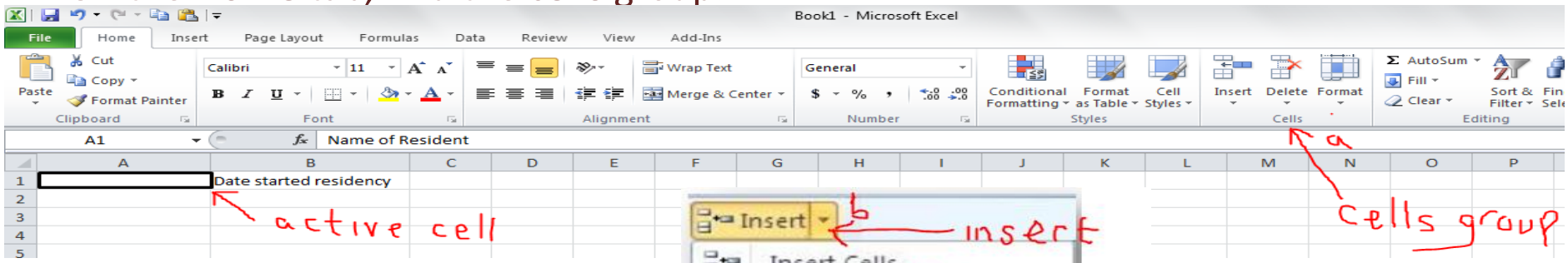
- Exit edit mode by pressing [ENTER].

Inserting or deleting cells

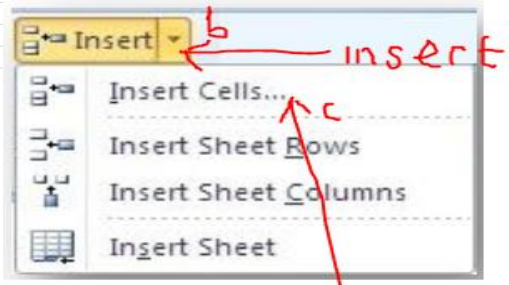
- A new cell can be inserted above the current active cell, in which case the active cell and those below it will each move down one row.
- A new cell can also be inserted to the left of the current active cell, in which case the active cell and those on its right will each move one column to the right.

To insert a cell:

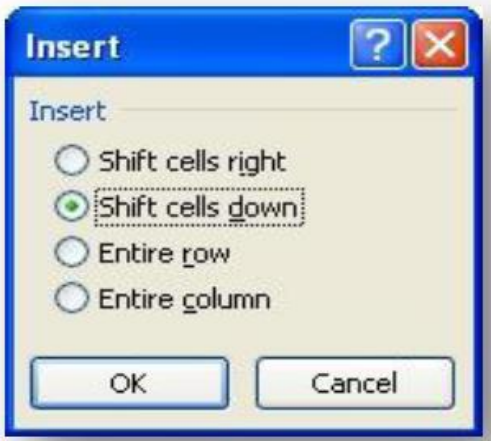
- Select the cell next to which you want to insert a new cell
- On the **Home** tab, find the **cells** group.



- Click **insert** followed by **insert cells**.



- A dialog box will open. Click the direction in which you want the surrounding cells to shift, and click **OK**.

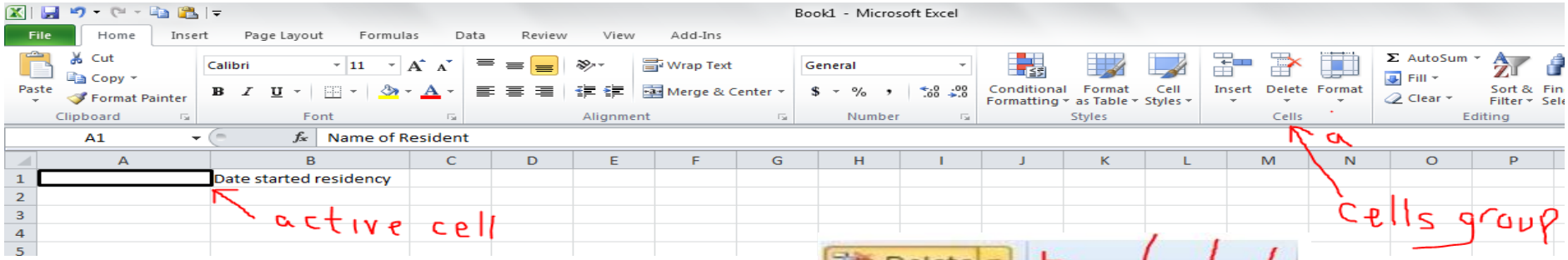


Alternatively: You can right-click on the active cell and select **Insert** on the pop-up menu.

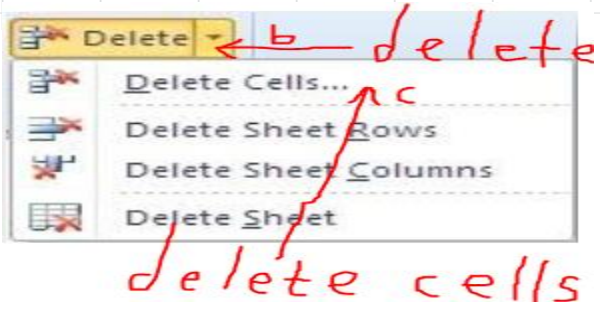
Inserting or deleting cells contd.

To delete a cell:

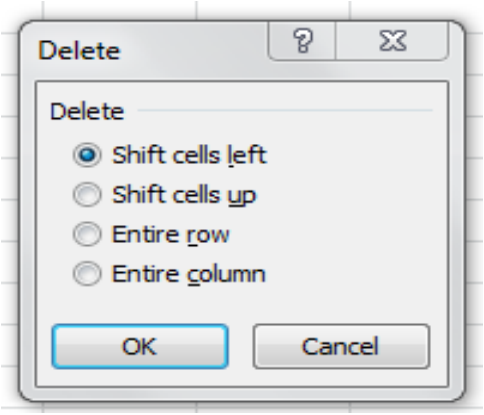
- Select the cell that you want to delete.
- On the **Home** tab, find the **cells** group.



- Click **delete** followed by **delete cells**.



- A dialog box will open. Click the direction in which you want the surrounding cells to shift, and click **OK**.



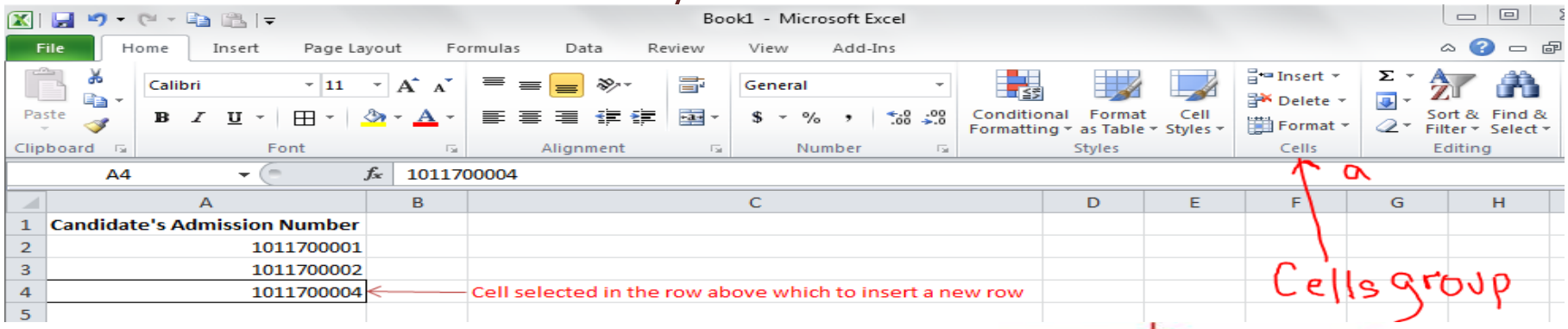
Alternatively: You can right-click on the active cell and select **Delete** on the pop-up menu

Inserting or deleting rows

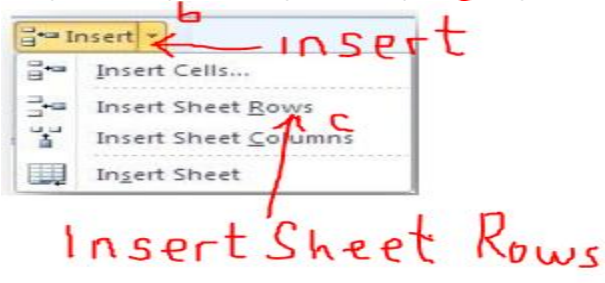
- When you insert a row, the new row will be positioned above the row containing the active cell.

To insert a row:

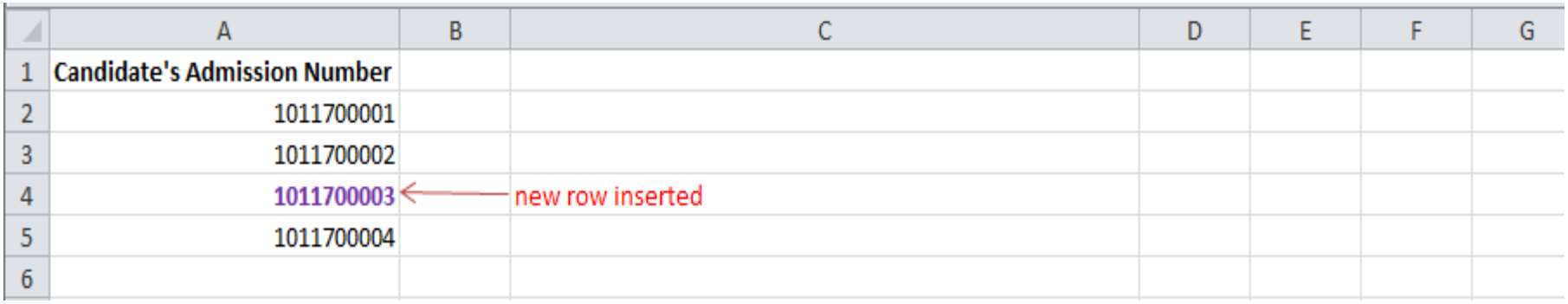
- Select a cell in the row above which you want to insert a new row



- On the **Home** tab, find the **Cells** group and click **Insert** followed by **Insert Sheet Rows**.



- A new row will be inserted above the current row.

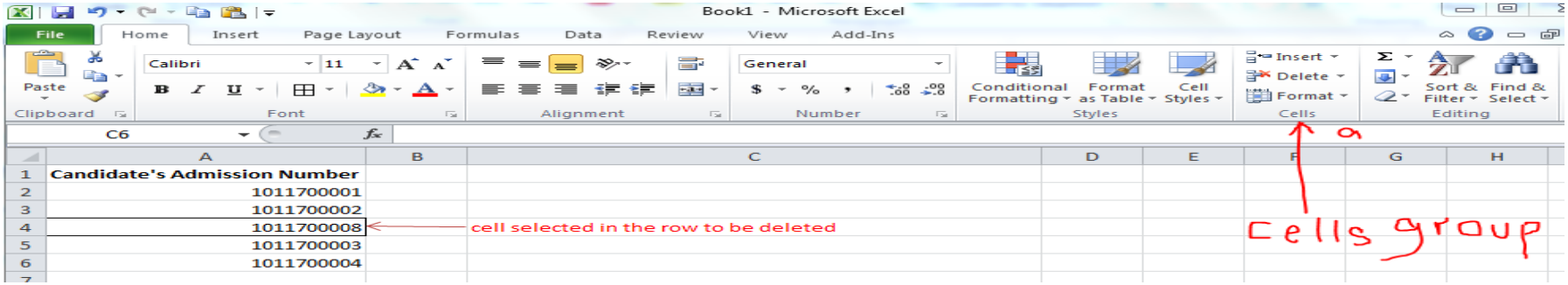


Inserting or deleting rows contd.

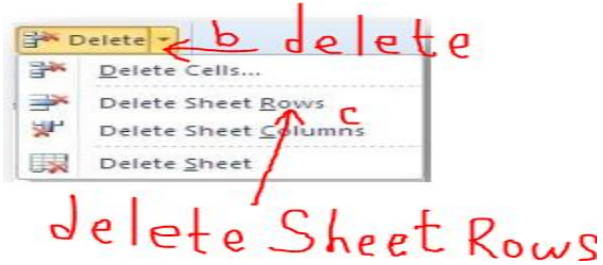
- When you delete a row, all the rows below it will move up by one.

To delete a row:

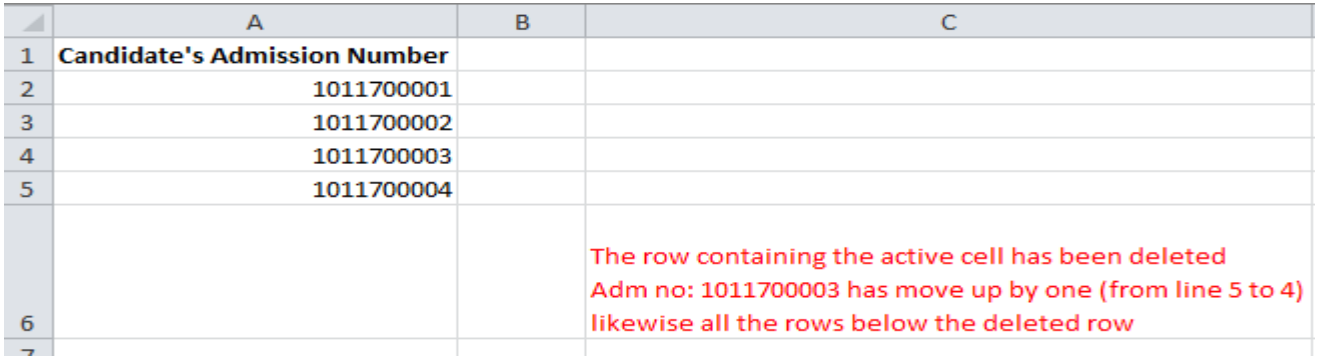
- Select a cell in the row that you want to delete.



- On the **Home** tab, find the **Cells** group and click **Delete** followed by **Delete Sheet Rows**.



- The row containing the active cell will be deleted.

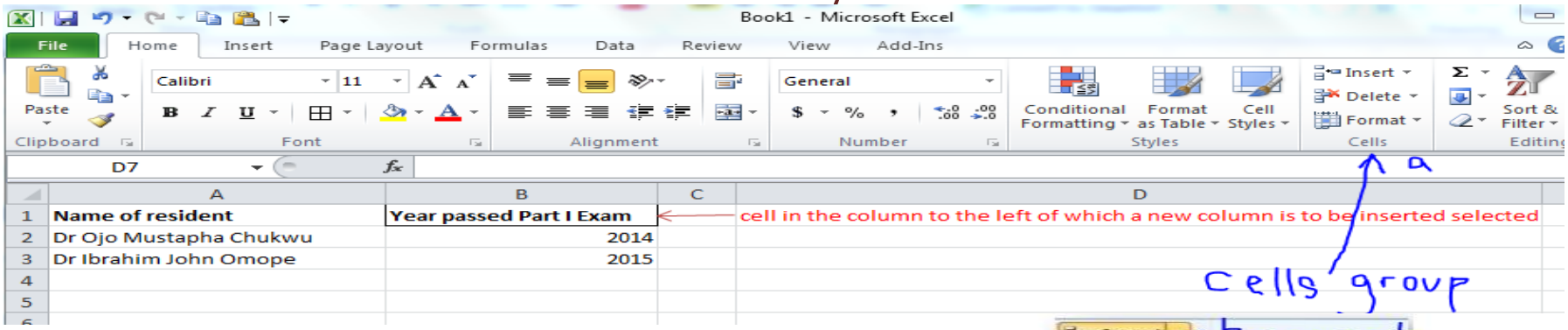


Inserting or deleting columns

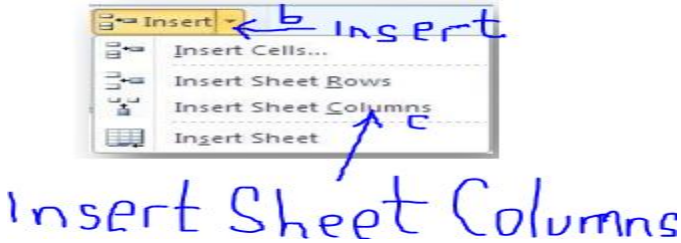
- When you insert a column, the new column will be positioned on the left of the column containing the active cell.

To insert a column:

- Select a cell in the column to the left of which you want to insert a new column.



- On the **Home** tab, find the **Cells** group and click **Insert** followed by **Insert Sheet Columns**.



- A new column will be inserted to the left of the current column.

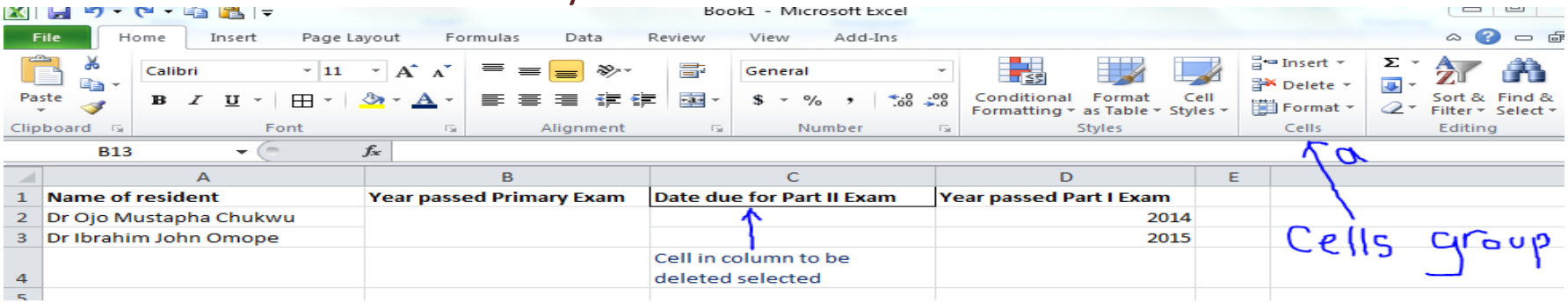
	A	B	C
1	**Name of resident**	**Year passed Primary Exam**	**Year passed Part I Exam**
2	Dr Ojo Mustapha Chukwu		2014
3	Dr Ibrahim John Omope		2015
4		New column inserted to the left of the selected column	

Inserting or deleting columns contd.

- When you delete a column, all the all the columns on its right will move left by one.

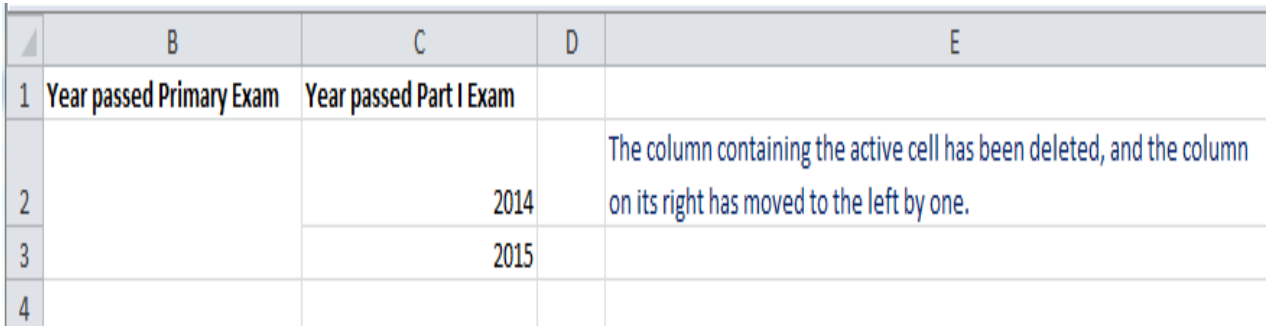
To delete a column:

- Select a cell in the column that you want to delete.



- On the **Home** tab, find the **Cells** group and click **Delete** followed by **Delete Sheet Columns**.

- The column containing the active cell will be deleted.



Alternative way of Inserting or deleting rows and columns

- An alternative way of inserting or deleting rows and columns is to right-click on the relevant cell.

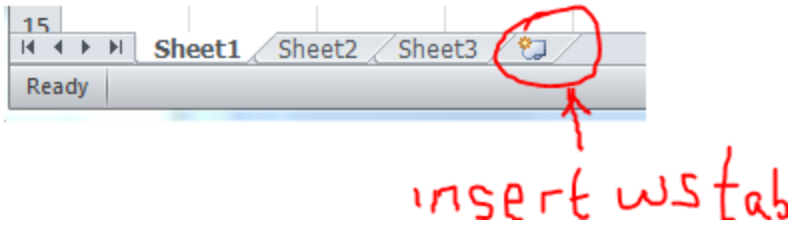
- Then use the pop-up menu to insert or delete the row or column of choice.

- The menu can also be used to format the data contained in the worksheet (this shall be covered in Module 4).

Inserting or deleting a worksheet

To insert a worksheet at the end of the existing worksheets:

- Click the **Insert Worksheet** tab at the bottom of the screen.
- The shortcut key for this is [SHIFT] + [F11].



To insert a new worksheet before an existing worksheet:

- Select the worksheet before which you want to insert a new worksheet.
- On the **Home** tab, find the **Cells** group and click **Insert** followed by **Insert Sheet**.
- A new worksheet will be inserted before the current worksheet.

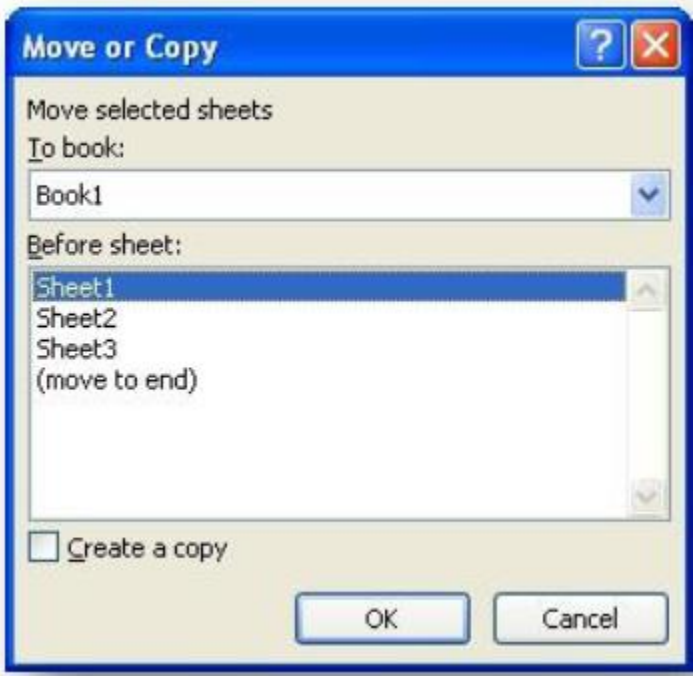
To delete a worksheet:

- Select the worksheet that you want to delete.
- On the **Home** tab, find the **Cells** group and click **Delete** followed by **Delete Sheet**.
- The current worksheet will be deleted.

Moving /copying or renaming a worksheet

To move or copy a worksheet:

- Right-click on the worksheet tab and select **Move or Copy** from the pop-up menu. A dialog box will open:



- The **To book** field allows you to move or copy the current worksheet to another workbook.
- The **Before sheet** field allows you to specify the new position of the worksheet.
- The **Create a copy** checkbox lets you specify whether the worksheet should be moved or copied.

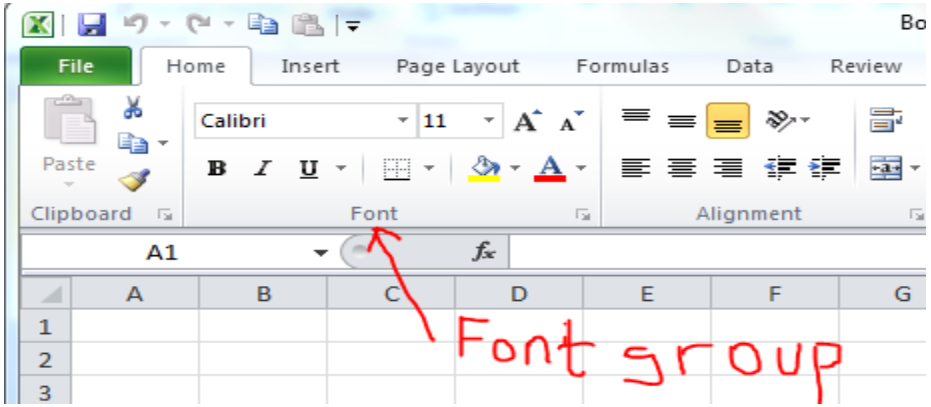
Renaming a worksheet:

- Right-click on the worksheet tab, and select **Rename** from the pop-up menu. Type the new worksheet name and press [ENTER].

FORMATTING DATA

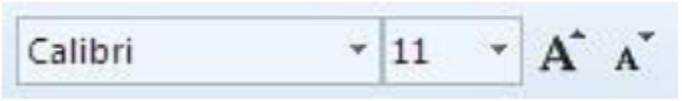
Formatting cell and cell contents

- You can make a worksheet easier to read and understand by applying different types of formatting to cells and cells contents.
- This includes changing the font, font size, font style, font color, adding cell borders and changing the background of cells.
- Since formatting is attached to the cell and not the entry, you can format a cell before or after you enter the data.
- The **Font** group on the **Home** tab of the **Ribbon** provides quick access to the most commonly used formatting commands. To apply any of these, just select the cell or cells that you want to format, and then click on the desired icon.

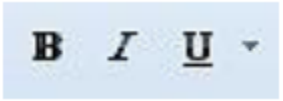


Formatting cell and cell contents contd.

- The commonly used formatting attributes include:



Font and Size



Bold, Italic, Underline

Cell borders

Background and Font colour

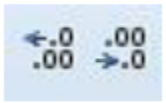
Alignment: Left, Centre or Right

Merge and centre text across multiple cells

Wrap text within a cell

Rotate angle of text

Format number as Currency, Percentage or Decimal



Increase or Decrease number of decimal places

Changing the Font and Font size

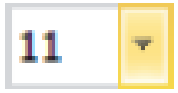
- A font is defined as a group of characters sharing similar type attributes. The default font in new Excel 2010 workbooks is Calibri.
- Font size is measured in points. The larger the font size, the larger the data. The default font size in new Excel 2010 workbooks is 11 points.

To change the Font:

- Select the cell that you want to format.
- On the **Home** tab, in the **Font** group, click the **Font** arrow 

and select the desired font from the list.

To change the Font Size:

- Select the cell that you want to format.
- On the **Home** tab, in the **Font** group, click the **Font Size** arrow 

and select the desired font size from the list.
- If a font size you want is not listed in the **Font Size** list, click in the **Font Size** box, type the desired number, and then press the **Enter** key.
- You can also change the font size by clicking the **Increase Font Size** button  or **Decrease Font Size** button  in the **Font** group on the **Home** tab of the **Ribbon**.

Applying Font Styles

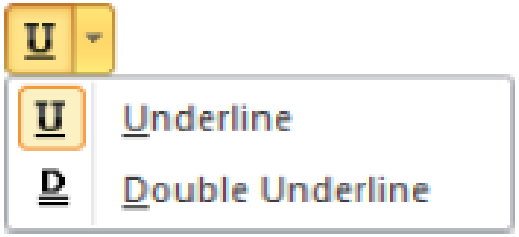
- Font styles are attributes such as bold, italic and underline. They are used to emphasize important data in a worksheet.
- Bolding makes the character darker, Italicizing slants the characters to the right, while underlining adds a line below the character in a cell, not the cell itself.

To bold or italicize data:

- Select the cell that you want to format.
- On the **Home** tab, in the **Font** group, click the **Bold** button  or the **Italic** button  .

To underline data:

- Select the cell that you want to format.
- On the **Home** tab, in the **Font** group, do one of the following as applicable.
  - To apply a single underline, click the **Underline** button.
  - To apply a double underline, click the **Underline** arrow, and then click **Double Underline**.

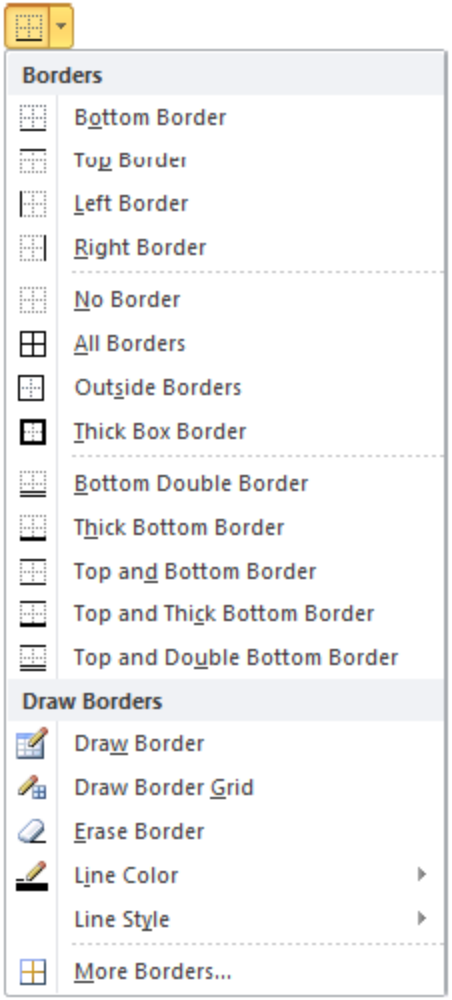


Adding Cell Borders

- You can add borders to any or all sides of a single cell or range. Excel includes several predefined border styles that you can use.

To add a cell border:

- Select the cell or cells to which you want to add a border. On the **Home** tab, in the **Font** group, click the **Borders** button to apply the most recently used border style, or click the **Borders** arrow and select a different border style from the menu.
- You can remove a cell border by clicking the **Borders** arrow, and then clicking **No Border**.



Changing the Font Color and Fill Color

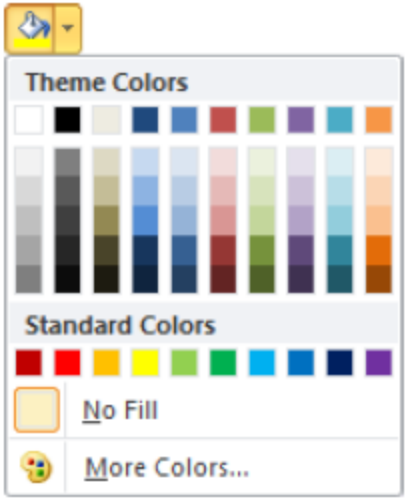
- You can change the font color or fill color of cells to emphasize important data or add visual impact to a worksheet.
- Fill color refers to the background color of a cell.

To change the Font Color:

- Select the cell that you want to format.
- On the **Home** tab, in the **Font** group, click the **Font Color** button to apply the most recently used color, or click the **Font Color** arrow and select a different color from the color palette.

To change the Fill Color:

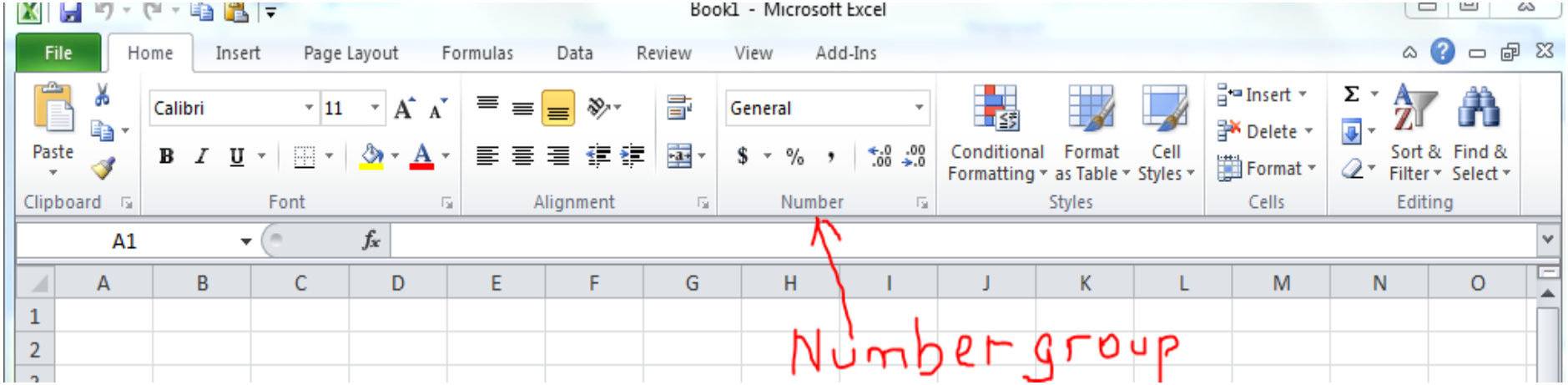
- Select the cell that you want to format.
- On the **Home** tab, in the **Font** group, click the **Fill Color** button to apply the most recently used color, or click the **Fill Color** arrow and select a different color from the color palette.



- You can remove a fill color by clicking the **Fill Color** arrow, and then clicking **No Fill**.

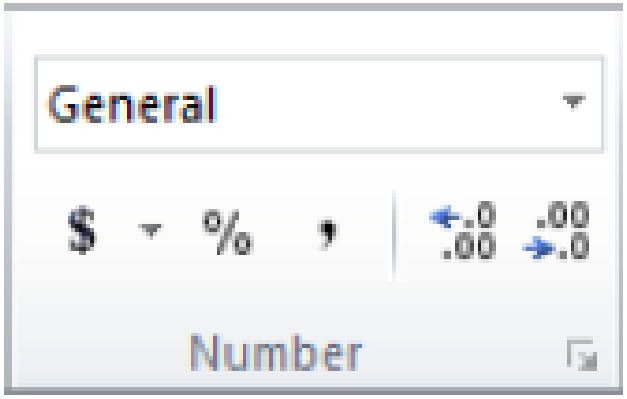
Formatting Numbers

- You can apply number formats to cells containing numbers to better reflect the type of data they represent.
- You can display a numeric value as a percentage, as currency, as a date or time, etc.
- The **Number** group on the **Home** tab of the **Ribbon** provides quick access to the most commonly used number formats.



- Formatting does not change the actual value stored in a cell. The actual value is used in calculations and is displayed in the **Formula** bar when the cell is selected.

Formatting Numbers contd.



To format Numbers:

- Select the cell that you want to format.
- On the **Home** tab, in the **Number** group, do one of the following as applicable:
  - Click the **Accounting Number Format** button $ to display the number with a dollar sign, comma separators, and two decimal places. You can select a different symbol by clicking the **Accounting Number Format** and selecting the desired symbol from the menu.
  - Click the **Percent Style** button % to convert the number to a percentage and display it with a percent sign.
  - Click the **Comma Style** button , to display the number with comma separators and two decimal places.

To change the number of decimal places:

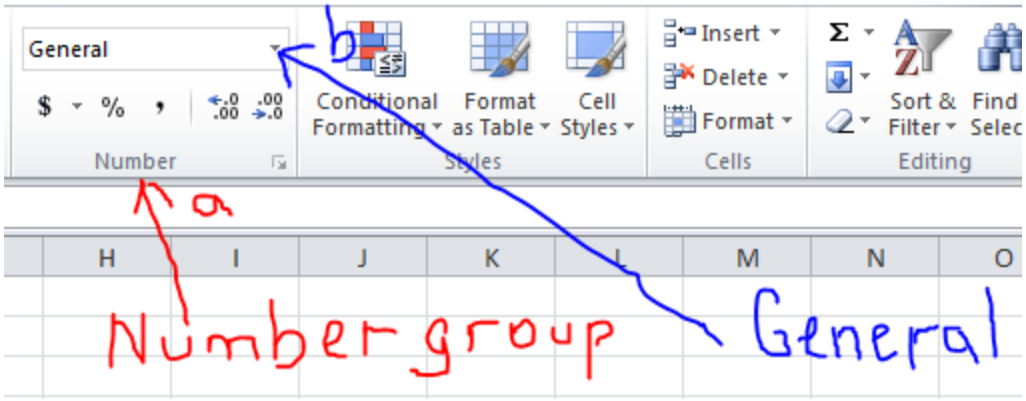
- Select the cell that you want to format.
- On the **Home** tab, in the **Number** group, do one of the following as applicable:
  - Click the **Increase Decimal** button .0 .00 to increase the number of decimal places.
  - Click the **Decrease Decimal** button .00 .0 to decrease the number of decimal places.

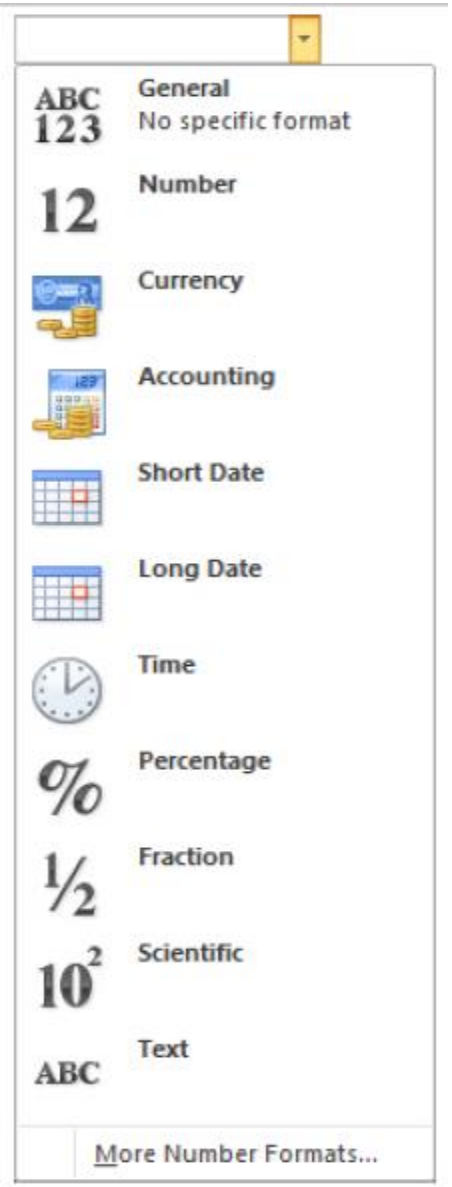
Formatting Numbers contd.

- Alternatively numbers can be formatted using the General menu

To format numbers using the General menu:

- Select the cell that you want to format.
- On the **Home** tab, find the **Number** group, click the **General** arrow and select the type of formatting you which to do from the options in the **Number Format** menu.

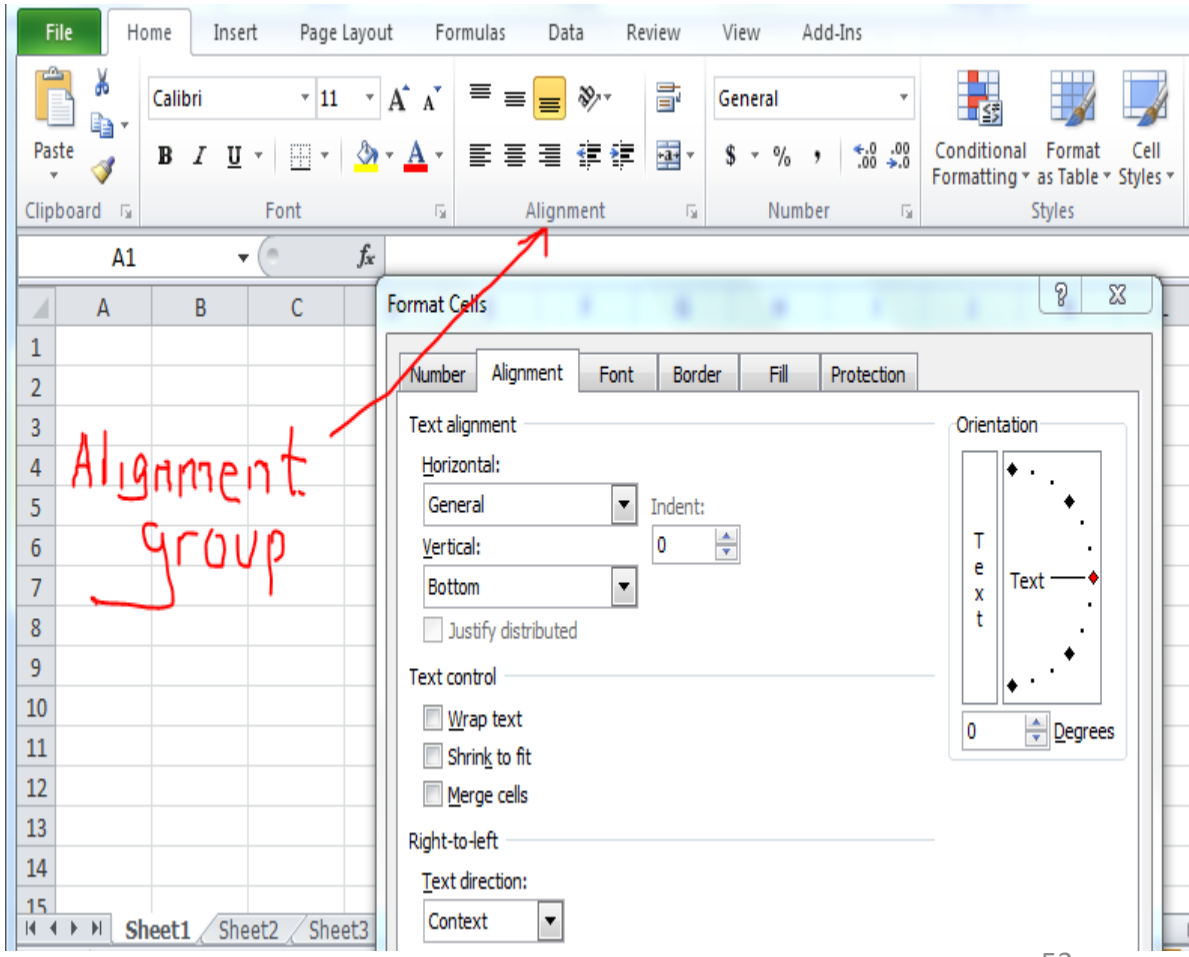




Positioning Cell Contents

- The **Alignment** group on the **Home** tab on the **Ribbon** contains the most useful commands for positioning data within cells. They can be used to change the alignment, indentation, and orientation of cell data; wrap data within cells, as well as merge cells.

- Click the dialog box launcher  in the **Alignment** group to open the Alignment tab of the **Format Cells** dialog box.

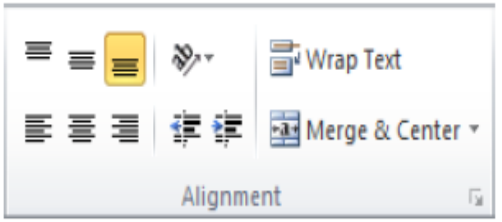


Aligning Data

- The horizontal and vertical alignment of cell data can be changed.
- By default, text is aligned to the left edge of a cell and numbers are aligned to the right.

To align data:

- Select the cell that contains the data you want to align.
- On the **Home** tab, in the **Alignment** group, click the desired alignment button.



- The **Alignment** buttons and their functions are as indicated in the Table below:

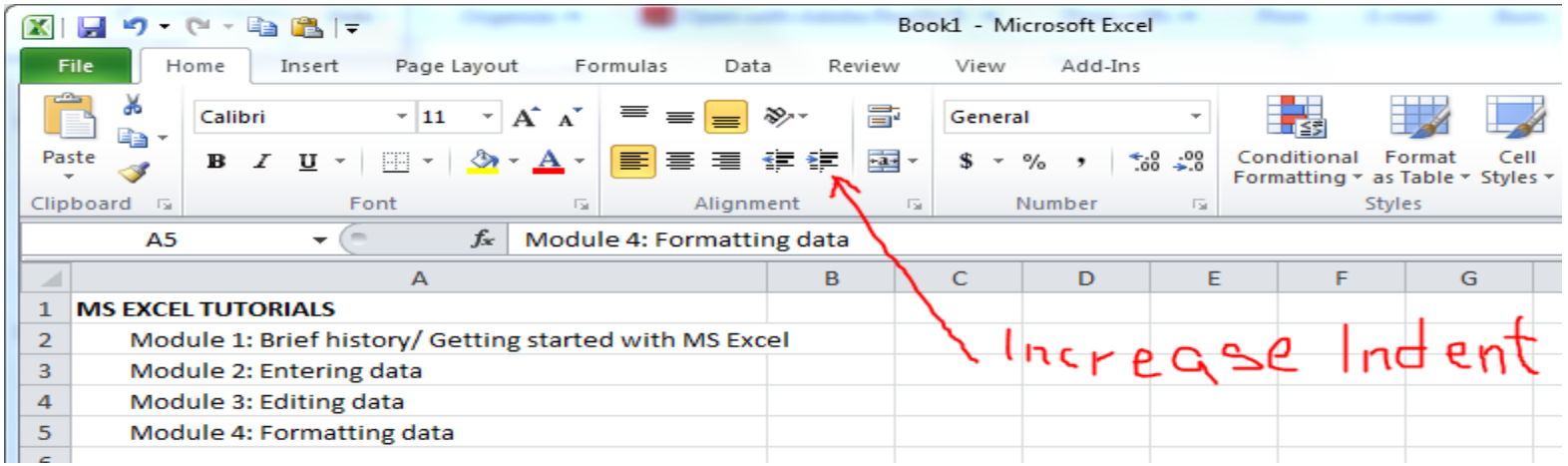
Name	Description
Align Text Left	Aligns the cell contents with the left edge of the cell.
Center	Centers the cell contents horizontally within the cell.
Align Text Right	Aligns the cell contents with the right edge of the cell.
Top Align	Aligns the cell contents with the top edge of the cell.
Middle Align	Centers the cell contents vertically within the cell.
Bottom Align	Aligns the cell contents with the bottom edge of the cell.

Indenting Data

- Indenting moves data away from the edge of the cell. This is often used to indicate a level of less importance (such as a subtopic).
- Each click increments the amount of indentation by one character.

To indent data:

- Select the cell that contains the data you want to indent.
- On the **Home** tab, in the **Alignment** group, click the **Increase Indent** button  the number of times that you want the data indented.



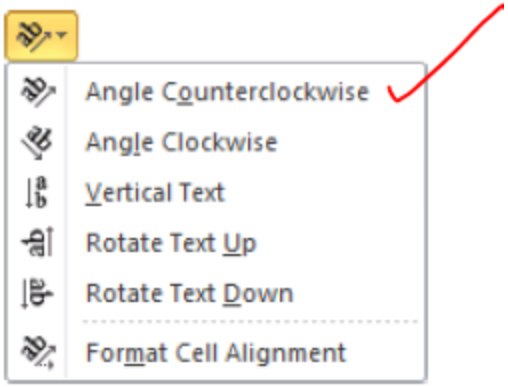
- You can decrease or remove the indentation applied to cell data by clicking the **Decrease Indent** button  in the **Alignment** group.

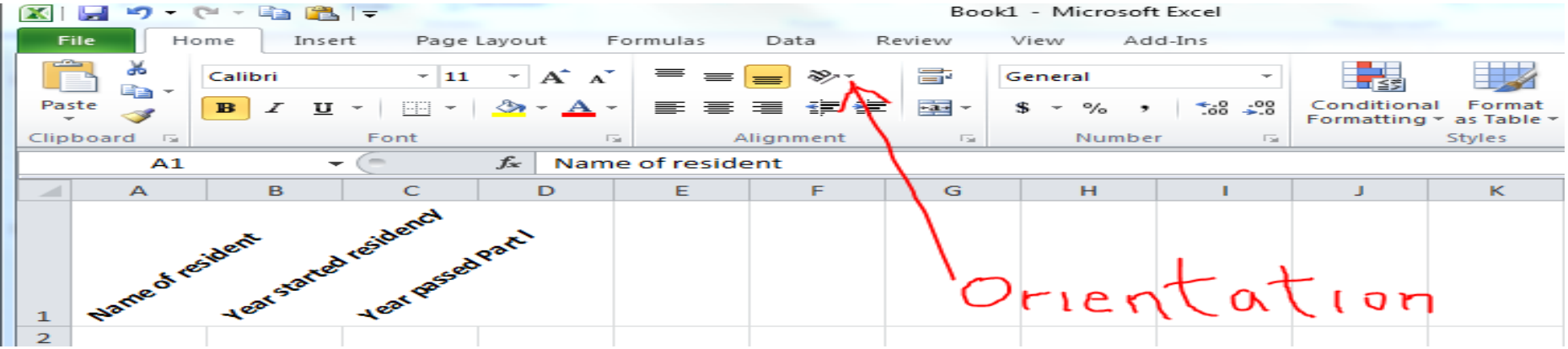
Rotating Data

- Data can be rotated clockwise, counterclockwise, or vertically within a cell.
- This is often used to label narrow columns or to add visual impact to a worksheet.

To rotate data:

- Select the cell that contains the data you want to rotate.
- On the **Home** tab, in the **Alignment** group, click the **Orientation** button and select the desired option from the menu. The row height automatically adjusts to fit the rotated data.





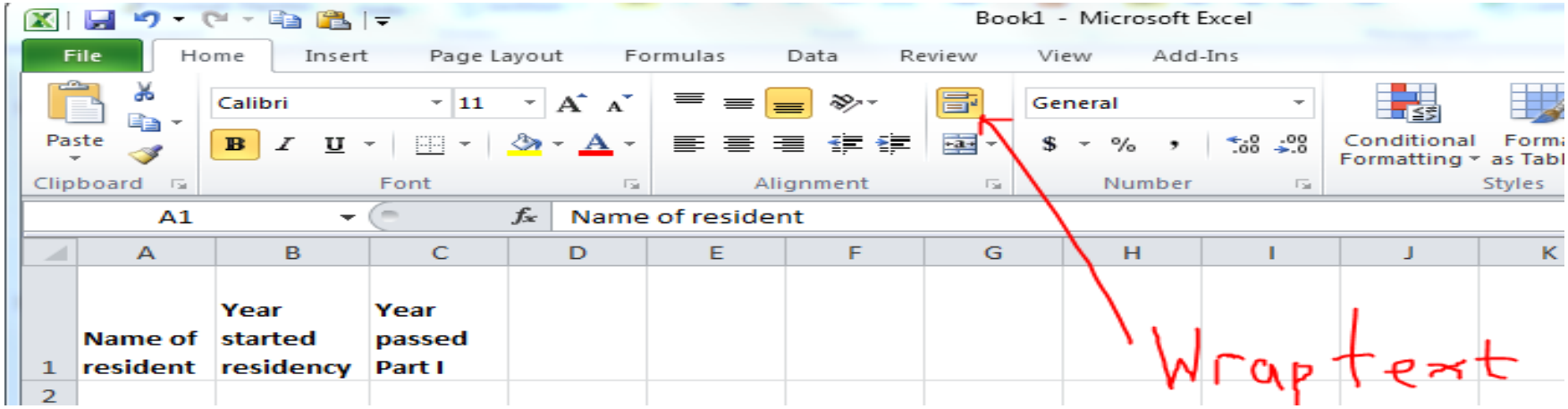
- You can restore the data to its default orientation by clicking the **Orientation** button and selecting the currently selected orientation.

Wrapping Data

- Wrapping displays data on multiple lines within a cell.
- The number of wrapped lines depends on the width of the column and the length of the data.

To wrap data:

- Select the cell that contains the data you want to wrap.
- On the **Home** tab, in the **Alignment** group, click the **Wrap Text** button . The row height automatically adjusts to fit the rotated data.



- You can restore the data to its original format by clicking the **Wrap Text** button again.

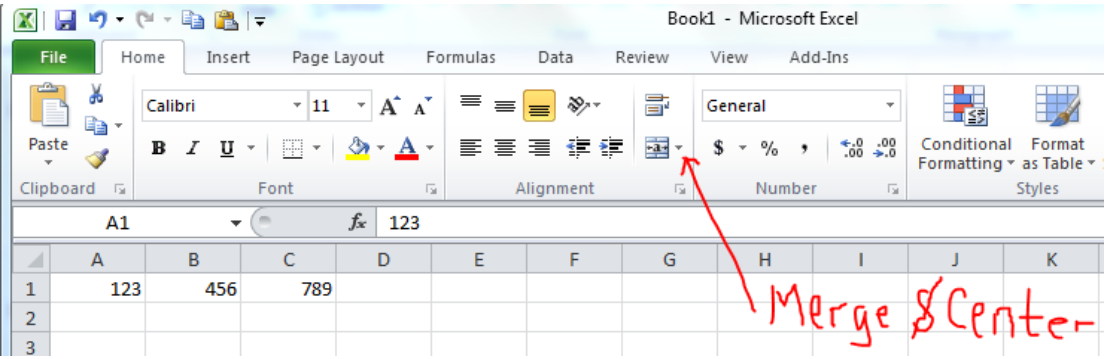
Merging Cells

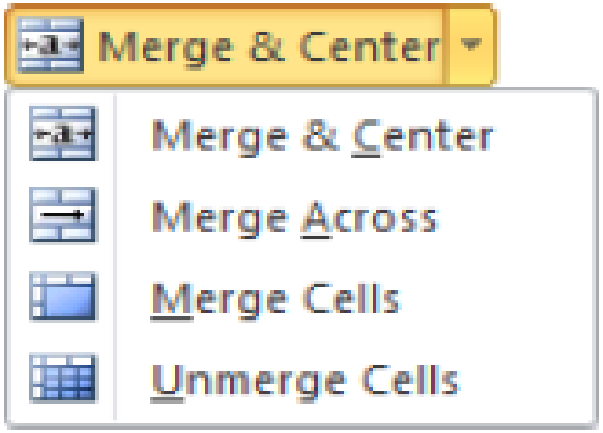
- Merging combines two or more adjacent cells into one larger cell. It is a way of creating labels that span several columns.
- If the cells you intend to merge have data in more than one cell, only the data in the upper-left cell remains after you merge the cells.

To merge cells:

- Select the cells that you want to merge.
- On the **Home** tab, in the **Alignment** group, click the **Merge & Center** arrow and select one of the following options as applicable.

  - **Merge & Center**: merges the selected cells into one cell and centers the data. This is the default action of the button.
  - **Merge Across**: Merges each row of the selected cells into a larger cell.
  - **Merge Cells**: Merges the selected cells into one cell.





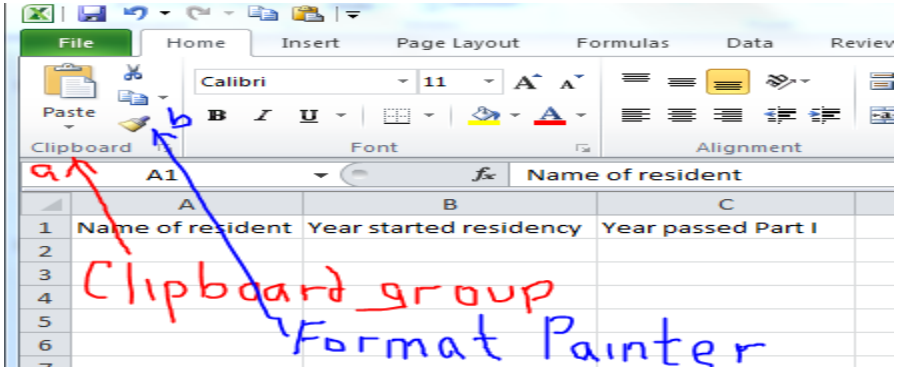
- You can split a merged cell by selecting it, clicking the **Merge & Center** arrow, and then clicking **Unmerge Cells**.

Copying Cell Formats

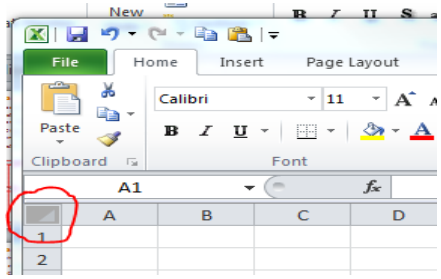
- After formatting a cell, you might want to apply the same formats to other cells in the worksheet.
- Rather than selecting each cell and applying the individual formats, you can use the **Format Painter** command to quickly copy the formatting of one cell and apply it to other cells.

To copy cell formats:

- Select the cells that has the formatting you want to copy.
- On the **Home** tab, in the **Clipboard** group, click the **Format Painter** button  . The mouse pointer changes to a plus sign with a paintbrush  .
- Select the cell to which you want to apply the copied formatting.



If you want to apply the copied formatting to more than one cell, double-click the **Format Painter** button instead of single-clicking it. This keeps the **Format Painter** active until you press the **Esc** key.



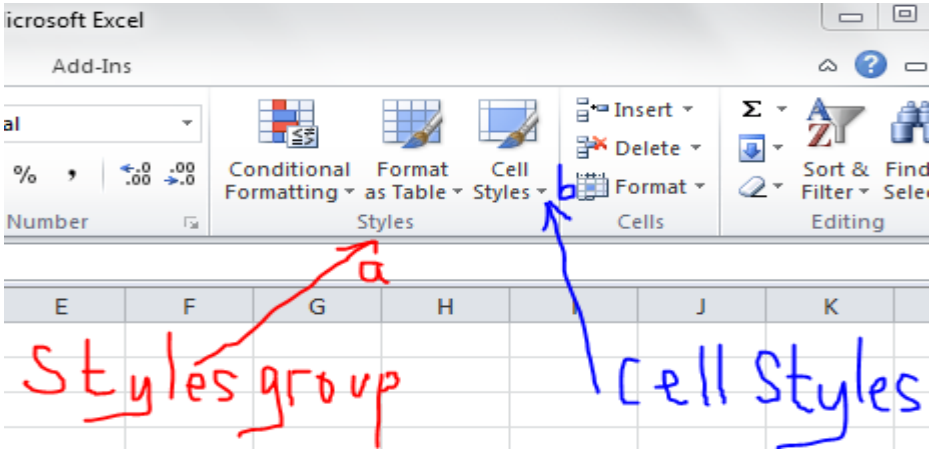
- If you want to apply the copied formatting to all the cells in the worksheet click on the square to the immediate left of Column A heading (just above the label for Row 1).

Applying Cell Styles

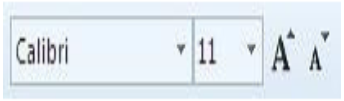
- A cell style is a defined collection of formats (font, font size, font color, cell border, fill color, etc) that you can use to quickly format the cells in a worksheet.
- In addition to saving time, it can help you keep formatting consistently throughout the worksheet.
- Excel includes several predefined styles for different worksheet elements such as headings, numbers, calculations, notes, etc.

To apply a style:

- Select the cell that you want to format.
- On the **Home** tab, in the **Styles** group, click the **Cell Styles** button and select the desired style from the gallery.



Formatting rows and columns

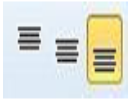


Font and Size


Bold, Italic, Underline


Cell borders


Background and Font colour


Alignment: Left, Centre or Right

Merge and centre text across multiple cells

Wrap text within a cell


Rotate angle of text

Format number as Currency, Percentage or Decimal

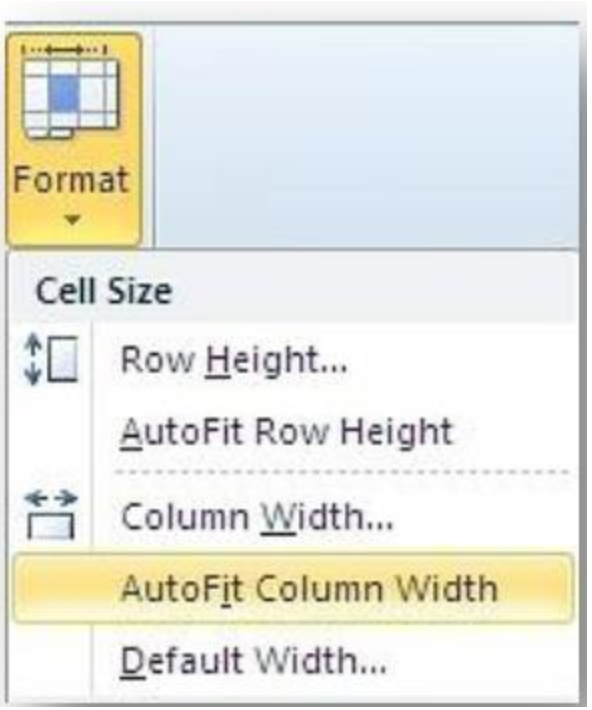
Increase or Decrease number of decimal places

- Any of the cell formatting options shown on the left can easily be applied to all the cells contained in one or more rows or columns.
- Simply select the rows or columns by clicking on the row or column labels, and then click on the formatting icons that you want to apply.

To manually adjust row height and column width:

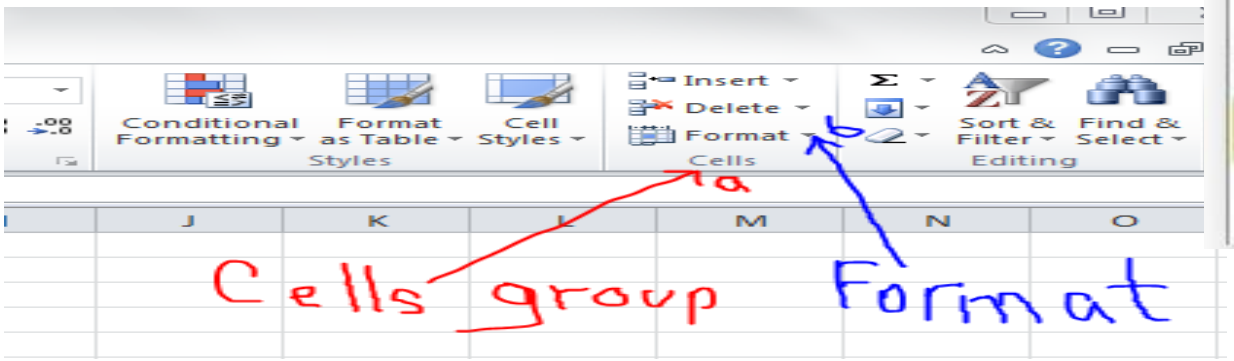
- To manually adjust the height of a row, click and drag the boundary between two row labels.
- To manually adjust the width of a column, click and drag the boundary between two column headings.

Formatting rows and columns contd.



To automatically adjust row height and column width:

- Select the rows or columns that you want to format.
- On the **Home** tab, in the **Cells** group, click the **Format** button and select either of **Autofit Row Height** or **Autofit Column Width** in the **Cell Size** menu as applicable.



To set a row height or column width:

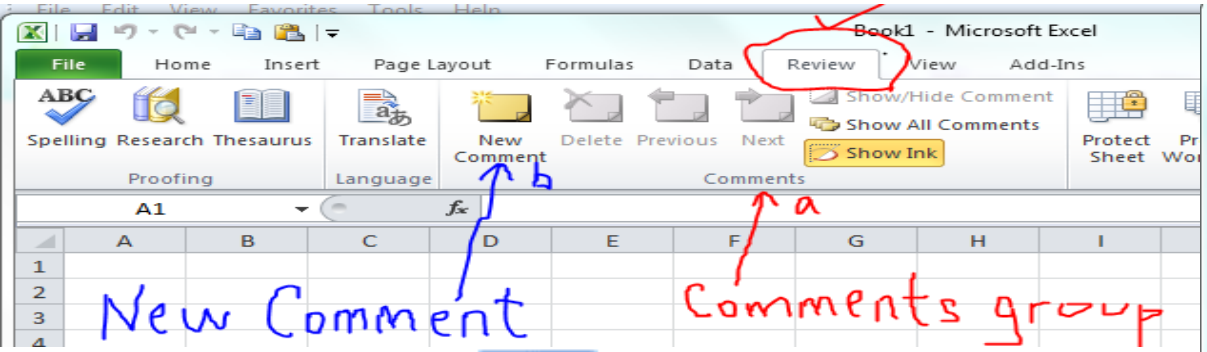
- Select the rows or columns that you want to format.
- On the **Home** tab, in the **Cells** group, click the **Format** button, select either of **Row Height** or **Column Width** in the **Cell size** menu as applicable, type the value that you want in the box that appears and click OK.

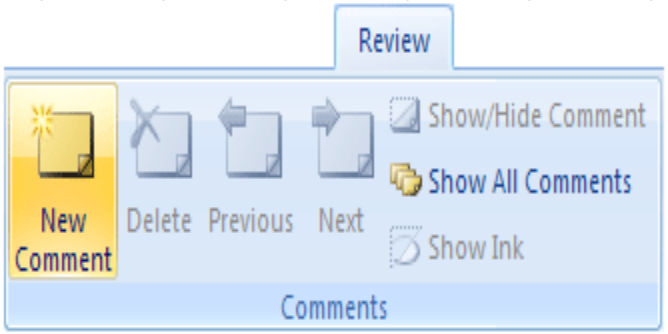
Adding a Comment to a Cell.

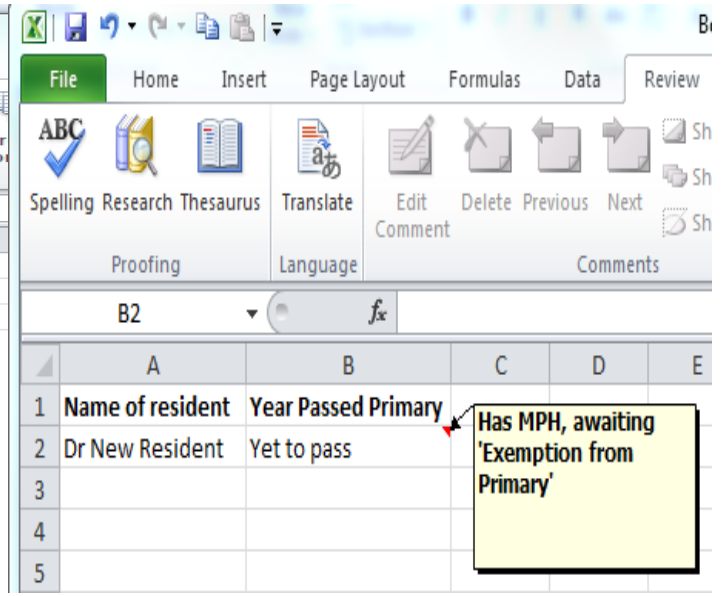
- A comment can be added to any cell on your spreadsheet.
- When you hover your mouse pointer over a cell that contains a comment, you will see the comment appear in a sort of sticky - note.

To add a comment to a cell:

- Select the cell that you want to add a comment.
- On the **Review** tab, in the **Comments** group, click the **New Comment** button, press the backspace key to delete the word “Test” in the textbox that appears to the right of the selected cell and type in your comment. Then click on any other cell.







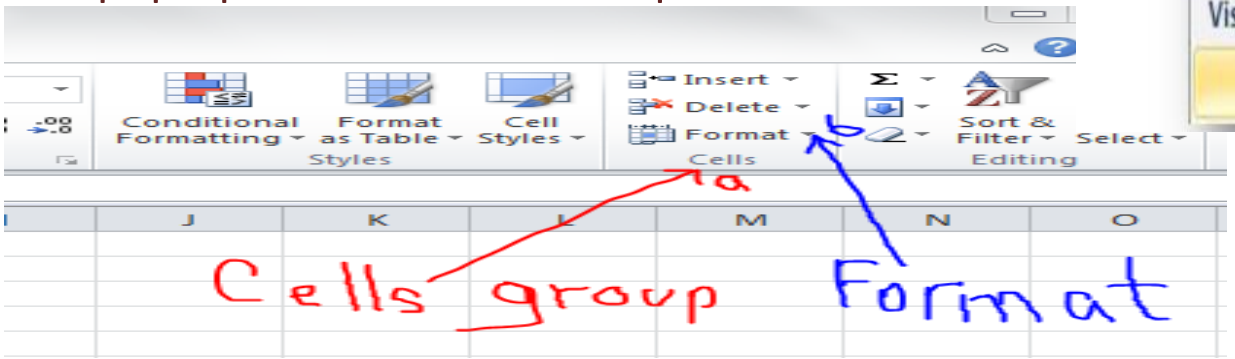
Adding a Comment to a Cell contd.

- To increase or decrease the size of the comment area, hold down the left mouse button over the white circles in the border of the textbox and drag.
- When you have finished typing your comment, click on any other cell. The comment will disappear.
- The cell in which the comment has been entered now has a red triangle in the top right corner. This indicates that it contains a comment.
- If you move your mouse pointer over the cell, the comment will appear.
- To edit the comment, right click the cell that contains the comment, then from the menu that appears, select **Edit Comment**.
- To delete the comment, right click the cell that contains the comment. Then from the menu that appears, select **Delete Comment**.

Hiding rows and columns

To hide or unhide rows and columns

- Select the rows or columns that you want to hide.
- On the **Home** tab, in the **Cells** group, click the **Format** button and select **Hide & Unhide** (below Visibility), and then select the appropriate option in pop-up menu that comes up.



Easiest way to hide or unhide a row or column:

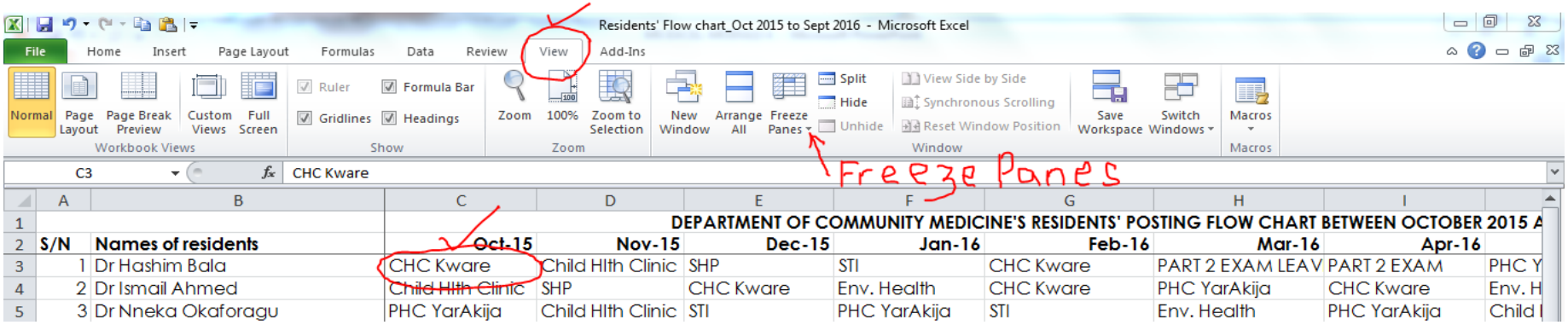
- Select the row or column heading.
- Right-click to view the pop-up menu.
- Then select **Hide** or **Unhide**.

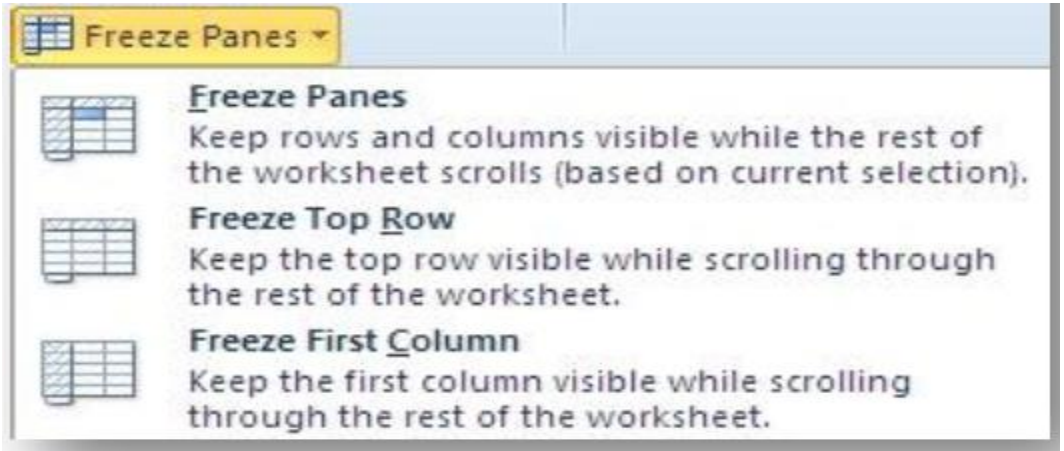
Keeping row and column headings in view

- It is often necessary to keep particular rows and columns visible as you scroll through the worksheet.

To keep particular rows and columns visible:

- Select a cell immediately below the rows that you want to remain visible, and immediately to the right of the column that you want to remain visible.
- On the **View** tab, click **Freeze Panes,** and select the first option.





If **Freeze Panes** has already been applied, then the option automatically changes to **Unfreeze Panes**.

FORMULAS
&
USE OF FUNCTIONS

Formulas in Excel

- Formulas are equations that perform calculations on values in the worksheet.
- A formula always starts with an equal sign **(=)**. This lets Excel know that it's going to have to work something out.
- In the body of the formula, you're going to tell Excel what you want it to calculate.
- A formula can contain any or all of the following parts.

1. **Functions**: A function, such as **PI()** or **SUM()**, starts with an equal sign (=).
2. **Cell reference**: You can refer to data in worksheet cells by including cell reference (e.g., A1, B1, C1, etc.) in the formula.
3. **Constants**: You can also enter constants such as numbers or text values (e.g., 2, 3, 4, 20%, 25%, etc.) directly into the formula.
4. **Operators**: These are the symbols that are used to specify the type of calculation that you want the formula to perform.

The operators that are used include:

+	addition
-	subtraction
*****	multiplication
/	division
^	exponentiation ('to the power of')

Formulas in Excel contd.

Order of operations in Excel

The operations in Excel are evaluated in particular order of precedence.

- Operations inside brackets are calculated first
- Exponentiation is calculated second.
- Multiplication and division are calculated third.
- Addition and subtractions are calculated forth.
- When you have several items at the same level of precedence, they are calculated from left to right.

Examples:

= 10+ 5*3-7 (result: 10+15-7 = 18)

= (10+5)*3-7 (result: 15*3-7 =38)

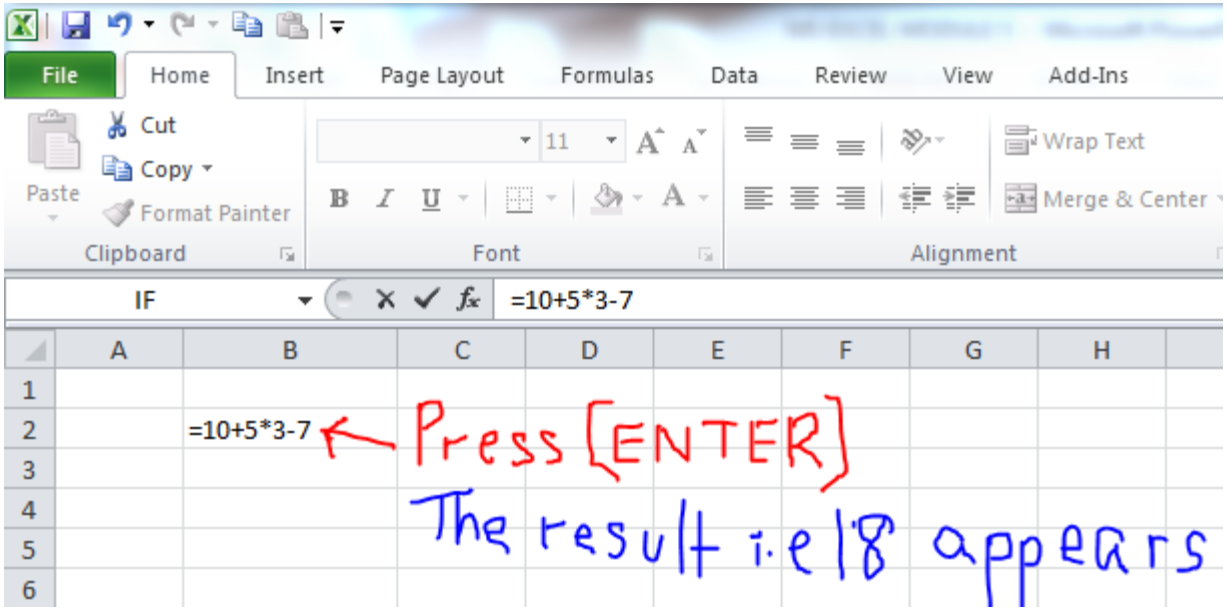
= (10+5) * (3-7) (result: 15 * -4 = -60)

- If you are not sure how a formula will be evaluated, use brackets.

Formulas in Excel contd.

To create a simple formula:

- Click the cell in which you want to enter the formula.
- Type = (equal sign)
- Enter the formula by typing the constants and operators that you want to use in the calculation.
- Press ENTER.
- The constants and operators entered into the cell become replaced by the result (i.e., 18).

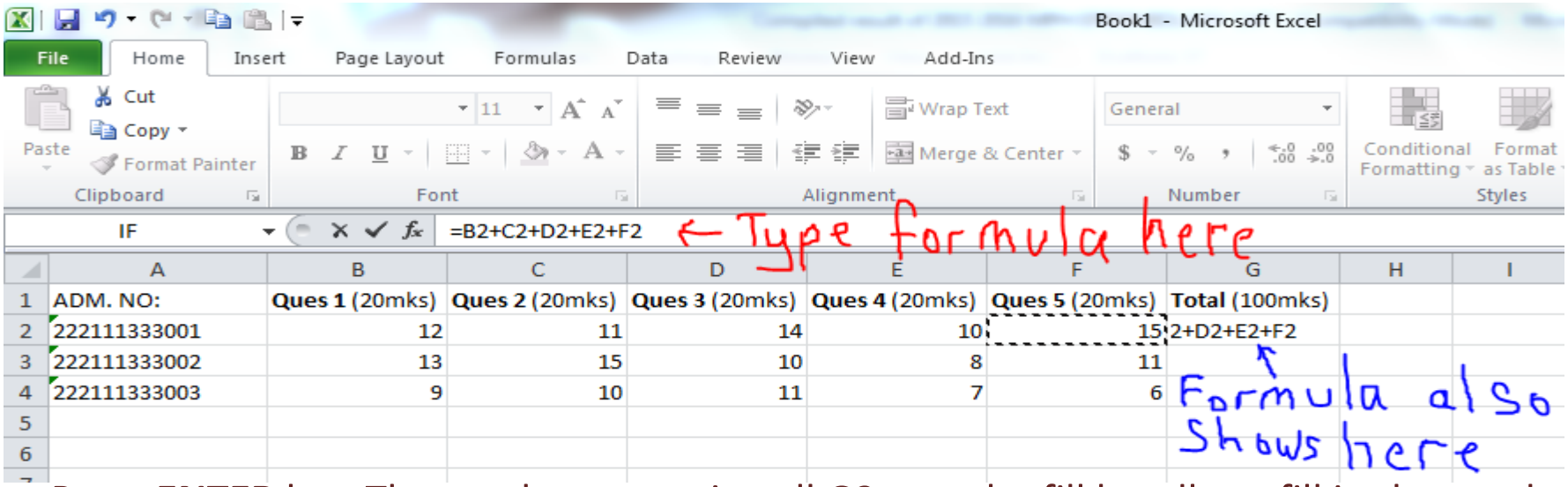


Formulas in Excel contd.

To create a formula with cell reference:

- Click the cell in which you want to enter the formula (G2).
- In the **Formula bar** at the top of the Excel window that you use type = (equal sign).

- Click on the 1st cell you want in the formula (B2).
- Enter the desired operator (*).
- Click on the next cell you want in the formula (C2), and enter the desired operator again. Continue until the formula is complete. The formula entered in the Formula bar also shows in the cell selected for the result.



	A	B	C	D	E	F	G	H	I
1	ADM. NO:	**Ques 1** (20mks)	**Ques 2** (20mks)	**Ques 3** (20mks)	**Ques 4** (20mks)	**Ques 5** (20mks)	**Total** (100mks)		
2	222111333001	12	11	14	10	15	2+D2+E2+F2		
3	222111333002	13	15	10	8	11			
4	222111333003	9	10	11	7	6			
5									
6									

- Press **ENTER** key. The result appears in cell G2, use the fill handle to fill in the results for cells G3 and G4.

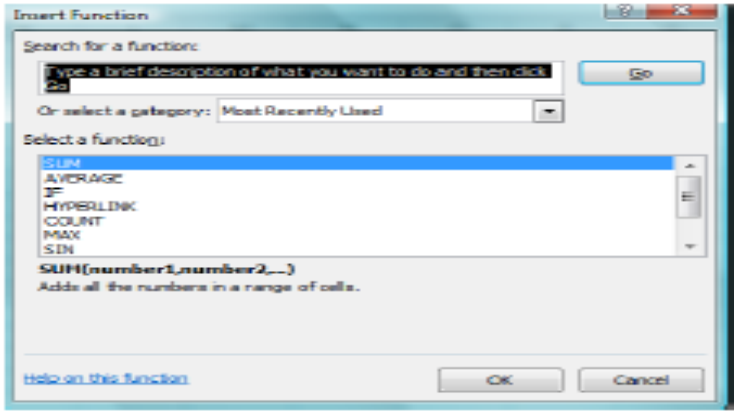
Formulas in Excel contd.

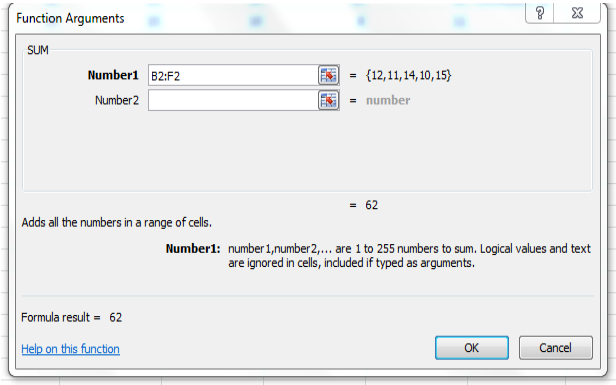
To create a formula with Function:

- Click the cell in which you want to enter the formula (F2).
- Click **Insert Function**  on the formula bar  .

  Excel inserts the equal sign (=) for you.
- Select the function that you want to use.

  If you're not sure which function to use, type a question that describes what you want to do in the **Search for a function** box (e.g., "add numbers" returns the **SUM** function) or browse from the categories in the **Or select a category box**.





- Select the desired function in the **Select a function** menu and click OK.
- Enter or modify the arguments in the **Function Arguments** box that comes up, and click OK. The result appears in cell G2, use the fill handle to fill in the results for cells G3 and G4 .

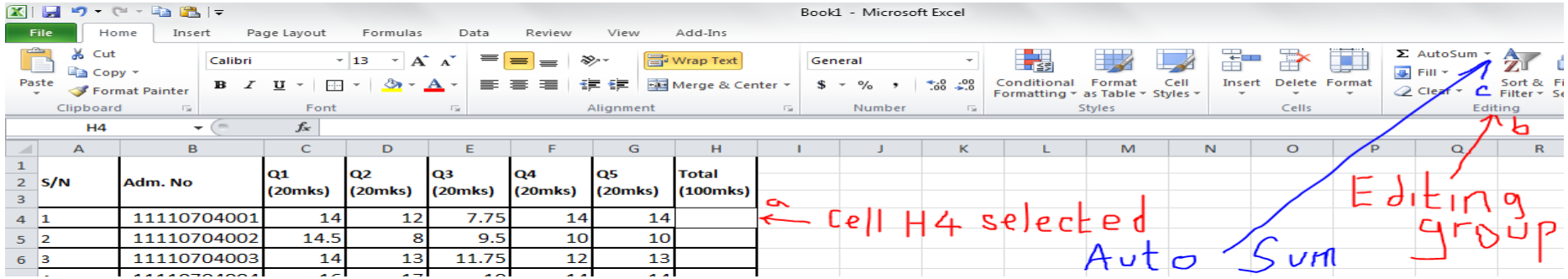
Formulas in Excel contd.

Use of Auto Sum

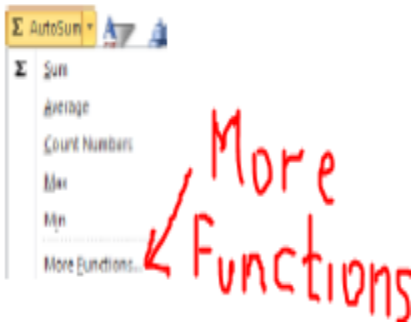
- Auto Sum is used to summarize values quickly.

To use Auto Sum:

- Select the cell where you would like your formula's solution to appear.
- On the **Home** tab, find the **Editing** group and click **Auto Sum** to sum your numbers (if S/N and Adm. No. were entered as text).
- If S/N and Adm. No. were entered as numbers, click the arrow next to **Auto Sum** and click **More Functions**, then enter C4:G4 in the **Function Arguments** box and click OK.



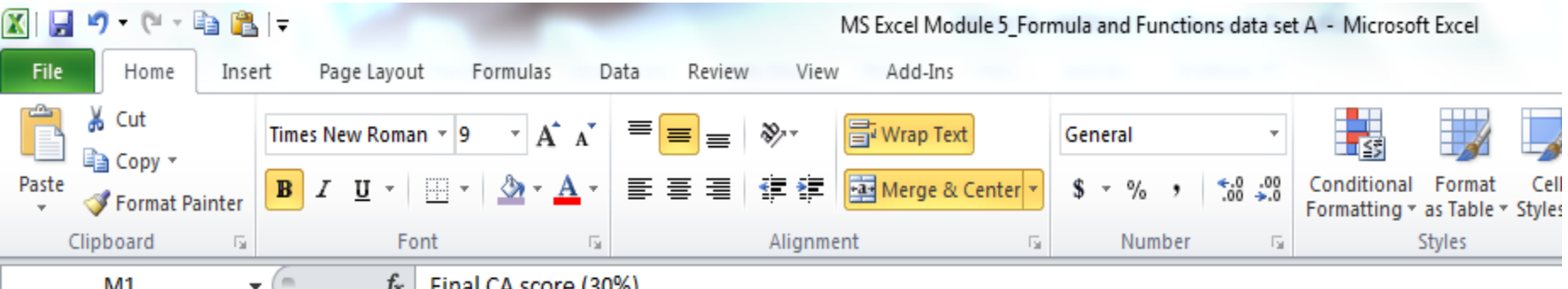
- The **Function Arguments** are used to specify the scope and direction of summation (i.e., cells across row s or in a column)
- Alternatively, select/highlight the cells to be summed up, and the cell where you want your formula's solution to appear and click **Auto Sum**.



Formulas in Excel contd.

Example 1_Multistage computation of CATs result

- You are coordinating a course, the results of the students performance in the two continuous assessment tests conducted have been entered as shown in columns B to K.
- You are to compute the sum of the scores for CATs 1 and 2 in column L and convert it to a maximum of 30% in column M.



	A	B	C	D	E	F	G	H	I	J	K	L	M
1	ADM. NO.	CAT 1 SCORES						CAT 2 SCORES				TOTAL (180 marks)	Final CA score (30%)
2		C1Q1	C1Q2	C1Q3	C1Q4a	C1Q4b	C1Q5	C2Q1	C2Q2	C2Q3	C2Q4		
3		(20mks)	(20mks)	(20mks)	(10mks)	(10mks)	(20mks)	(20mks)	(20mks)	(20mks)	(20mks)		
4	11110704001	4	7	11	3	0	13	6	11.5	15	17		
5	11110704002	7	2	8	0	6	8	9	9.25	19	17.5		
6	11110704003	15	10.5	11	8	8	20	13.5	11.5	18	17.5		
7	11110704004	16	15	19	8	10	16	18.5	17	19	17.5		

Formulas in Excel contd.

Example 1_Multistage computation of CATs result contd.

SUM | =SUM(B4:K4)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		CAT 1 SCORES						CAT 2 SCORES				TOTAL (180 marks)	Final CA score (30%)
2	ADM. NO.	C1Q1	C1Q2	C1Q3	C1Q4a	C1Q4b	C1Q5	C2Q1	C2Q2	C2Q3	C2Q4		
3		(20mks)	(20mks)	(20mks)	(10mks)	(10mks)	(20mks)	(20mks)	(20mks)	(20mks)	(20mks)		
4	11110704001	4	7	11	3	0	13	6	11.5	15	17	(B4:K4)	
5	11110704002	7	2	8	0	6	8	9	9.25	19	17.5		
6	11110704003	15	10.5	11	8	8	20	13.5	11.5	18	17.5		
7	11110704004	16	15	19	8	10	16	18.5	17	19	17.5		

Stage 1_Computation of Total for CATs 1 and 2 (in Column L):

- Click on cell L4.
- Click on the **Formula bar**, type in = SUM(B4:K4), and click [ENTER]. This adds the values in cells B4 to K4, and displays the result in cell L4.
- Press [ENTER] to display the result (i.e **87.5**).

L4 | =SUM(B4:K4)

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		CAT 1 SCORES						CAT 2 SCORES				TOTAL (180 marks)	Final CA score (30%)
2	ADM. NO.	C1Q1	C1Q2	C1Q3	C1Q4a	C1Q4b	C1Q5	C2Q1	C2Q2	C2Q3	C2Q4		
3		(20mks)	(20mks)	(20mks)	(10mks)	(10mks)	(20mks)	(20mks)	(20mks)	(20mks)	(20mks)		
4	11110704001	4	7	11	3	0	13	6	11.5	15	17	87.5	
5	11110704002	7	2	8	0	6	8	9	9.25	19	17.5		
6	11110704003	15	10.5	11	8	8	20	13.5	11.5	18	17.5		
7	11110704004	16	15	19	8	10	16	18.5	17	19	17.5		

Formulas in Excel contd.

Example 1_Multistage computation of CATs result contd.

SUM | =(L4/180)*30

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		CAT 1 SCORES						CAT 2 SCORES				TOTAL (180 marks)	Final CA score (30marks)
2	ADM. NO.	C1Q1	C1Q2	C1Q3	C1Q4a	C1Q4b	C1Q5	C2Q1	C2Q2	C2Q3	C2Q4		
3		(20mks)	(20mks)	(20mks)	(10mks)	(10mks)	(20mks)	(20mks)	(20mks)	(20mks)	(20mks)		
4	11110704001	4	7	11	3	0	13	6	11.5	15	17	87.5	=(L4/180)*30
5	11110704002	7	2	8	0	6	8	9	9.25	19	17.5		
6	11110704003	15	10.5	11	8	8	20	13.5	11.5	18	17.5		
7	11110704004	16	15	19	8	10	16	18.5	17	19	17.5		

Stage 2_Computation of Final CATs score to a maximum of 30marks (in Column M):

- Click on cell M4.
- Click on the **Formula bar**, type in =(L4/180)*30, and click [ENTER]. This works out the value in cell L4 adjusted to a maximum of 30 marks instead of 180 marks, and displays the result in cell M4.
- Press [ENTER] to display the result (i.e **14.58**).

M4 | =(L4/180)*30

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		CAT 1 SCORES						CAT 2 SCORES				TOTAL (180 marks)	Final CA score (30marks)
2	ADM. NO.	C1Q1	C1Q2	C1Q3	C1Q4a	C1Q4b	C1Q5	C2Q1	C2Q2	C2Q3	C2Q4		
3		(20mks)	(20mks)	(20mks)	(10mks)	(10mks)	(20mks)	(20mks)	(20mks)	(20mks)	(20mks)		
4	11110704001	4	7	11	3	0	13	6	11.5	15	17	87.5	14.5833333
5	11110704002	7	2	8	0	6	8	9	9.25	19	17.5		
6	11110704003	15	10.5	11	8	8	20	13.5	11.5	18	17.5		
7	11110704004	16	15	19	8	10	16	18.5	17	19	17.5		

Formulas in Excel contd.

Example 1_Multistage computation of CATs result contd.

Stage 3_Copying the formulas in row 2 to the remaining rows:

- Select cell L4.
- Move the cursor over the fill handle in the bottom right corner of the selected cell. It will change to a black cross.
- Hold down the left mouse button and drag the cross over the remaining rows in column L. The values in cells L5 to L7 are automatically calculated.
- Select cell M4 and repeat the procedure described above for automatic calculation of the values in cells M5 to M7.

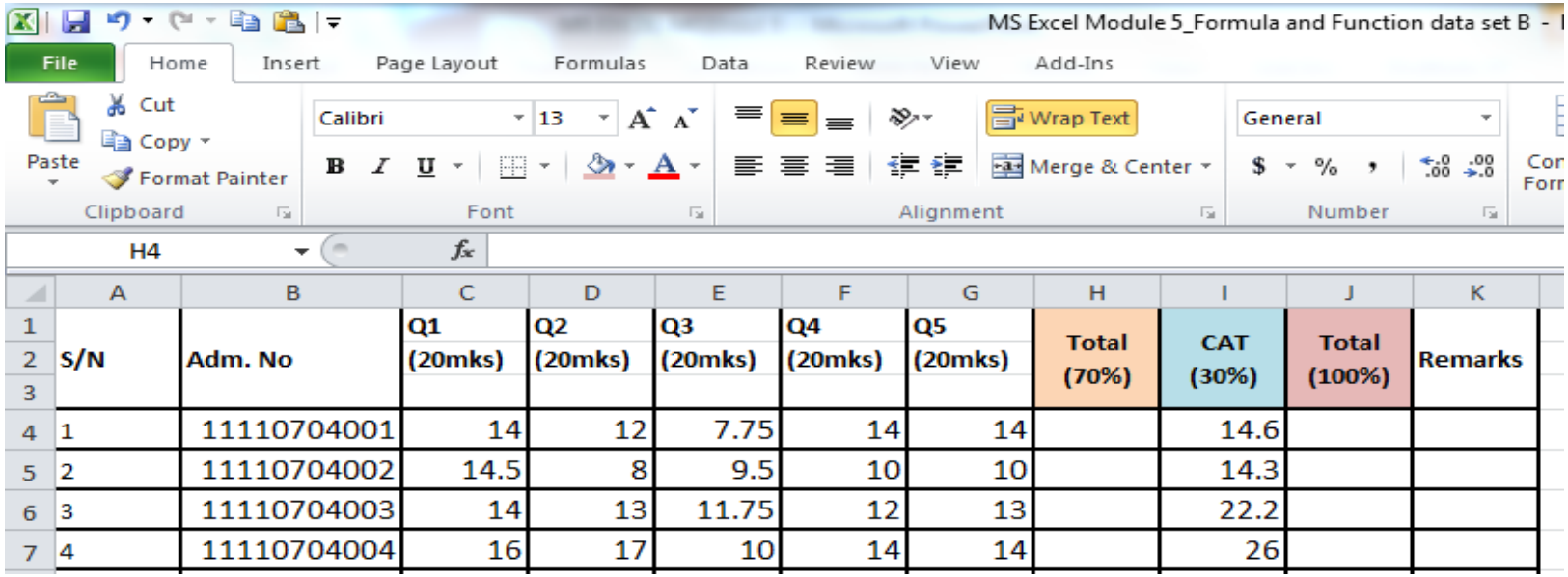
M4 f_x =(L4/180)*30

	A	B	C	D	E	F	G	H	I	J	K	L	M
1		CAT 1 SCORES						CAT 2 SCORES				TOTAL (180 marks)	Final CA score (30%)
2	ADM. NO.	C1Q1	C1Q2	C1Q3	C1Q4a	C1Q4b	C1Q5	C2Q1	C2Q2	C2Q3	C2Q4		
3		(20mks)	(20mks)	(20mks)	(10mks)	(10mks)	(20mks)	(20mks)	(20mks)	(20mks)	(20mks)		
4	11110704001	4	7	11	3	0	13	6	11.5	15	17	87.5	14.5833333
5	11110704002	7	2	8	0	6	8	9	9.25	19	17.5	85.75	14.2916667
6	11110704003	15	10.5	11	8	8	20	13.5	11.5	18	17.5	133	22.1666667
7	11110704004	16	15	19	8	10	16	18.5	17	19	17.5	156	26

Formulas in Excel contd.

Example 2_Multistage computation of 1st Semester Exam result

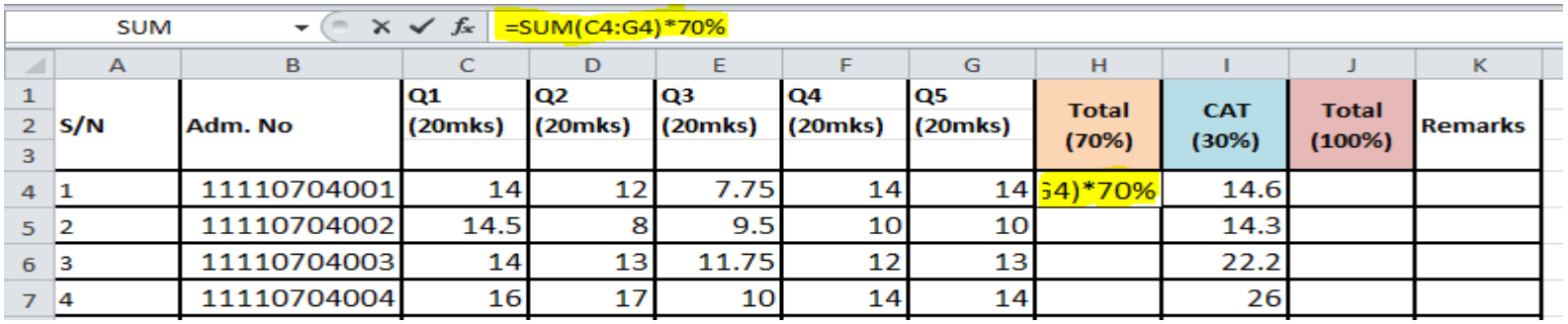
- After the students have written the 1st Semester Examination, and the results have been entered as shown in columns C to G.
- You are to compute the sum of scores for the 1st Semester Exam, to a maximum of 70% (in column H), add the previously computed CATs 1 and 2 result, to a maximum of 30% (in column I), and compute the final score, to a grand total of 100% (in column J). Again, multistage computation is required.



	A	B	C	D	E	F	G	H	I	J	K
1			Q1	Q2	Q3	Q4	Q5	Total	CAT	Total	
2	S/N	Adm. No	(20mks)	(20mks)	(20mks)	(20mks)	(20mks)	(70%)	(30%)	(100%)	Remarks
3											
4	1	11110704001	14	12	7.75	14	14		14.6		
5	2	11110704002	14.5	8	9.5	10	10		14.3		
6	3	11110704003	14	13	11.75	12	13		22.2		
7	4	11110704004	16	17	10	14	14		26		

Formulas in Excel contd.

Example 2_Multistage computation of 1st Semester Exam result contd.

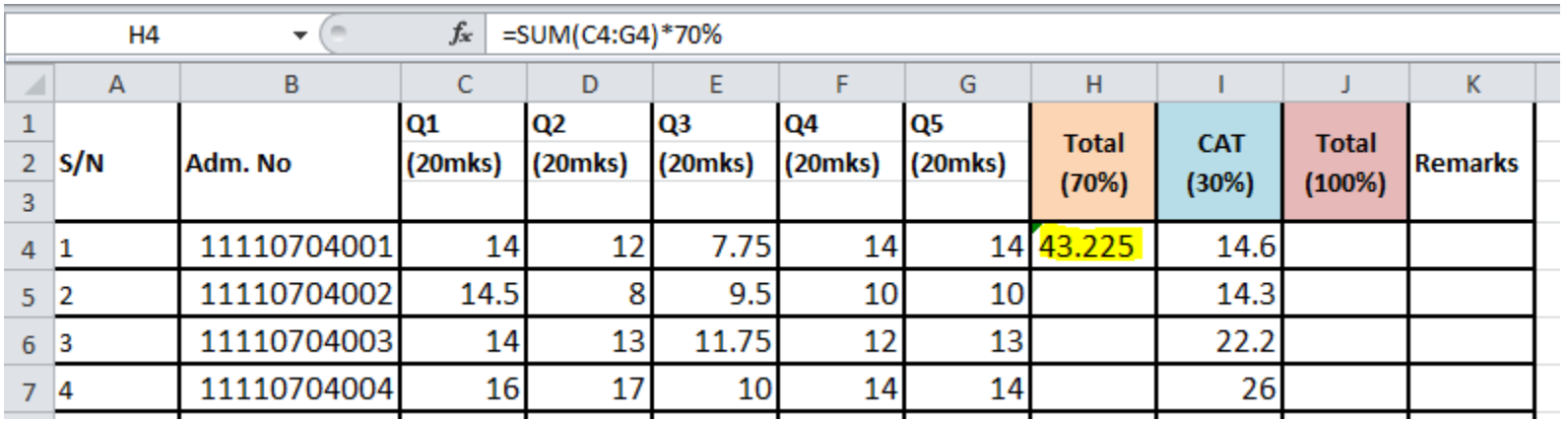


SUM =SUM(C4:G4)*70%

	A	B	C	D	E	F	G	H	I	J	K
1											
2	S/N	Adm. No	Q1 (20mks)	Q2 (20mks)	Q3 (20mks)	Q4 (20mks)	Q5 (20mks)	Total (70%)	CAT (30%)	Total (100%)	Remarks
3											
4	1	11110704001	14	12	7.75	14	14	G4)*70%	14.6		
5	2	11110704002	14.5	8	9.5	10	10		14.3		
6	3	11110704003	14	13	11.75	12	13		22.2		
7	4	11110704004	16	17	10	14	14		26		

Stage 1_Computation of Total for Question 1 to 5, to a maximum of 70% (in Column H):

- Click on cell H4.
- Click on the **Formula bar**, type in = SUM(C4:G4)*70%, and click [ENTER]. This adds the values in cells C4 to G4, multiplies it by 70% , and displays the result in cell H4 (i.e., to a maximum of 70%).
- Press [ENTER] to display the result (i.e **43.225**).

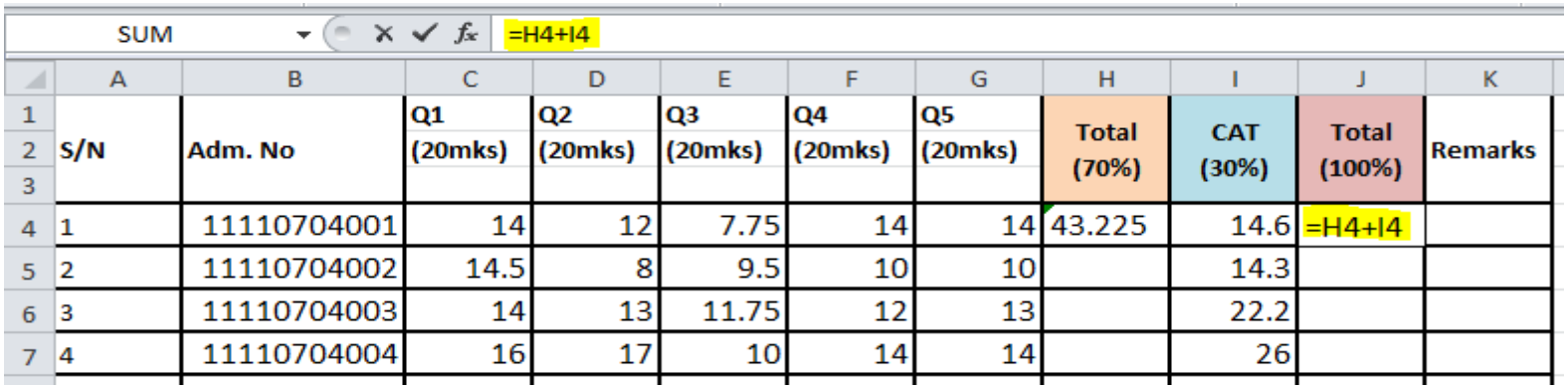


H4 =SUM(C4:G4)*70%

	A	B	C	D	E	F	G	H	I	J	K
1											
2	S/N	Adm. No	Q1 (20mks)	Q2 (20mks)	Q3 (20mks)	Q4 (20mks)	Q5 (20mks)	Total (70%)	CAT (30%)	Total (100%)	Remarks
3											
4	1	11110704001	14	12	7.75	14	14	43.225	14.6		
5	2	11110704002	14.5	8	9.5	10	10		14.3		
6	3	11110704003	14	13	11.75	12	13		22.2		
7	4	11110704004	16	17	10	14	14		26		

Formulas in Excel contd.

Example 2_Multistage computation of 1st Semester Exam result contd.

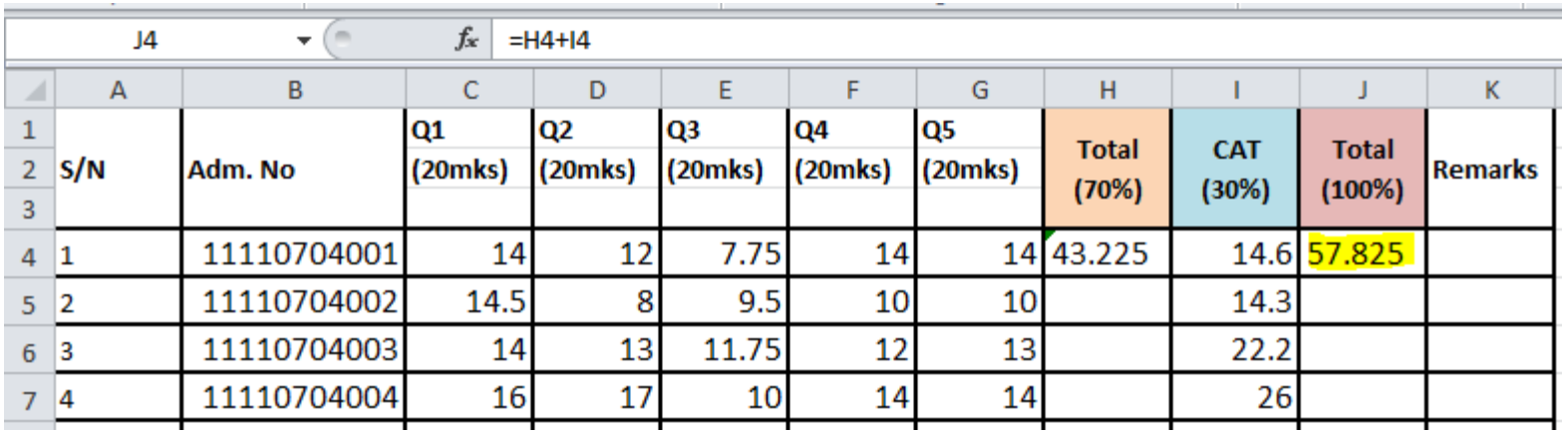


SUM | =H4+I4

	A	B	C	D	E	F	G	H	I	J	K
1											
2	S/N	Adm. No	Q1 (20mks)	Q2 (20mks)	Q3 (20mks)	Q4 (20mks)	Q5 (20mks)	Total (70%)	CAT (30%)	Total (100%)	Remarks
3											
4	1	11110704001	14	12	7.75	14	14	43.225	14.6	=H4+I4	
5	2	11110704002	14.5	8	9.5	10	10		14.3		
6	3	11110704003	14	13	11.75	12	13		22.2		
7	4	11110704004	16	17	10	14	14		26		

Stage 2_Computation of Final score, to a grand total of 100% (in Column J):

- Click on cell J4.
- Click on the **Formula bar**, type in = H4+I4, and click [ENTER]. This adds the values in cell H4 (1st Semester Exam total to a maximum of 70%) and I4 (CATs total to a maximum of 30%), and displays the result in cell J2 (as final score to a grand total of 100%).
- Press [ENTER] to display the result (i.e., **57.825**).



J4 | =H4+I4

	A	B	C	D	E	F	G	H	I	J	K
1											
2	S/N	Adm. No	Q1 (20mks)	Q2 (20mks)	Q3 (20mks)	Q4 (20mks)	Q5 (20mks)	Total (70%)	CAT (30%)	Total (100%)	Remarks
3											
4	1	11110704001	14	12	7.75	14	14	43.225	14.6	57.825	
5	2	11110704002	14.5	8	9.5	10	10		14.3		
6	3	11110704003	14	13	11.75	12	13		22.2		
7	4	11110704004	16	17	10	14	14		26		

Formulas in Excel contd.

Example 2_Multistage computation of 1st Semester Exam result contd.

Stage 3_Copying the formulas in row 2 to the remaining rows:

- Select cell H4.
- Move the cursor over the fill handle in the bottom right corner of the selected cell. It will change to a black cross.
- Hold down the left mouse button and drag the cross over the remaining rows in column H. The values in cells H5 to H7 are automatically calculated.
- Select cell J4 and repeat the procedure described above for automatic calculation of the values in cells J5 to J7.

J4 f_x =H4+I4

	A	B	C	D	E	F	G	H	I	J	K
1											
2	S/N	Adm. No	Q1 (20mks)	Q2 (20mks)	Q3 (20mks)	Q4 (20mks)	Q5 (20mks)	Total (70%)	CAT (30%)	Total (100%)	Remarks
3											
4	1	11110704001	14	12	7.75	14	14	43.225	14.6	57.825	
5	2	11110704002	14.5	8	9.5	10	10	36.4	14.3	50.7	
6	3	11110704003	14	13	11.75	12	13	44.625	22.2	66.825	
7	4	11110704004	16	17	10	14	14	49.7	26	75.7	

Formulas in Excel contd.

Adding Remarks using IF() Function

- Finally, remarks are made using the IF() Function.
- The **IF() function** checks for a specific condition, if the condition is met, then one action is taken; if the condition is not met, then a different action is taken.
- The structure of the **IF() function** is:

  = IF(condition, ”result if true”, “result if false”).

In the formula entered, a space should be inserted between:
J4 and **< 50,**
<50, and **“FAIL”,**
“FAIL”, and **“PASS”**

To add Remarks using IF() Function (in column K):

- Click on cell K4.
- Click on the **Formula bar**, type in = IF(J4 <50, ”FAIL”, ”PASS”), and click [ENTER]. This assigns FAIL for scores less than 50, and PASS for scores of 50 and above, and displays the result in cell K4 (as Remarks).
- Press [ENTER] to display the result (i.e., **FAIL** or **PASS**).
- Select cell K4, move the cursor over the fill handle in the bottom right corner of the selected cell. It will change to a black cross.
- Hold down the left mouse button and drag the cross over the remaining rows in column K. The Remarks for cells K5 to K7 are automatically inserted.

K4 | =IF(J4 < 50, "FAIL", "PASS")

	A	B	C	D	E	F	G	H	I	J	K
1											
2	S/N	Adm. No	Q1 (20mks)	Q2 (20mks)	Q3 (20mks)	Q4 (20mks)	Q5 (20mks)	Total (70%)	CAT (30%)	Total (100%)	Remarks
3											
4	1	11110704001	14	12	7.75	14	14	43.225	14.6	57.825	PASS
5	2	11110704002	14.5	8	9.5	10	10	36.4	14.3	50.7	PASS
6	3	11110704003	14	13	11.75	12	13	44.625	22.2	66.825	PASS
7	4	11110704004	16	17	10	14	14	49.7	26	75.7	PASS

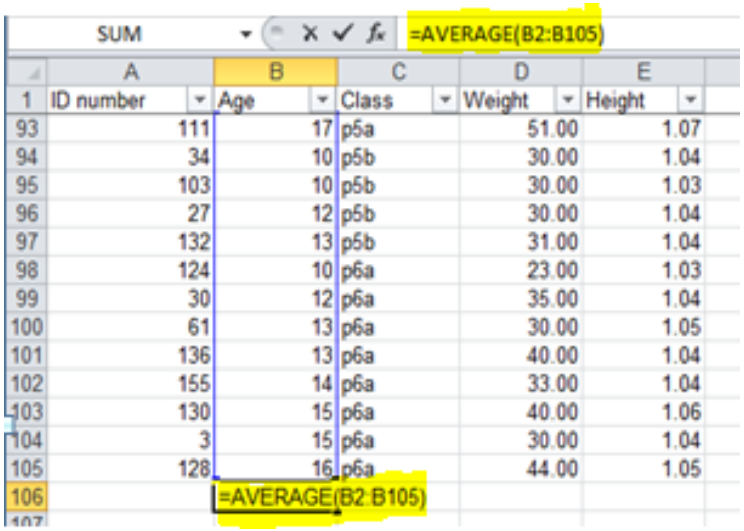
Formulas in Excel contd.

Example 3_Performing descriptive analysis in Excel

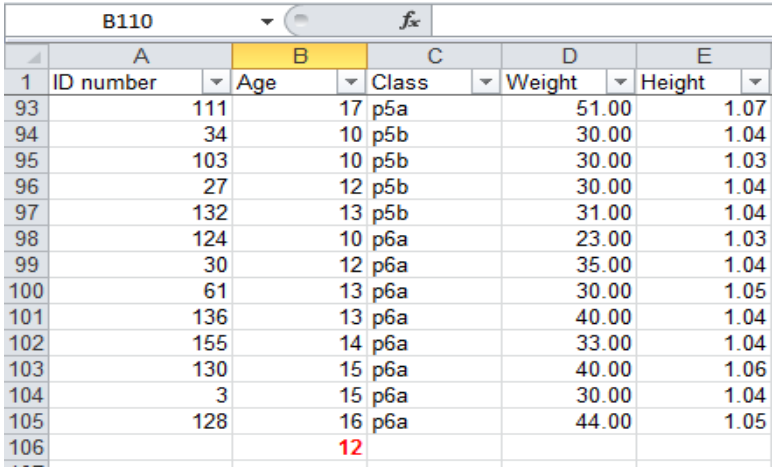
Descriptive analysis (such as mean, median, mode and standard deviation) of quantitative data can be performed in MS Excel.

To compute the mean for a dataset:

- Click in the cell immediately after the last entry in the dataset for the variable concerned (i.e., **cell B106**).
- Type **=AVERAGE(B2:B105)** since the dataset under the variable age extends from B2 to B105), and press **Enter**.
- The mean age (i.e., **12**) is displayed in the selected cell.



	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
93	111	17	p5a	51.00	1.07
94	34	10	p5b	30.00	1.04
95	103	10	p5b	30.00	1.03
96	27	12	p5b	30.00	1.04
97	132	13	p5b	31.00	1.04
98	124	10	p6a	23.00	1.03
99	30	12	p6a	35.00	1.04
100	61	13	p6a	30.00	1.05
101	136	13	p6a	40.00	1.04
102	155	14	p6a	33.00	1.04
103	130	15	p6a	40.00	1.06
104	3	15	p6a	30.00	1.04
105	128	16	p6a	44.00	1.05
106		=AVERAGE(B2:B105)			



	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
93	111	17	p5a	51.00	1.07
94	34	10	p5b	30.00	1.04
95	103	10	p5b	30.00	1.03
96	27	12	p5b	30.00	1.04
97	132	13	p5b	31.00	1.04
98	124	10	p6a	23.00	1.03
99	30	12	p6a	35.00	1.04
100	61	13	p6a	30.00	1.05
101	136	13	p6a	40.00	1.04
102	155	14	p6a	33.00	1.04
103	130	15	p6a	40.00	1.06
104	3	15	p6a	30.00	1.04
105	128	16	p6a	44.00	1.05
106		12			

Formulas in Excel contd.

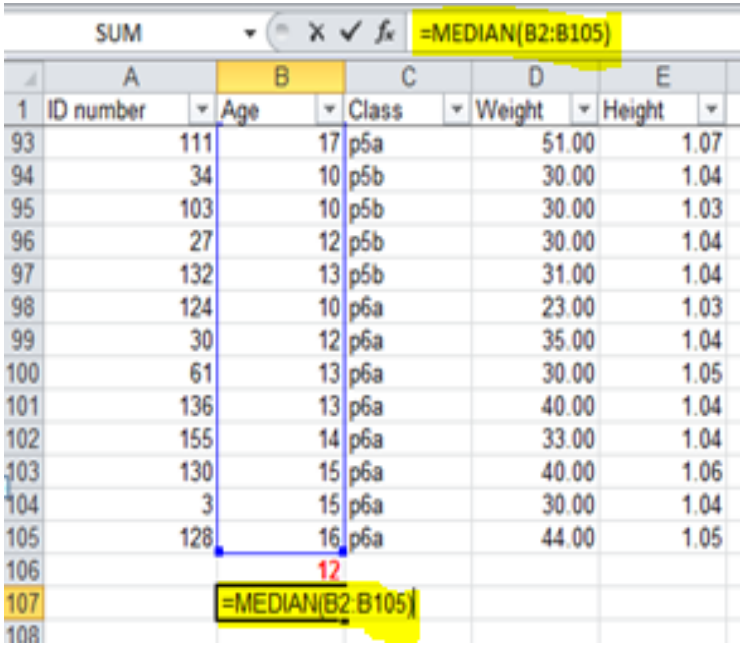
Example 3_Performing descriptive analysis in Excel contd.

To compute the median for a dataset:

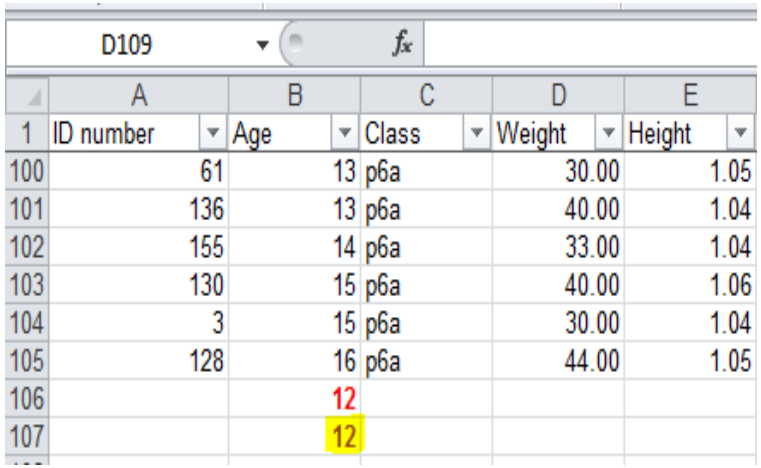
- Click in the cell immediately after the cell where the last computation was done (i.e., **cell B107**).

- Type **=MEDIAN(B2:B105)** since the dataset under the variable age extends from B2 to B105), and press **Enter**.

- The median age (i.e., **12**) is displayed in the selected cell.



	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
93	111	17	p5a	51.00	1.07
94	34	10	p5b	30.00	1.04
95	103	10	p5b	30.00	1.03
96	27	12	p5b	30.00	1.04
97	132	13	p5b	31.00	1.04
98	124	10	p6a	23.00	1.03
99	30	12	p6a	35.00	1.04
100	61	13	p6a	30.00	1.05
101	136	13	p6a	40.00	1.04
102	155	14	p6a	33.00	1.04
103	130	15	p6a	40.00	1.06
104	3	15	p6a	30.00	1.04
105	128	16	p6a	44.00	1.05
106		12			
107		=MEDIAN(B2:B105)			
108					



	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
100	61	13	p6a	30.00	1.05
101	136	13	p6a	40.00	1.04
102	155	14	p6a	33.00	1.04
103	130	15	p6a	40.00	1.06
104	3	15	p6a	30.00	1.04
105	128	16	p6a	44.00	1.05
106		12			
107		12			

Formulas in Excel contd.

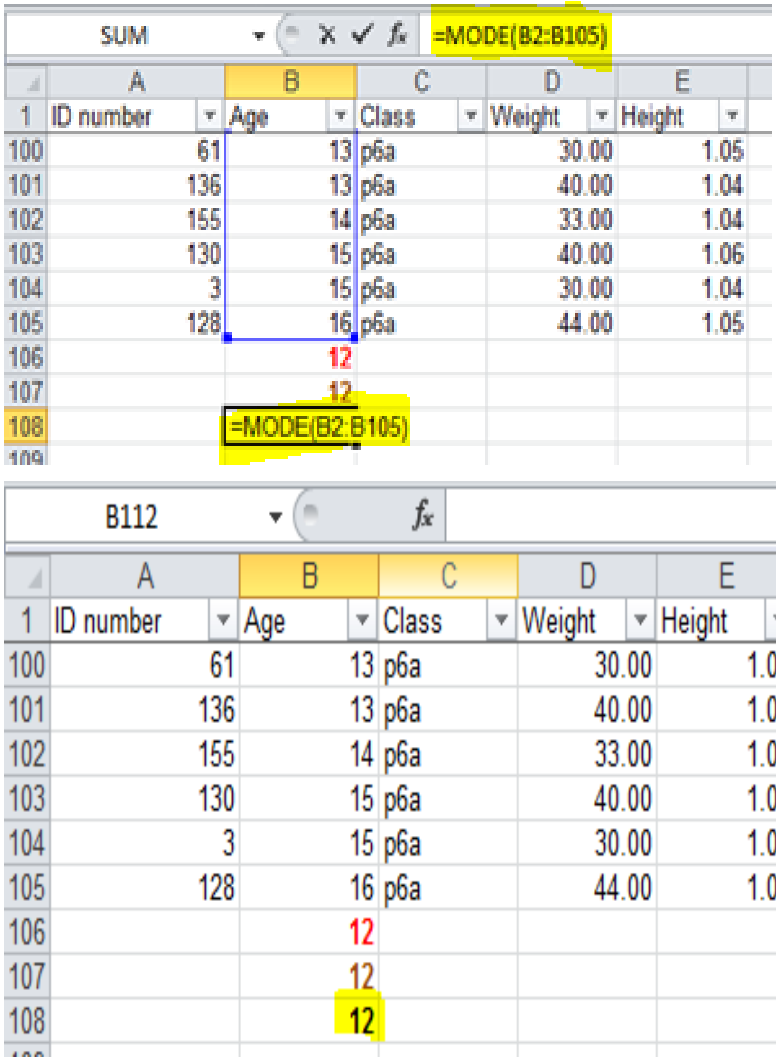
Example 3_Performing descriptive analysis in Excel contd.

To compute the mode for a dataset:

- Click in the cell immediately after the cell where the last computation was done (i.e., **cell B108**).

- Type **=MODE(B2:B105)** since the dataset under the variable age extends from B2 to B105), and press **Enter**.

- The modal age (i.e., **12**) is displayed in the selected cell.



The results show that the ages of the school pupils in the study are normally distributed as the mean, median and mode are equal (i.e., **12**)

Formulas in Excel contd.

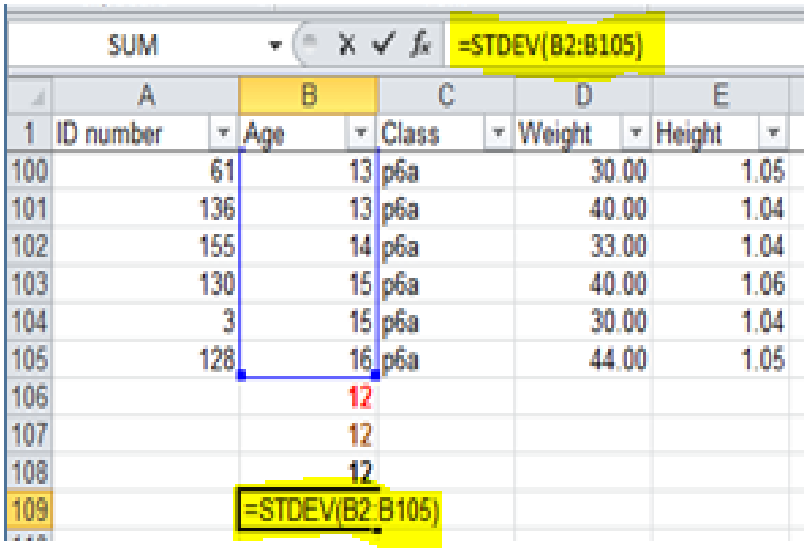
Example 3_Performing descriptive analysis in Excel contd.

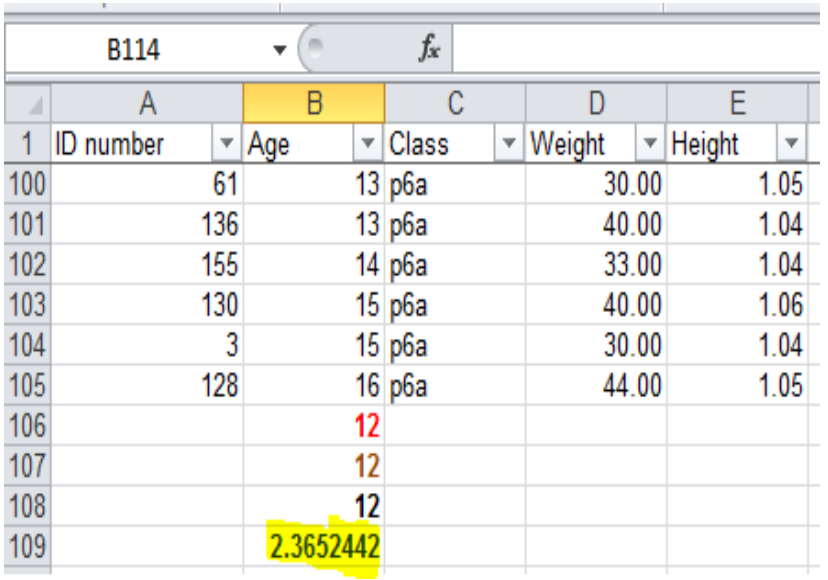
To find the standard deviation for a dataset:

- Click in the cell immediately after the cell where the last computation was done (i.e., **cell B109**).

- Type **=STDEV(B2:B105)** since the dataset under the variable age extends from B2 to B105), and press **Enter**.

- The standard deviation (i.e., **2.37**) is displayed in the selected cell.





	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
100	61	13	p6a	30.00	1.05
101	136	13	p6a	40.00	1.04
102	155	14	p6a	33.00	1.04
103	130	15	p6a	40.00	1.06
104	3	15	p6a	30.00	1.04
105	128	16	p6a	44.00	1.05
106		12			
107		12			
108		12			
109					

Formulas in Excel contd.

Deleting a Formula

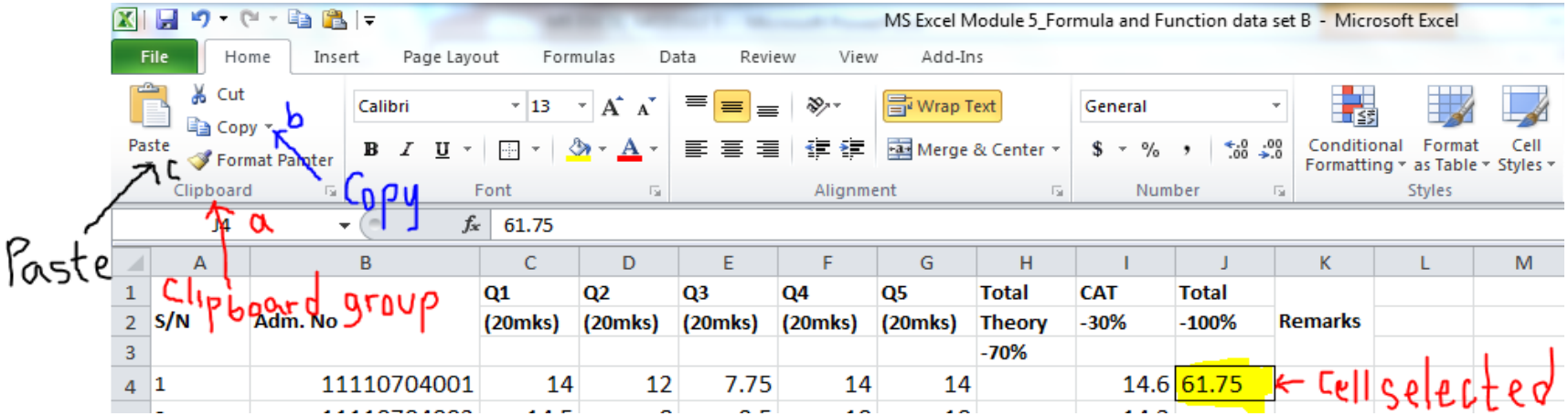
When you delete a formula, the resulting values of the formula is also deleted. It is possible to remove the formula only and leave the resulting value of the formula displayed in the cell.

To delete formulas along with their resulting values:

- Select the cell or range of cells that contains the formula.
- Press [DELETE].

To delete formulas without removing their resulting values:

- Select the cell or range of cells that contains the formula.
- On the **Home** tab, find the **Clipboard** group and click **Copy**  .
- On the **Home** tab, in the **Clipboard** group, click the arrow below **Paste**  and then click **Paste Values**.



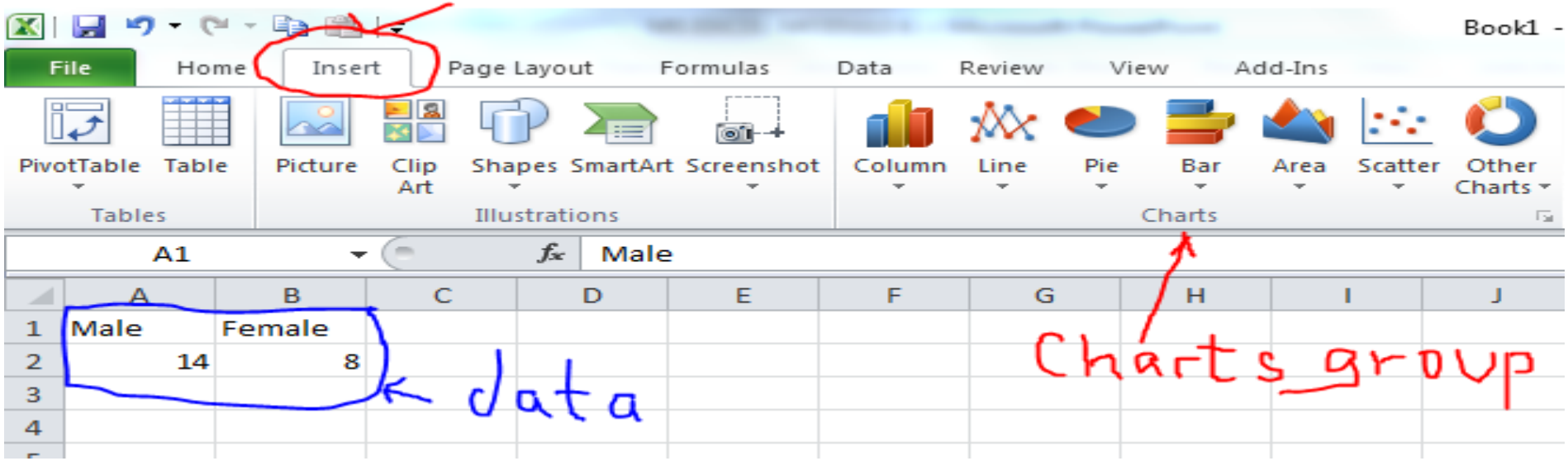
CREATING CHARTS IN MS EXCEL

Creating Charts in Excel

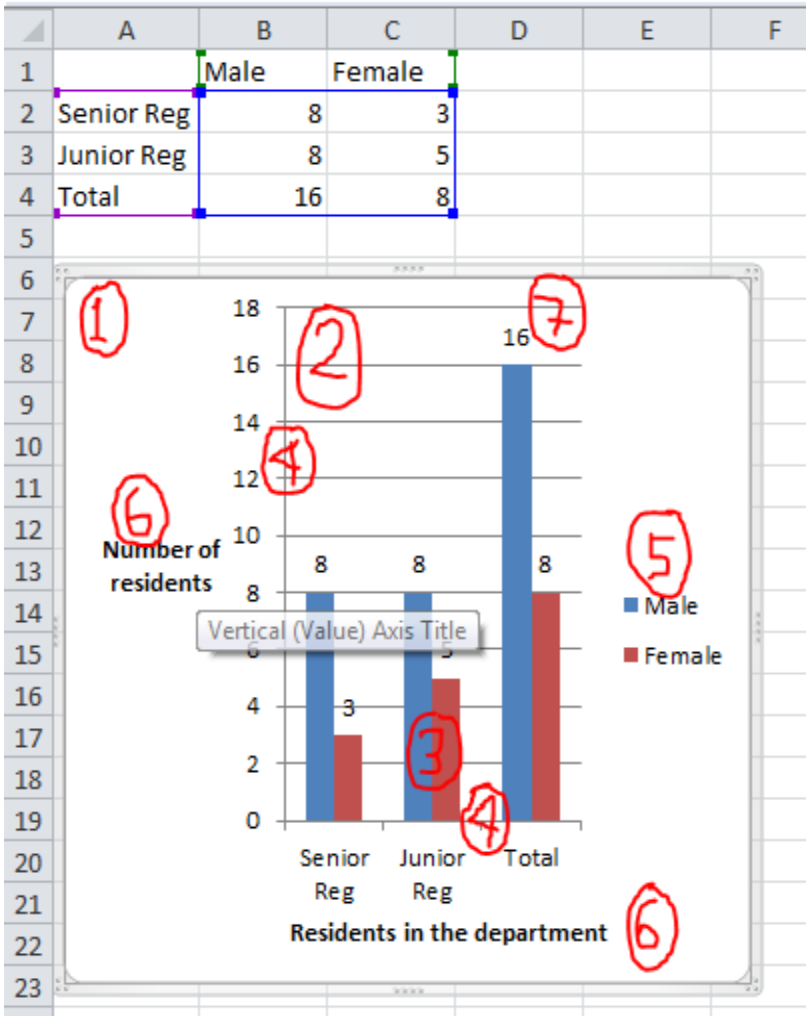
- Charts are used to display series of numeric data in a graphical format to make it easier to understand large quantities of data and the relationship between different series of data.

To create a chart:

- Select or enter the numeric data you want to include in the chart (together with the column heading) on a worksheet.
- On the **Insert** tab, find the **Charts** group and select the preferred chart type.
- Click a chart subtype from the drop menu that will appear.
- The chart appears in the current window.



Creating Charts in Excel contd.
Components of a chart



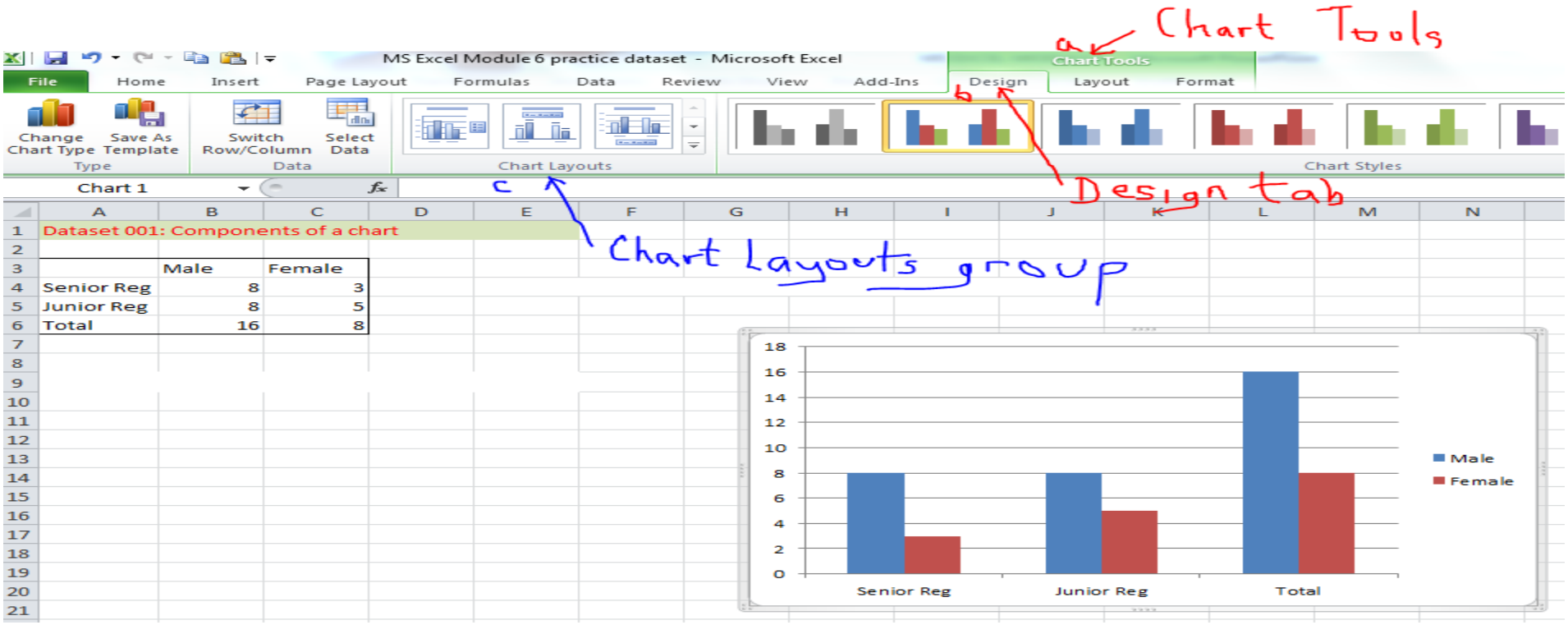
- The components of a chart include:

1. **Chart area**: This is the entire chart and all its elements.
2. **Plot area**: This is the area of the chart bounded by the axes.
3. **Data points**: These are individual values plotted in a chart represented by bars, columns, lines or pies.
4. **Horizontal** (category) and **vertical** (value) **axes** along which the data is plotted in the chart.
5. **Legend**: This identifies the patterns or colors that are assigned to the data series or categories in the chart.
6. **Axes titles**: These are descriptive text for the axes.
7. **Data label**: This provides additional information about a data marker that you can use to identify the details of a data point in a data series.

Creating Charts in Excel contd.

To change Chart Layout:

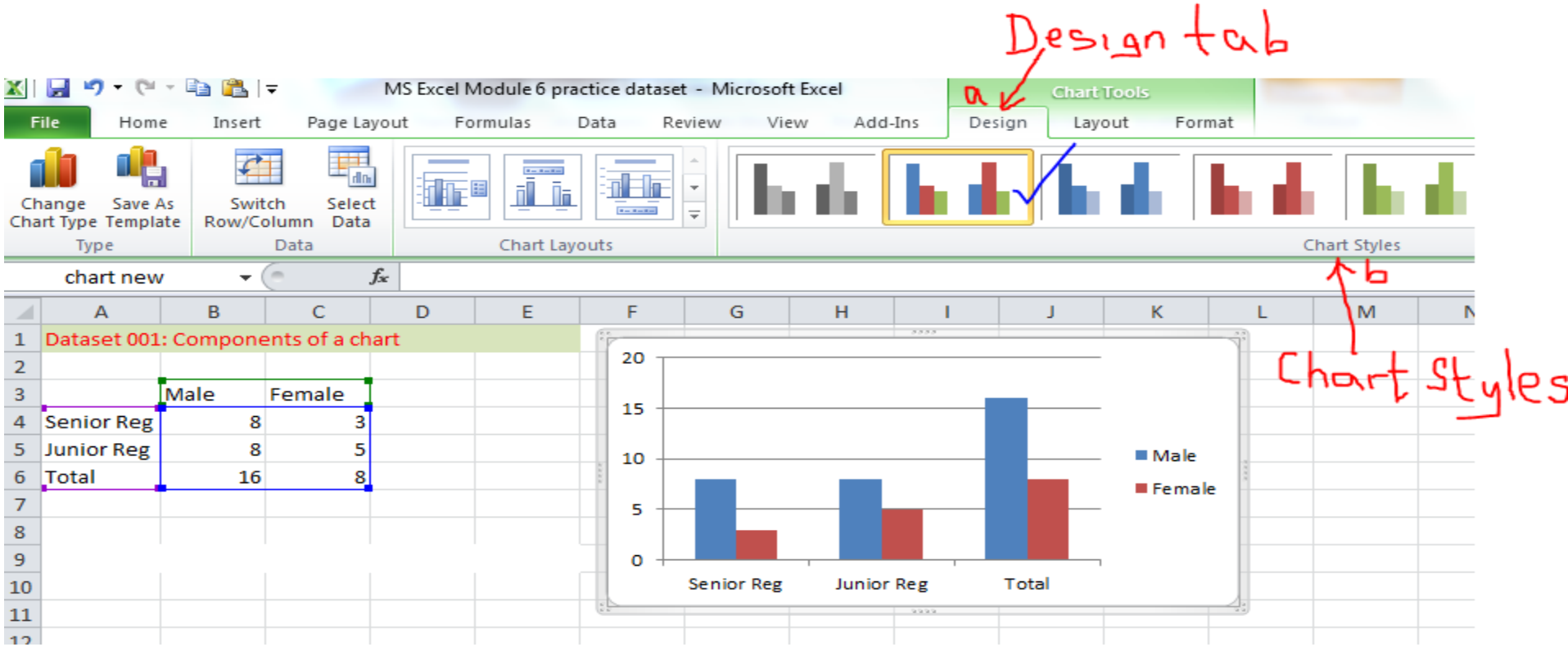
- Click anywhere in the chart
- Go to **Chart Tools**, and click on the **Design** tab.
- In the **Chart Layouts** group, select the chart layout that you want to use. To see all available layouts , click on the drop down arrow.



Creating Charts in Excel contd.

To change Chart Style:

- Click anywhere in the chart
- Go to the **Design** tab, in the **Chart Styles** group, click the chart style that you want to use. To see all predefined chart styles, click on the draw down arrow.



Creating Charts in Excel contd.

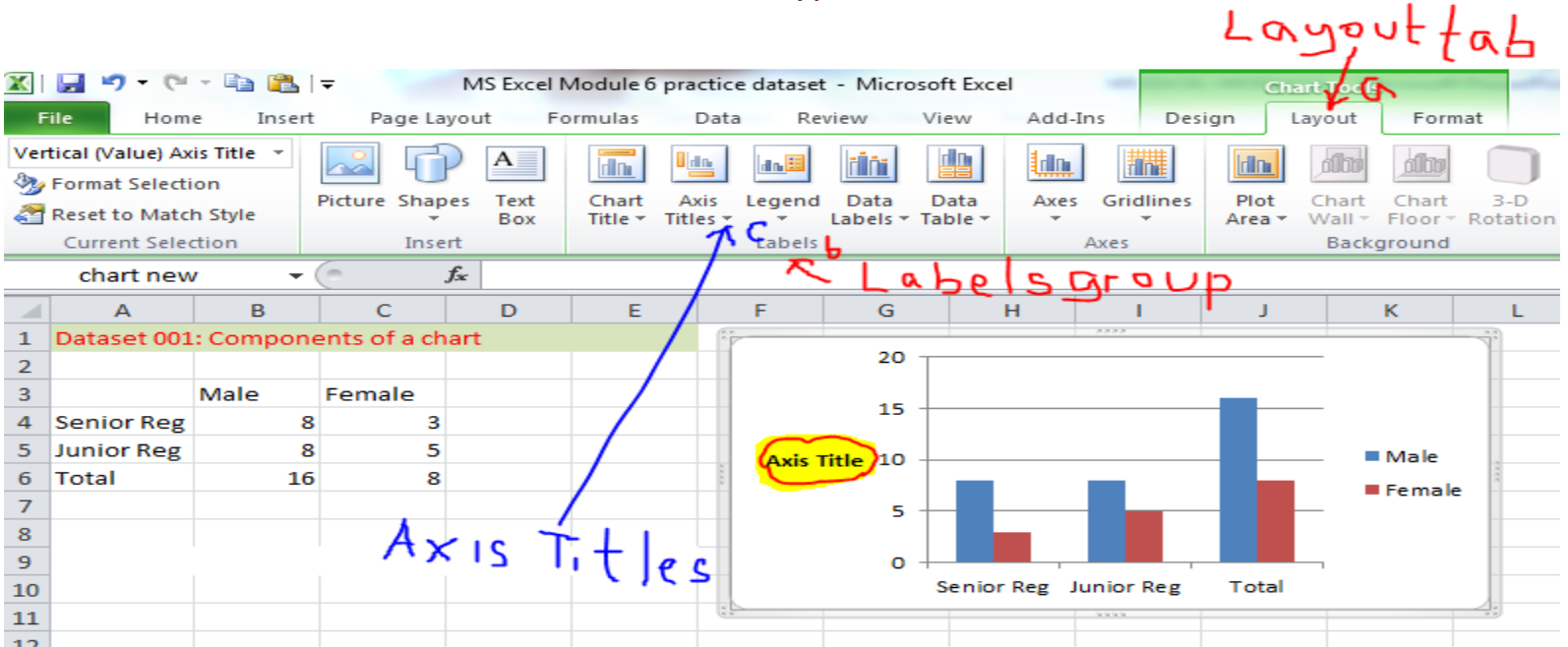
To add Axis Title:

- Click anywhere in the chart
- On the **Layout** tab, find the **Labels** group, and click **Axis Titles**.
- Do one or more of the following:

a. To add a title to a primary horizontal (category) axis, click **Primary Horizontal Axis Title**, and then click the option that you want.

b. To add a title to a primary vertical (value) axis, click **Primary Vertical Axis Title**, and then click the option that you want.

- In the **Axis Title** text box that appears in the chart, type the text that you want.
- To remove an axis title, click **Axis Title**, click the type of axis title to remove, and then click **None**.



Creating Charts in Excel contd.

To add Data Labels:

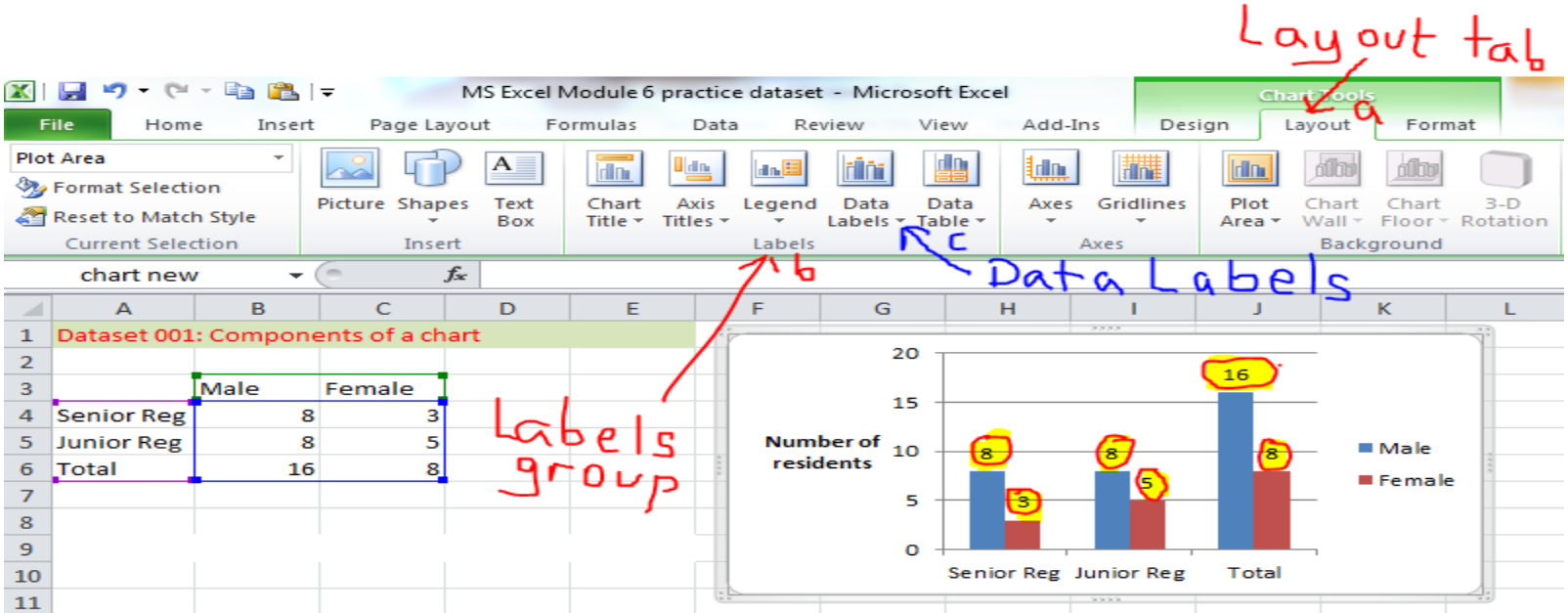
- On a chart, do one of the following:

  a. Click on the chart area to add a data label to all data points of a data series.

  b. Click in the data series to add a data label to all data points of a data series.

  c. Click on a specific data point to add a data label to a singe data point in a data series.
- On the **Layout** tab, in the Labels group, click **Data Labels**, and then click the display option that you want.
- Text boxes will appear in the area of your chart based on your selection.
- Click on the text box to modify the text.
- To remove data labels, click **Data Labels**, and then click None.

(Depending on the chart type that you used, different data label options will be available)



Creating Charts in Excel contd.

To hide or show a Legend:

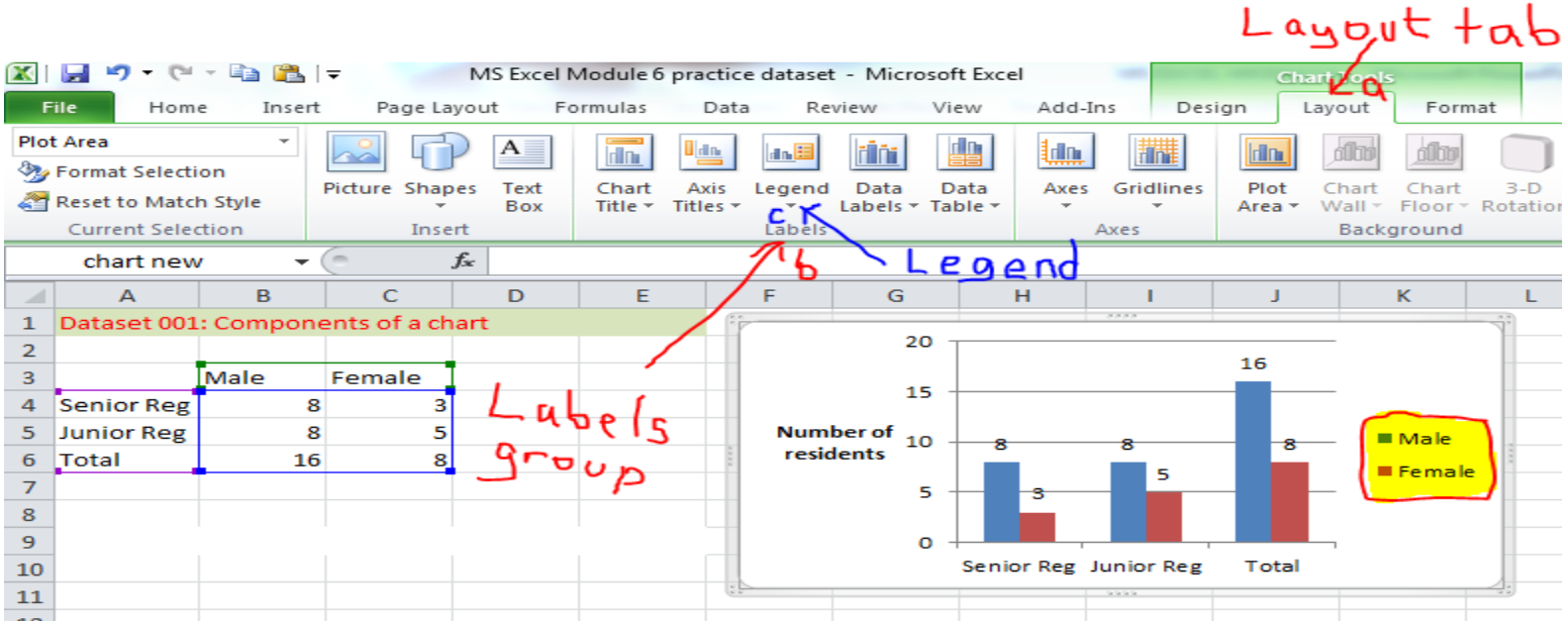
- When you create a chart, the legend appears, but you can hide the legend or change its location after creating the chart.
- Click the chart in which you want to show or hide the legend.
- On the **Layout** tab, in the **Labels** group, click **Legend**.
- Do one of the following:

a. To hide the legend, click **None**.

b. To display a legend, click the display option that you want..

c. For additional options, click **More Legend Options**, and then select the display option that you want

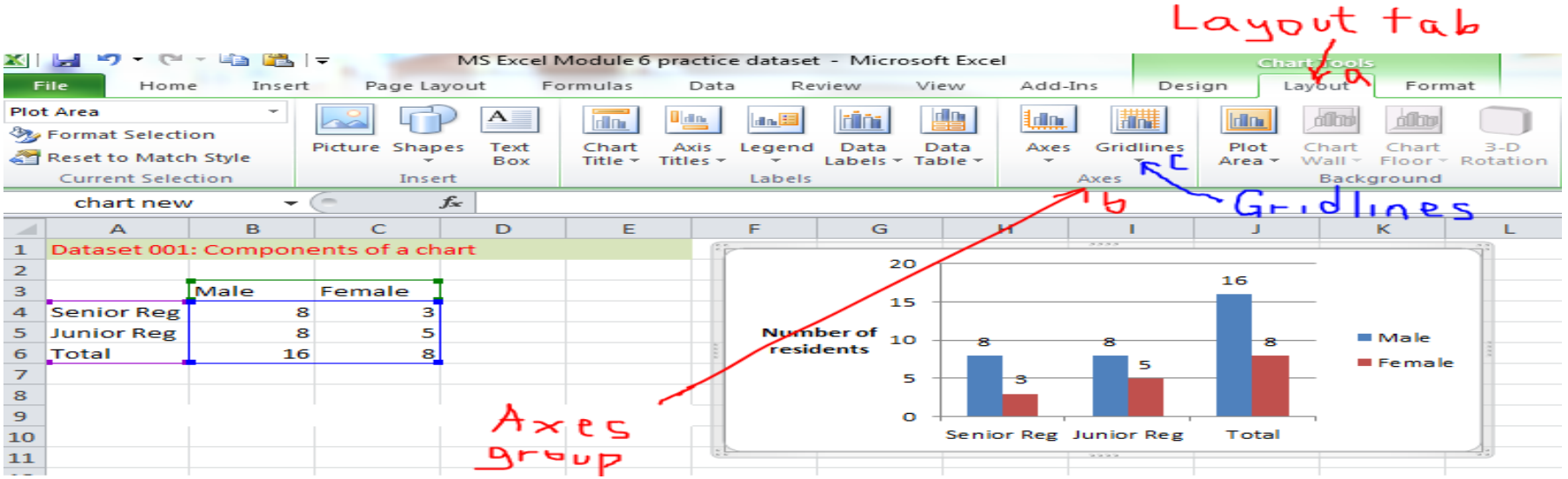
(To quickly remove a legend or a legend entry from a chart, you can select it and then press **DELETE**)

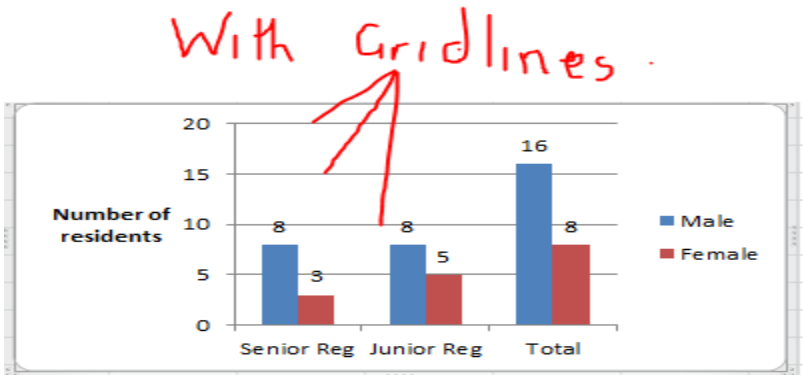


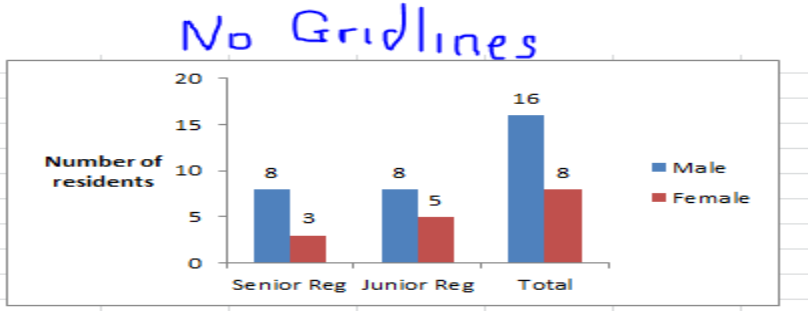
Creating Charts in Excel contd.

To remove Gridlines:

- When you create a chart, gridlines appear, it is preferable to remove them to make your chart neat.
- Click the chart in which you want to remove gridlines.
- On the **Layout** tab, in the **Axes** group, click **Gridlines**.
- Select Primary Horizontal Gridlines and click **None**.







Creating Charts in Excel contd.

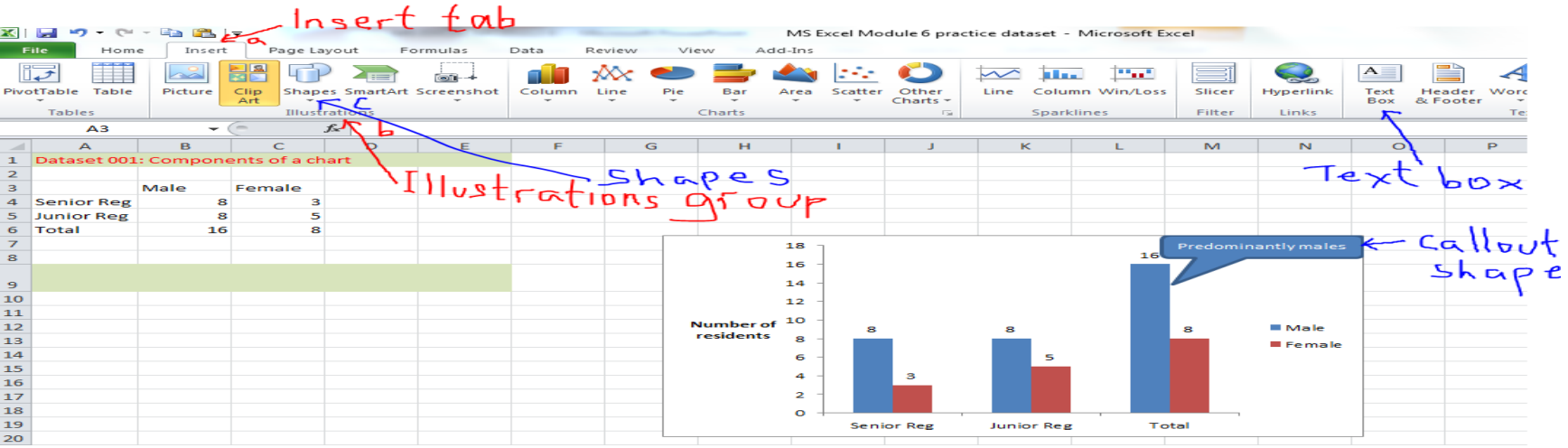
Inserting graphics in a worksheet:

- Sometimes you may want to add graphics such as a corporate logo to a worksheet. Images such as **ClipArt** and **SmartArt** are available in Excel, along with a host of cut-out shapes that you can use to label your chart. They are all on the **Insert** tab, in the **Illustrations** group.

To insert graphics (e.g., shapes) in a chart:

- Click the chart in which you want to insert graphics.
- On the **Insert** tab, in the **Illustrations** group, click the **graphic** of choice (in this case **Shapes)**.
- Select the shape of your choice and drag it to the place you want it to be in the chart.
- If you want to type some thing inside the shape, select a **text box**, drag it inside the shape and type what you want to type in it.

(In this case a callout shape highlighting male predominance has been inserted in the chart).



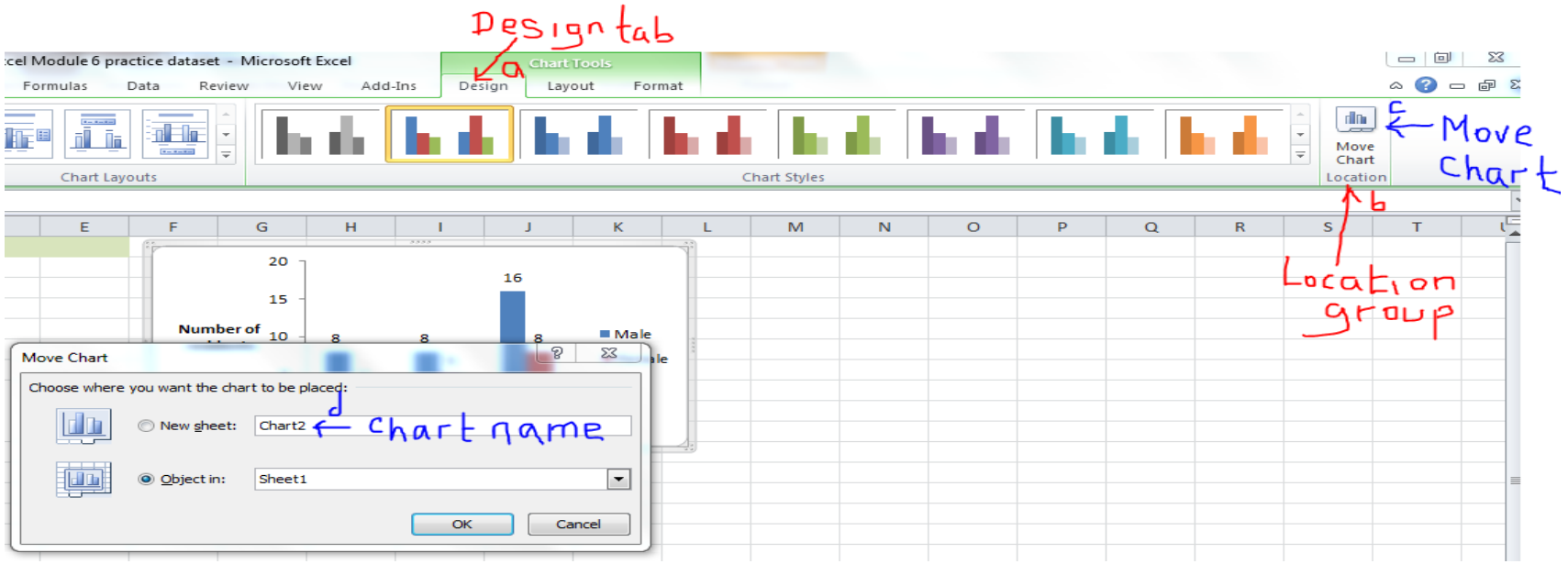
Creating Charts in Excel contd.

To Move or Resize Chart:

- You can move a chart to any location on a worksheet or to a new or existing worksheet. You can also change the size of the chart for a better fit.
- To move a chart , drag it to the location that you want.
- To resize a chart, click on one of the edges and drag towards the center.

To move chart to a New Sheet:

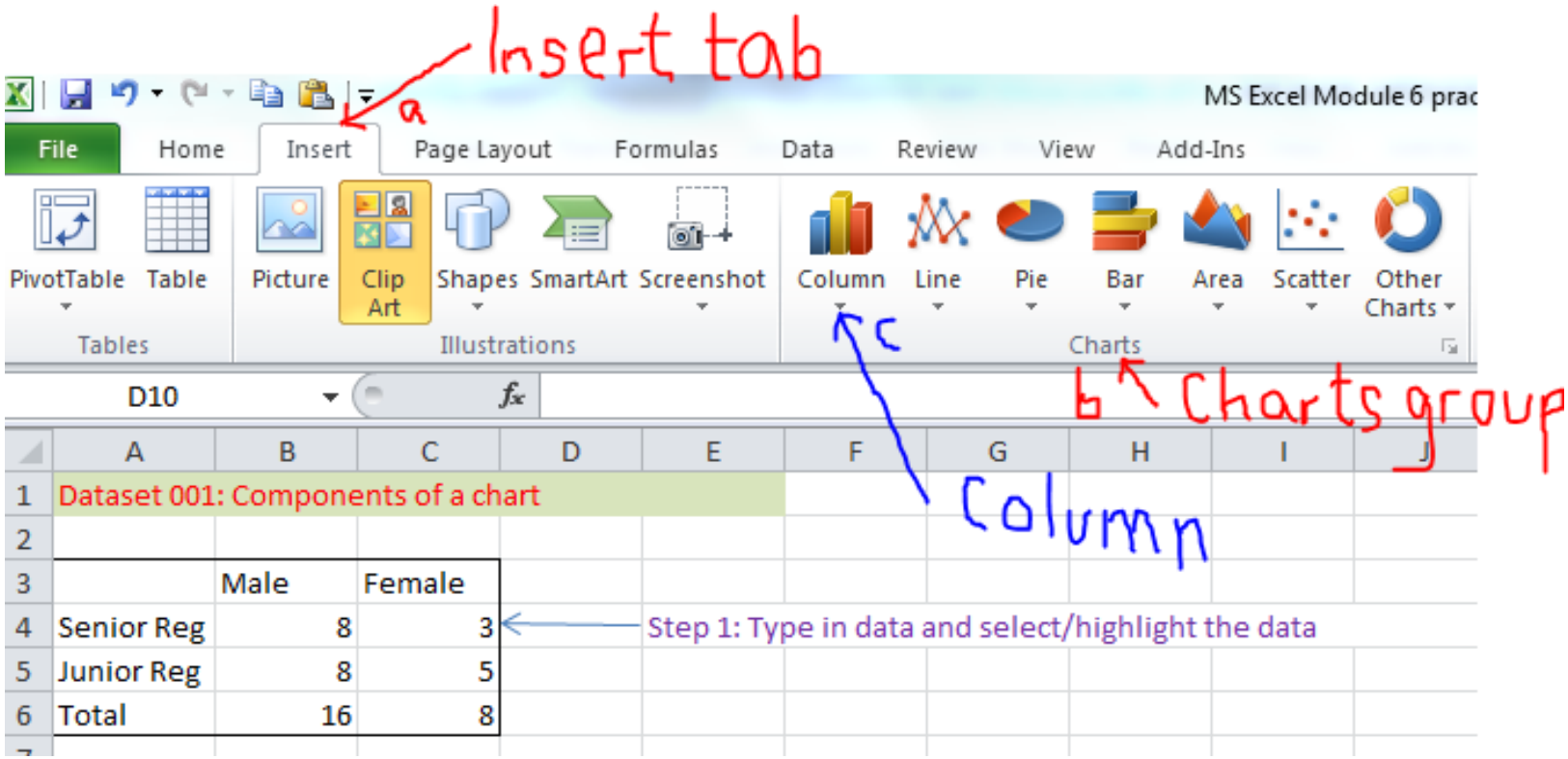
- On the **Design** tab, in the **Location** group, click **Move Chart**.
- Under **Choose where you want the chart to be placed**, click on the **New sheet** bubble.
- Type a new chart name in the **New sheet** box, and click **OK**.



Creating different types of Charts in Excel.
(Column or Vertical Bar Chart)

To create a Column (or Vertical Bar Chart):

- **Step1**: Type in your data in a worksheet (with the columns' headings properly labelled) and select/highlight the data.
- **Step 2**: On the **Insert** tab, in **Charts group**, click **Column**, use the draw down arrow to select the design of choice.

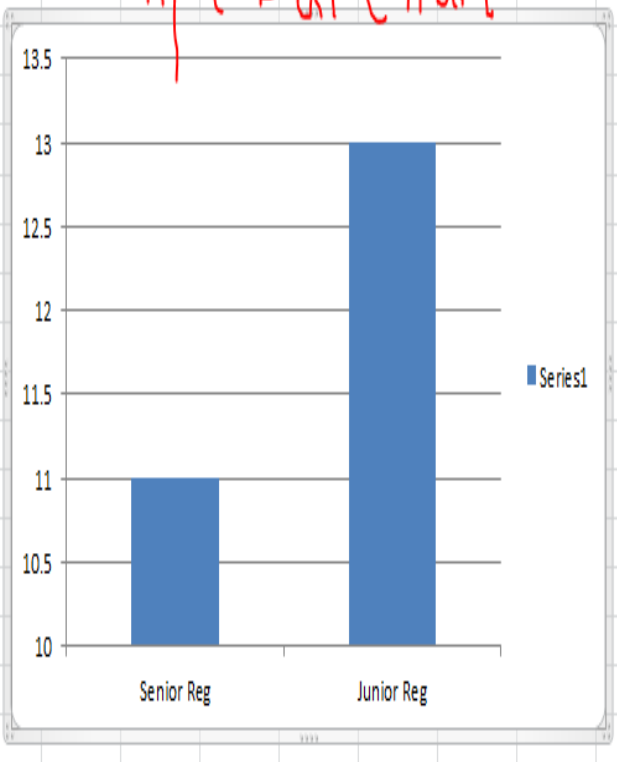


Creating different types of Charts in Excel contd.
(Column or Vertical Bart Chart contd.)

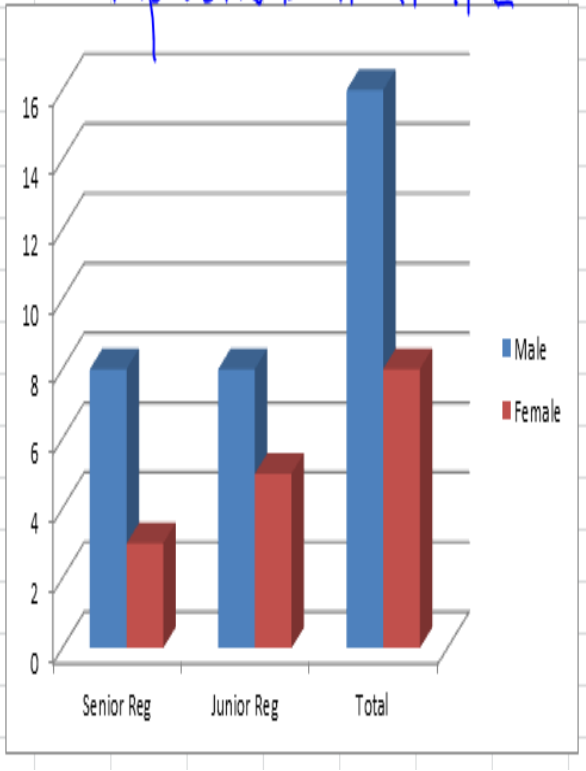
To create a Column (or Vertical Bar Chart) contd.:

- **Step 2 contd.**: The arrangement of data is usually dictated by the design of choice. The types of column (vertical bar chart) are as shown below:

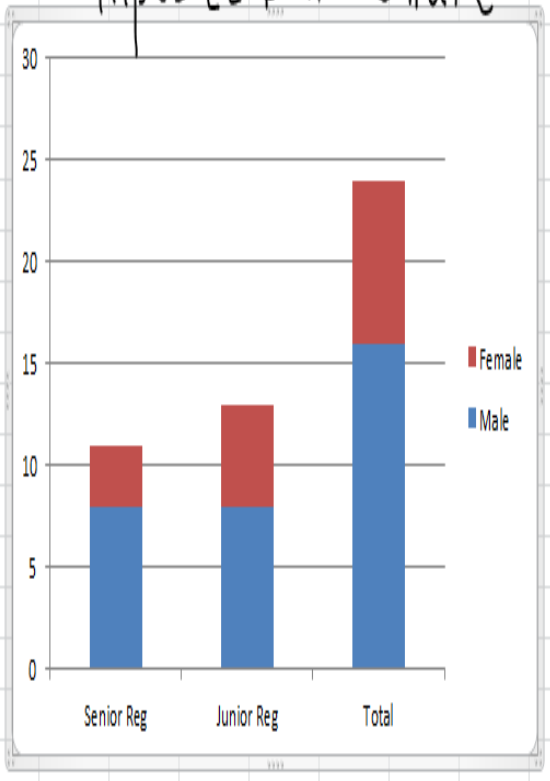
Simple Bar Chart



Compound Bar Chart



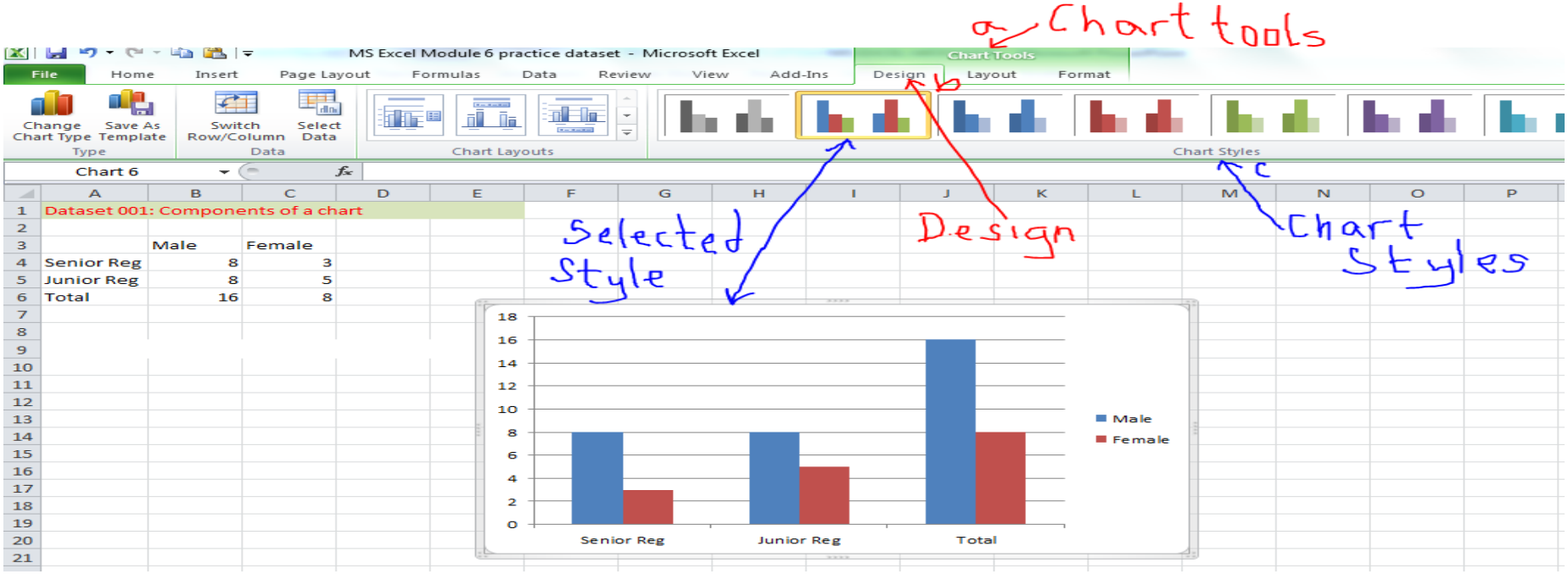
Composite Bar Chart



Creating different types of Charts in Excel contd.
(Column or Vertical Bar Chart contd.)

To create a Column (or Vertical Bar Chart) contd.:

- **Step 3**: To format the style, click on the **Design** tab in **Chart Tools**, and select the style of choice in the **Chart styles** group.

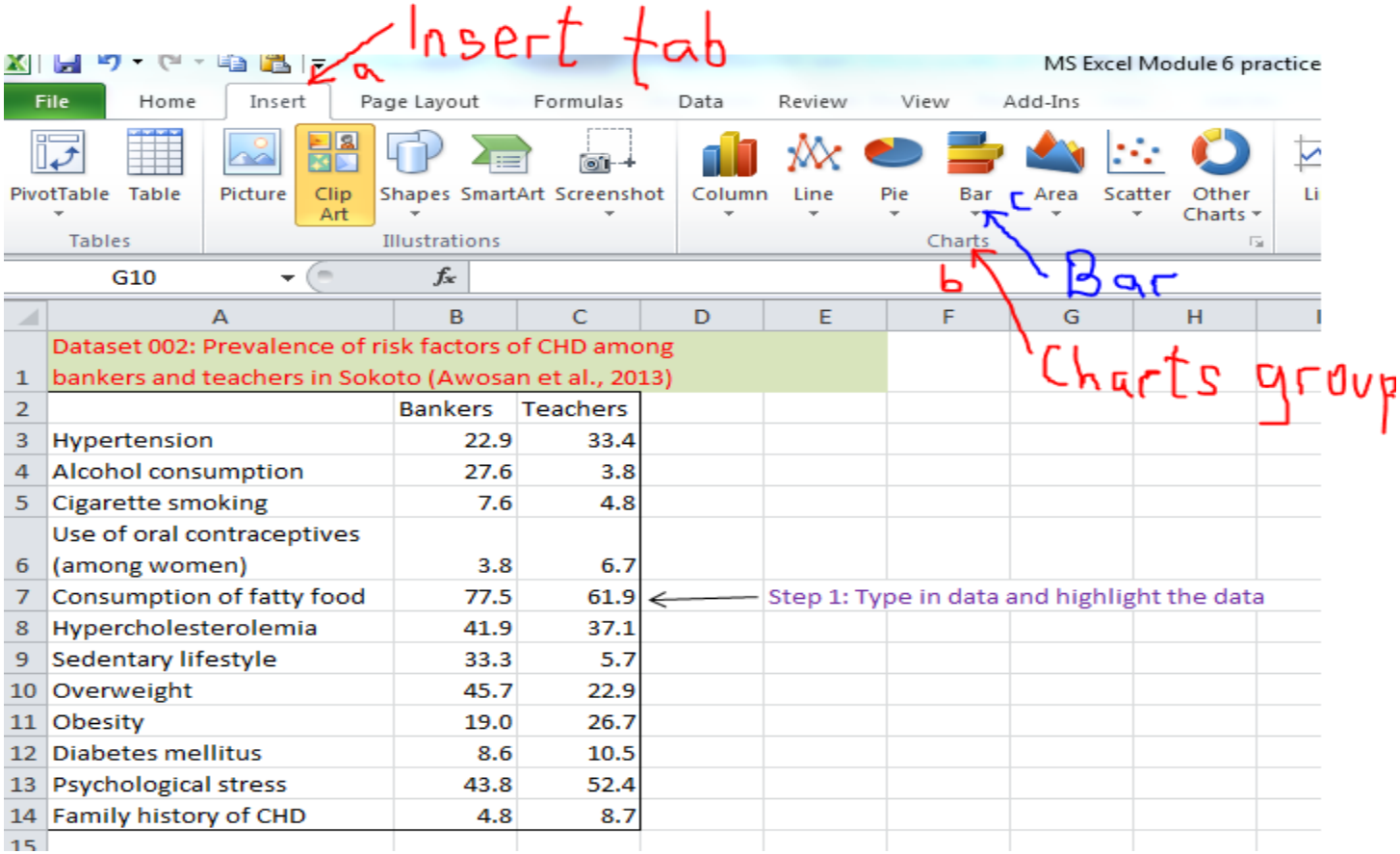


- **Step 4**: Add **Axis Title** (as appropriate) as earlier described.
- **Step 5**: Add **Data Labels** as earlier described.
- **Step 6**: Hide, show or reposition the **Legend** (as appropriate) as earlier described.
- **Step 7**: Remove **Gridlines** (in this case horizontal gridlines) as earlier described.

Creating different types of Charts in Excel contd.
(Bar or Horizontal Bar Chart)

To create a Bar (or Horizontal Bar Chart):

- **Step1**: Type in your data in a worksheet (with the columns' headings properly labelled) and select/highlight the data.
- **Step 2**: On the **Insert** tab, in **Charts group**, click **Bar**, use the draw down arrow to select the design of choice.

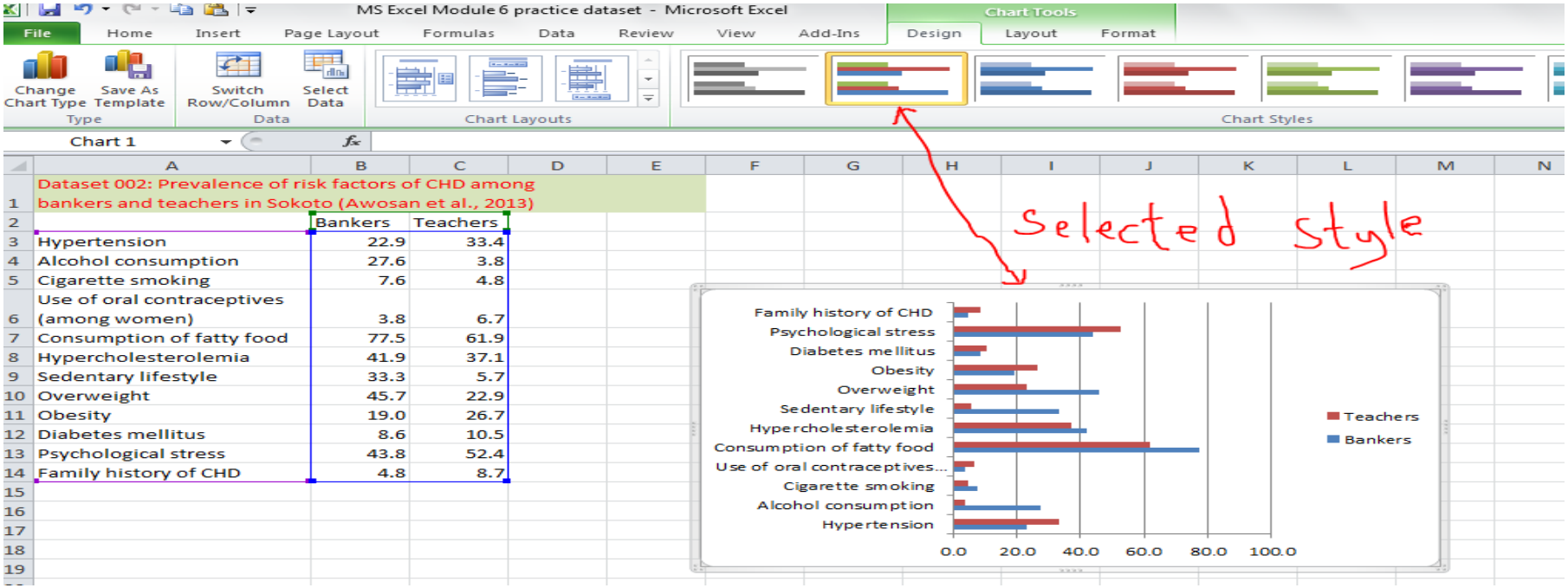


	Bankers	Teachers
Hypertension	22.9	33.4
Alcohol consumption	27.6	3.8
Cigarette smoking	7.6	4.8
Use of oral contraceptives (among women)	3.8	6.7
Consumption of fatty food	77.5	61.9
Hypercholesterolemia	41.9	37.1
Sedentary lifestyle	33.3	5.7
Overweight	45.7	22.9
Obesity	19.0	26.7
Diabetes mellitus	8.6	10.5
Psychological stress	43.8	52.4
Family history of CHD	4.8	8.7

Creating different types of Charts in Excel contd.
(Bar or Horizontal Bar Chart contd.)

To create a Bar (or Horizontal Bar Chart) contd.:

- **Step 3**: Select the style of your choice in the various styles that show in the **Chart Styles** group of **Design** tab, under **Chart Tools** that appears after clicking on the draw down arrow on **Bar**.

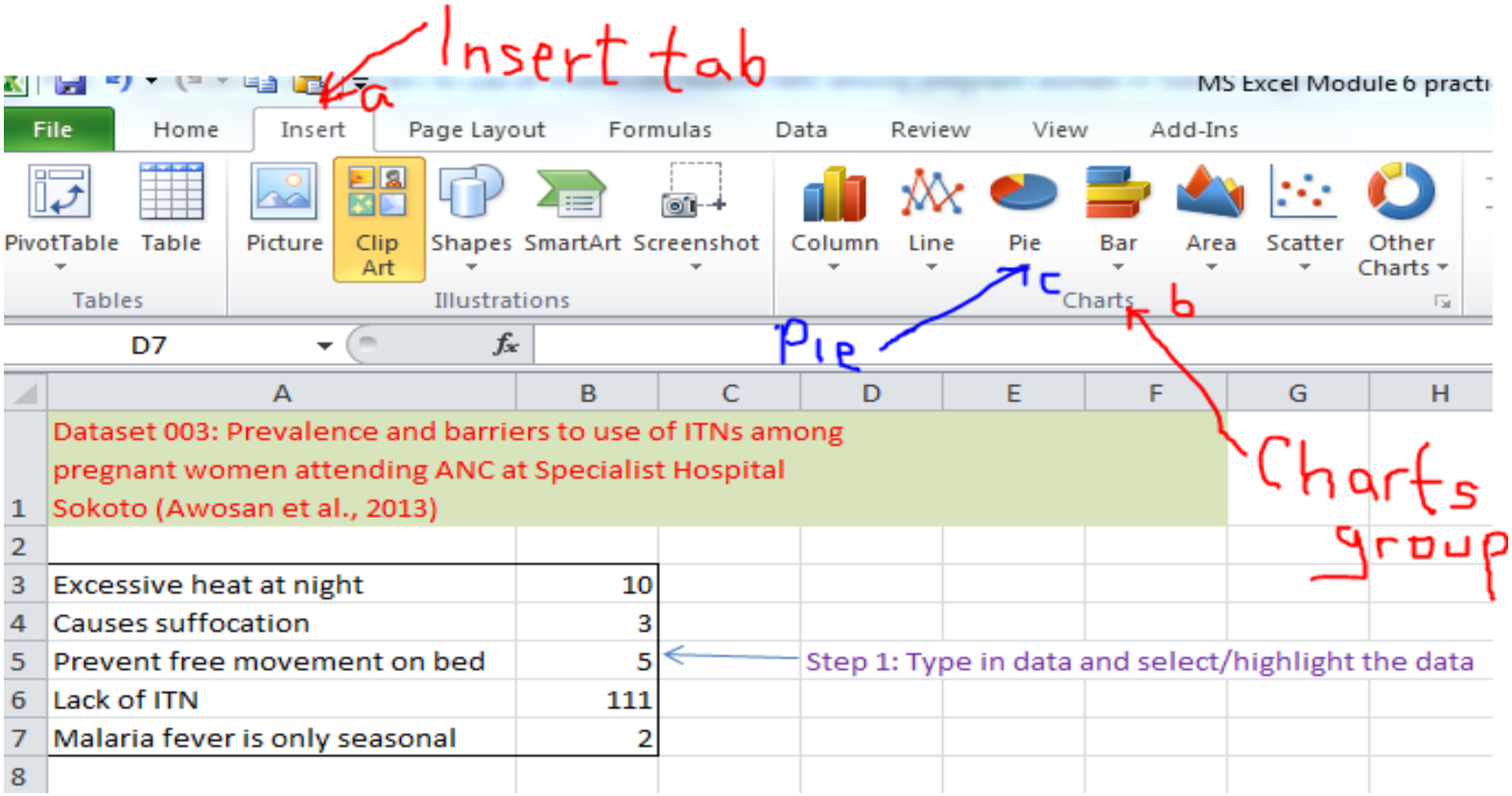


- **Step 4**: Add **Axis Title** (as appropriate) as earlier described.
- **Step 5**: Add **Data Labels** as earlier described.
- **Step 6**: Hide, show or reposition the **Legend** (as appropriate) as earlier described.
- **Step 7**: Remove **Gridlines** (in this case vertical gridlines) as earlier described.

Creating different types of Charts in Excel contd.
(Pie Chart)

To create a Pie Chart:

- **Step1**: Type in your data in a worksheet (with the columns' headings properly labelled) and select/highlight the data.
- **Step 2**: On the **Insert** tab, in **Charts group**, click **Pie**, use the draw down arrow to select the design of choice.

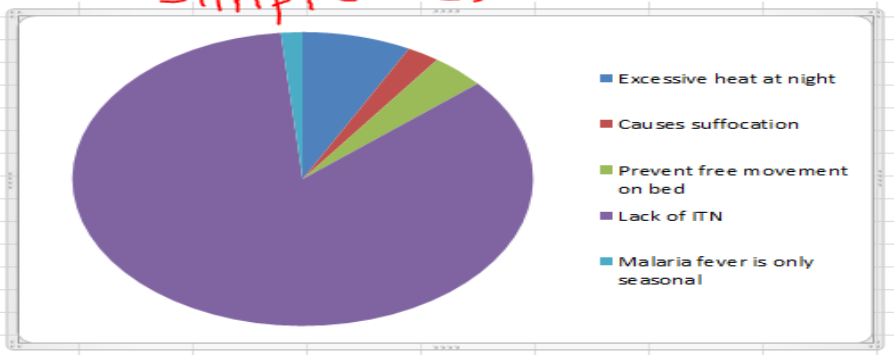


Creating different types of Charts in Excel contd.
(Pie Chart contd.)

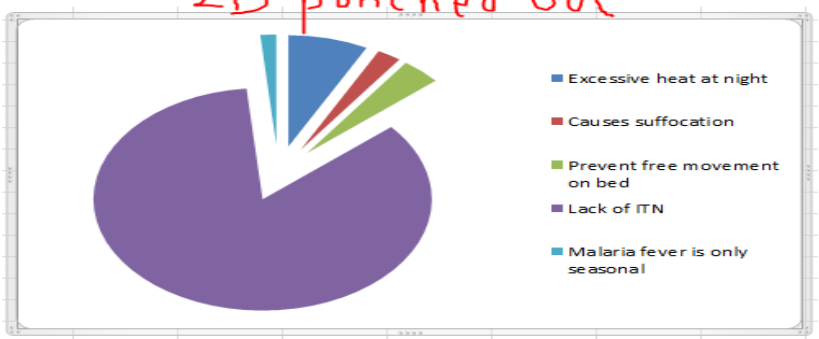
To create a Pie Chart contd.:

- **Step 2 contd.**: Although different designs are available, the Simple 2D Pie Chart should be used instead of 3D or punched out designs (unless it is absolutely necessary).

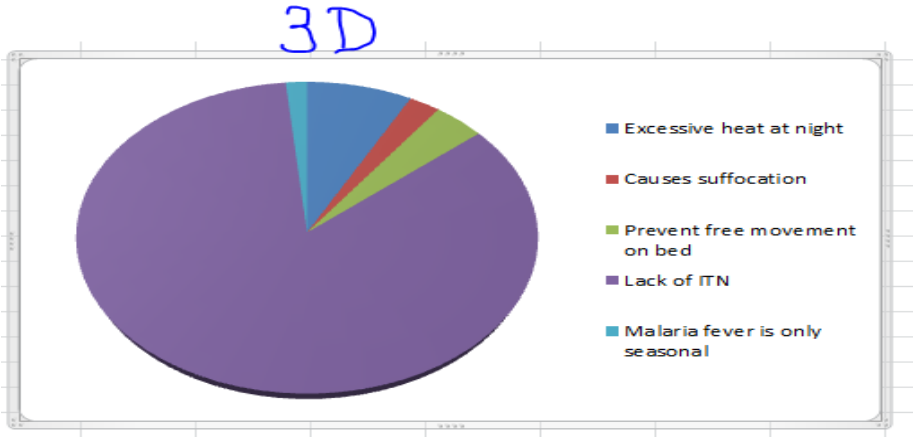
Simple 2D



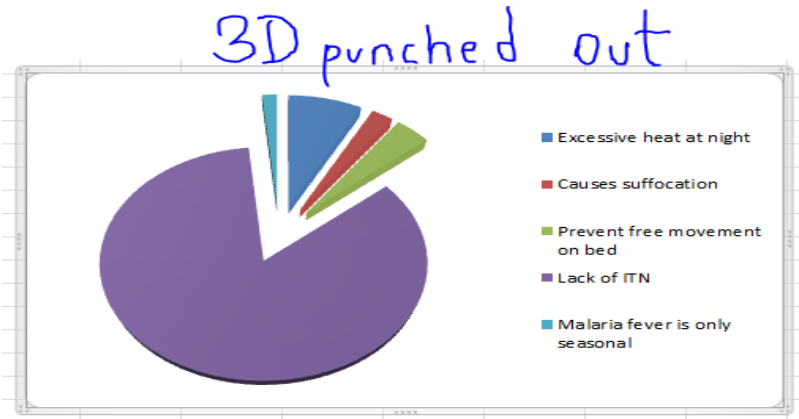
2D punched out



3D



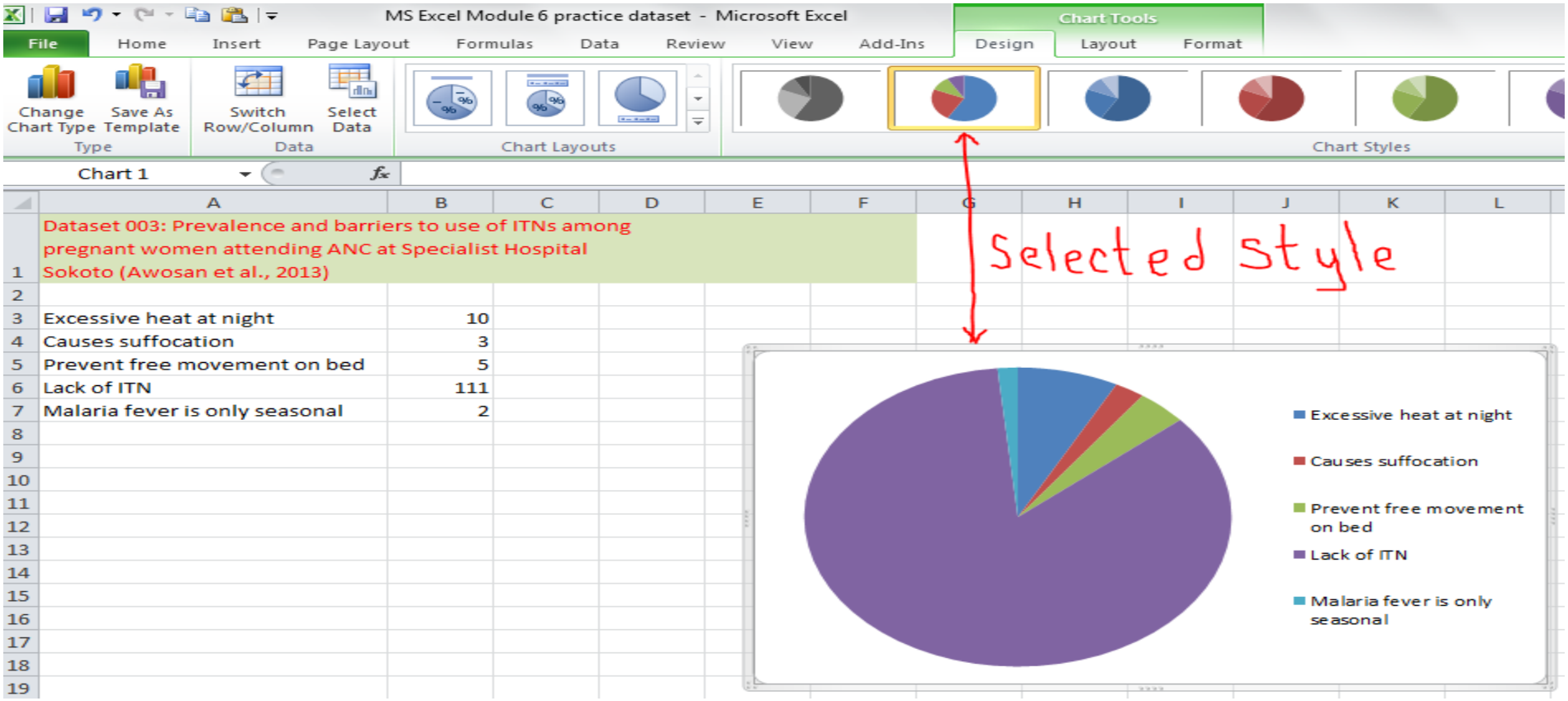
3D punched out



Creating different types of Charts in Excel contd.
(Pie Chart contd.)

To create a Pie Chart contd.:

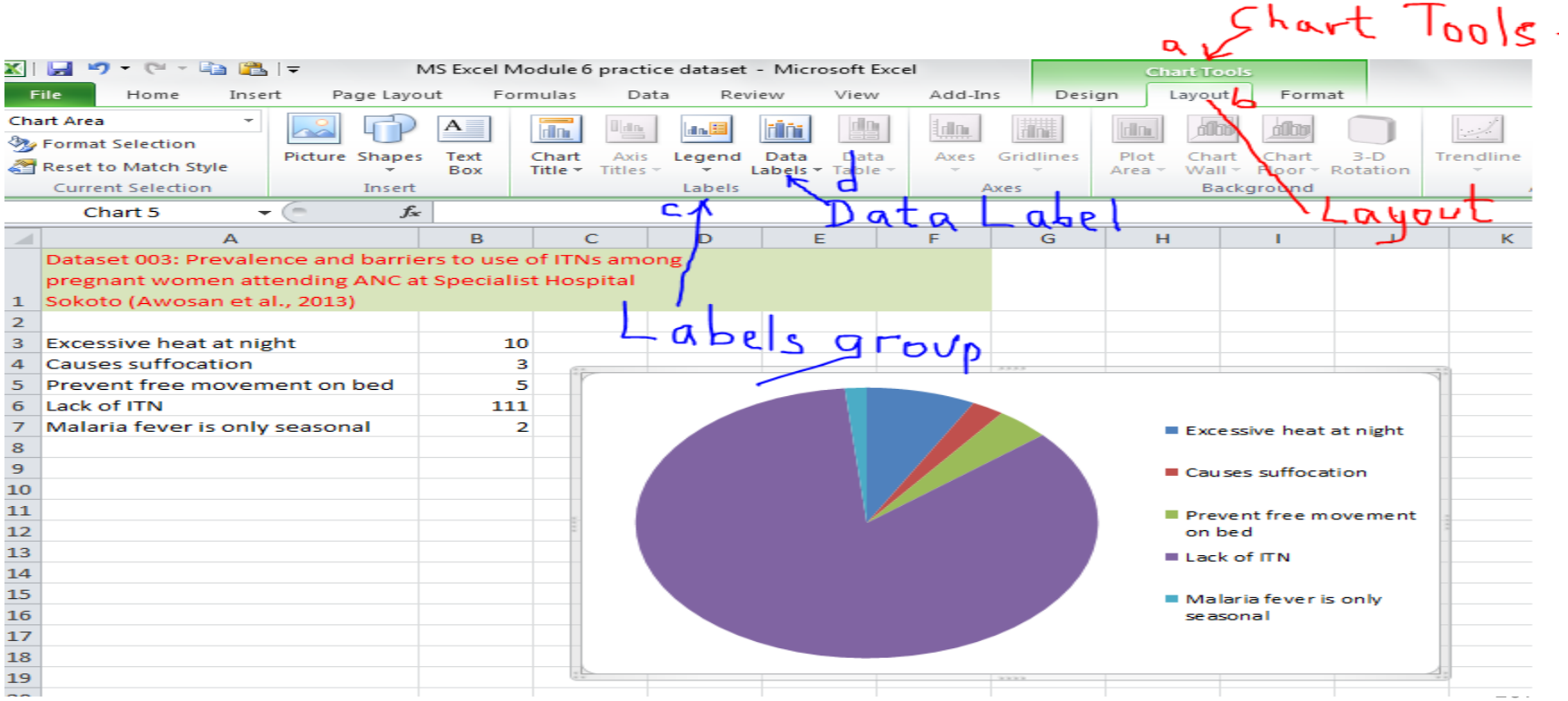
- **Step 3**: Select the style of your choice in the various styles that show in the **Chart Styles** group of **Design** tab , under **Chart Tools** that appears after clicking on the draw down arrow on **Pie**.



Creating different types of Charts in Excel contd.
(Pie Chart contd.)

To create a Pie Chart contd.:

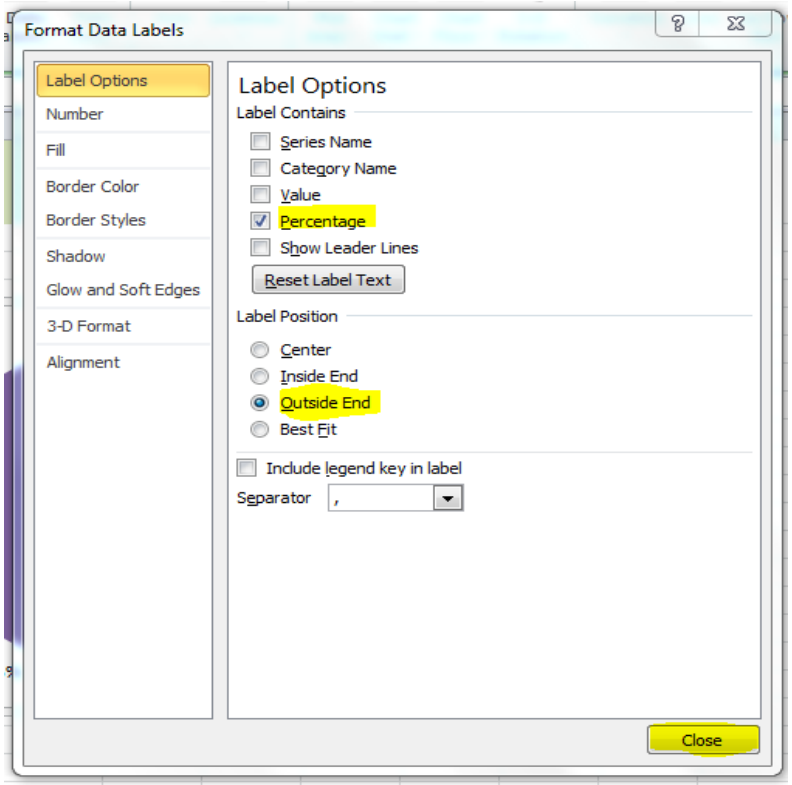
- **Step 4**: Unlike Column and Bar, in the case of Pie Chart, **Axis Title** is not applicable, the next thing to be done is to add **Data Labels**.
- In **Chart Tools**, click **Layout** tab, find the **Labels** group, and click on the draw down arrow on **Data Label**, and select **More Data Label Options** in the pop-up menu, following which **Format Data Labels** dialog box appears.

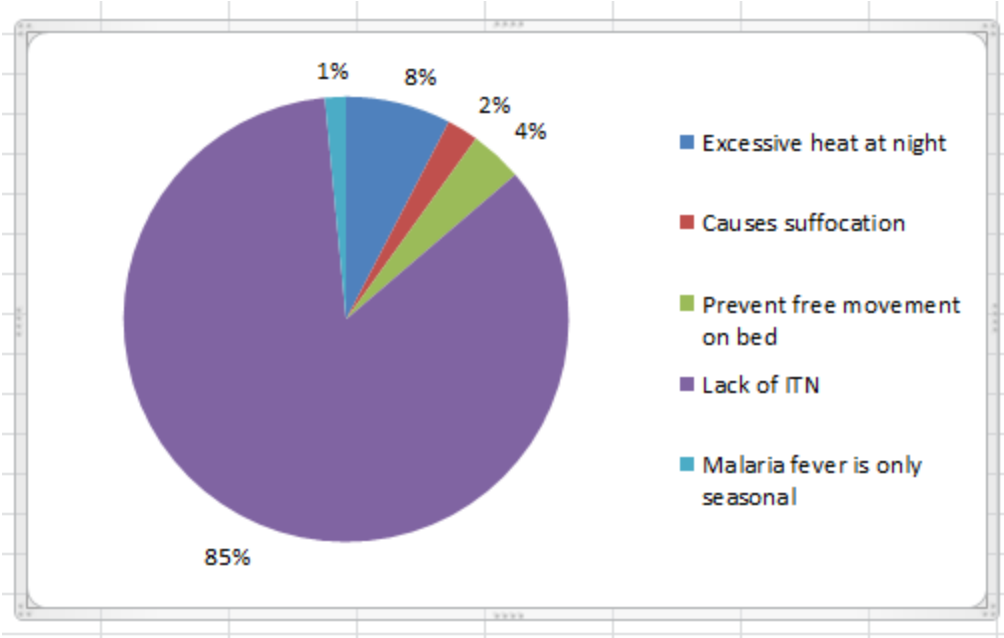


Creating different types of Charts in Excel contd.
(Pie Chart contd.)

To create a Pie Chart contd.:

- **Step 4 contd.**: In the **Format Data Labels** dialog box, do the following:
  - In the **Label Contains** section of **Label Options**: Deselect **Value** that usually appears by default and select **percentage**. You may retain or deselect **Show Leader Lines** as applicable.
  - In the **Label Position** section of **Label Options**: Select **Outside End,** and click **CLOSE**.





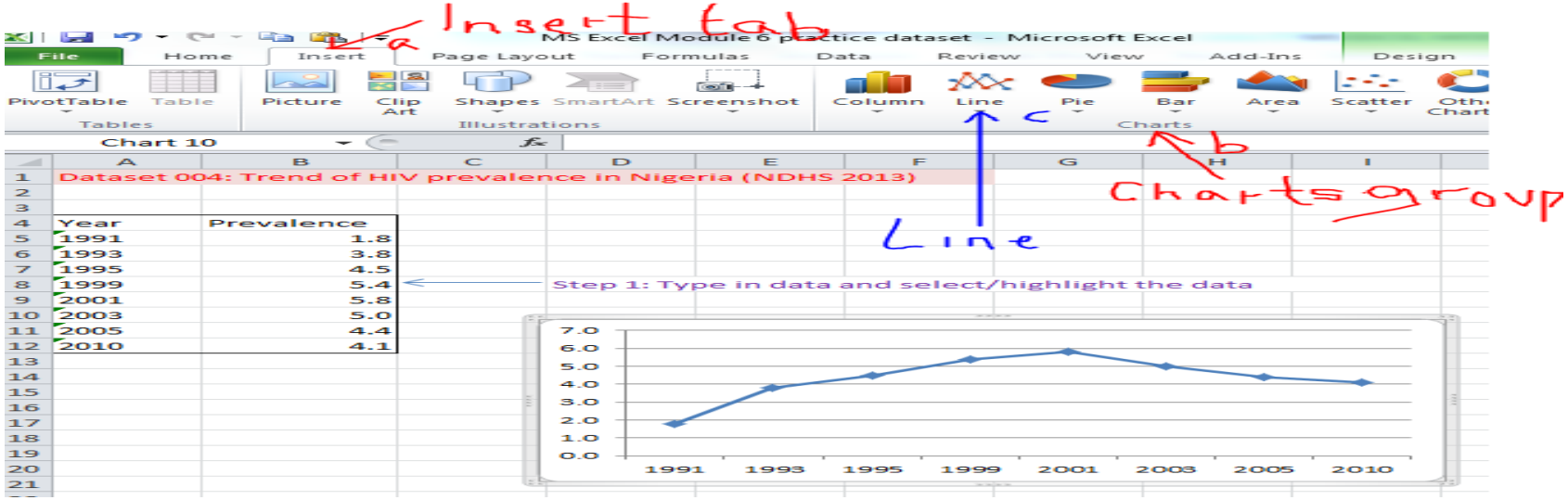
To change the position of the **Legend**, click on the draw down arrow on **Legend** in the **Labels** group and select the position of your choice.

Creating different types of Charts in Excel contd. (Line graph)

To create a Line Graph:

Line Graph is used to present time series data, such as trend of a disease or health condition.

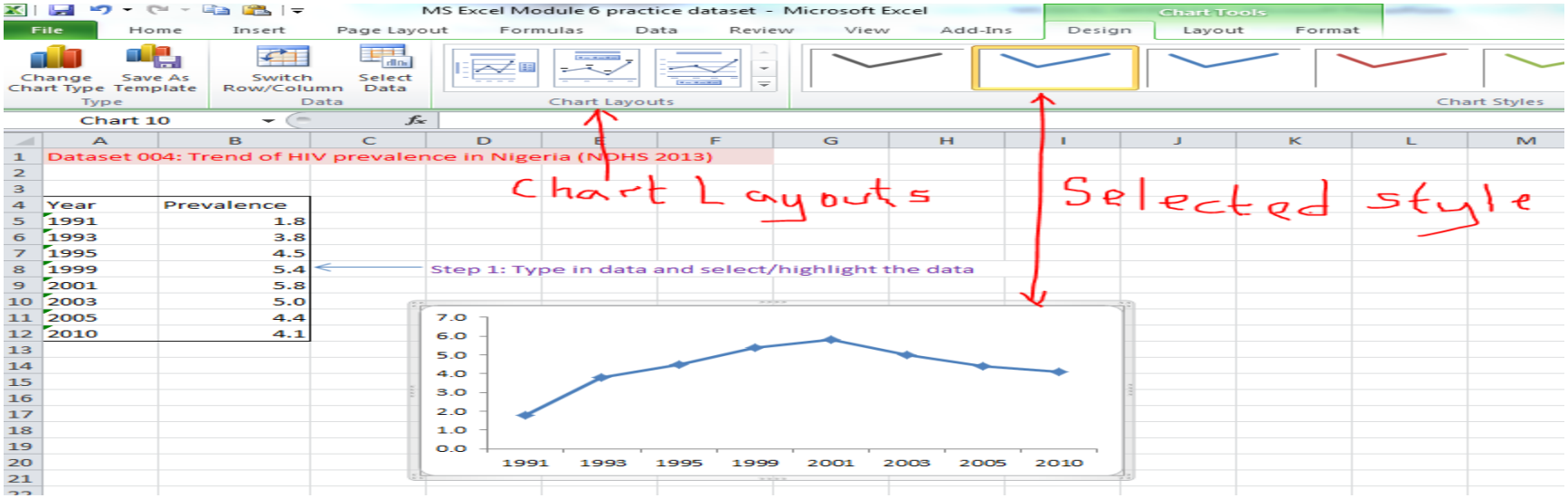
- **Step 1**: Type in your data in a worksheet (with the columns' headings properly labelled) and select/highlight the data. The years are entered as text [i.e., type inverted comma (') before typing the year] and not as numbers, this is to enable Excel treat them as categories.
- **Step 2**: On the **Insert** tab, in **Charts group**, click **Line**, use the draw down arrow to select the design of choice.



Creating different types of Charts in Excel contd.
(Line graph contd.)

To create a Line Graph contd.:

- **Step 3**: To format the style, click on **Design** tab, under **Chart Tools**, and select the style of choice in the **Chart styles** group.



- **Step 4**: Add **Axis Title** (as appropriate) as earlier described.
- **Step 5**: Add **Data Labels** as earlier described.
- **Step 6**: Retain or click on the **Series** and delete it (as appropriate).
- **Step 7**: Remove **Gridlines** as earlier described.

Copying Charts to MS Word document

To copy Charts to MS Word document or Power Point slide:

- Click on the chart you wish to copy and select copy.
- Create space in the MS Word document or Power Point slide you wish to copy the Chart to.
- Paste the chart in the selected area. You can still format the chart in the MS Word document or Power Point slide. Finally, type the Title of the Chart below it (as shown below).

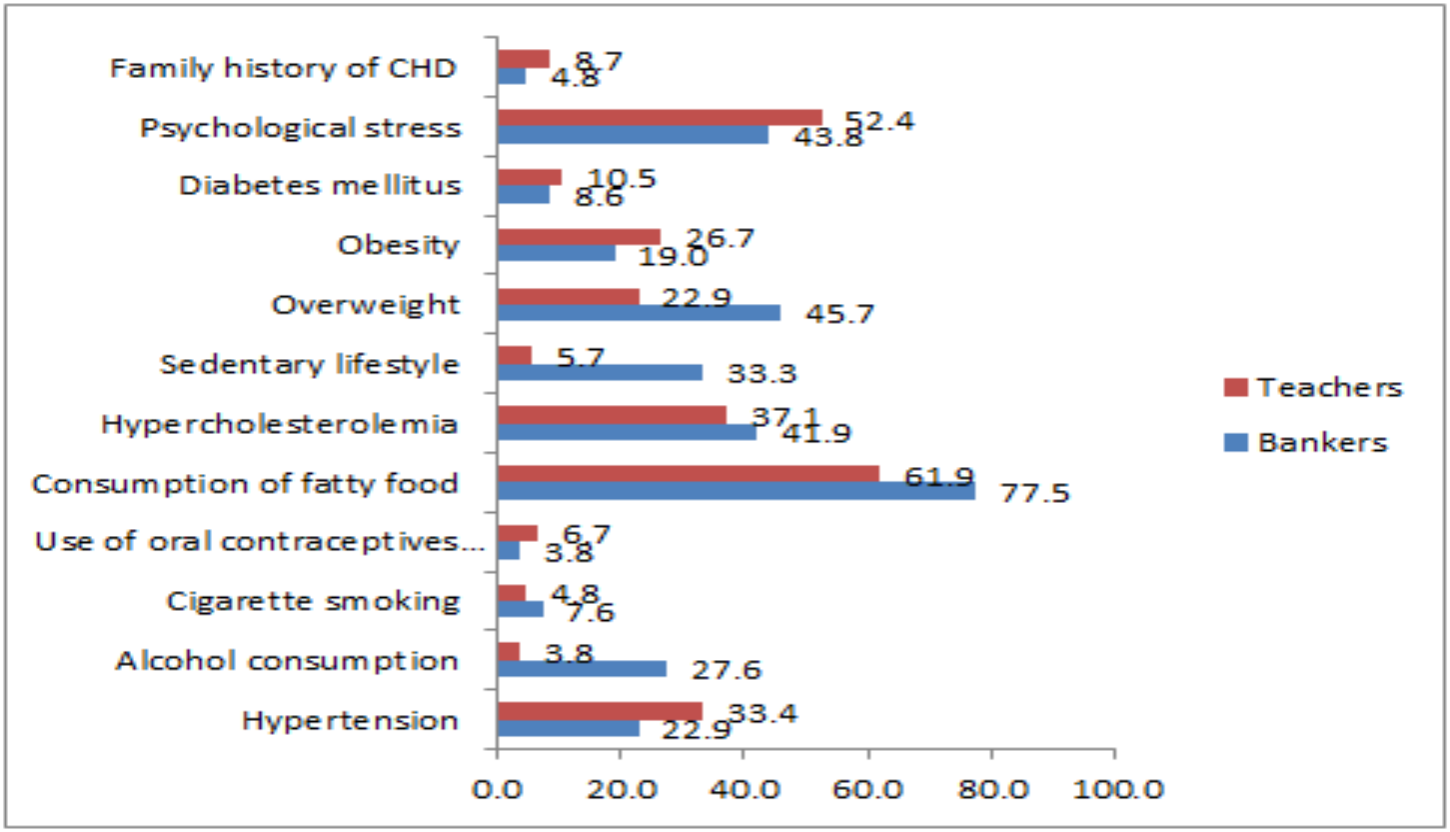


Figure 1: Prevalence of risk factors of CHD among bankers and teachers in Sokoto

DATA MANIPULATION

Sorting data

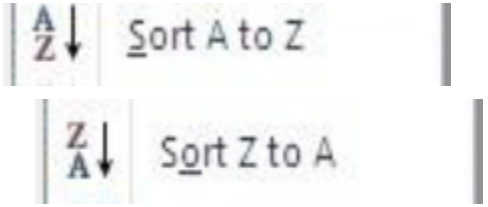
- The sort function sorts your data records based on the criteria that you specify. You can sort numbers, text or dates in either ascending (default) or descending order. Blank cells are always placed last in a sort.

To sort data in a single column:

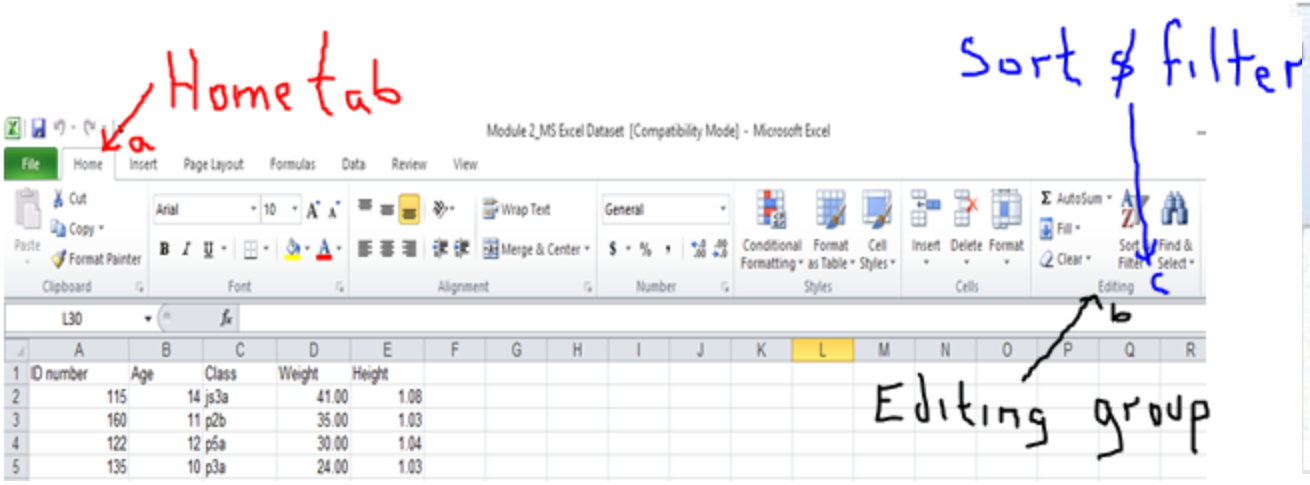
- Click anywhere in the column that you want to sort by.
- On the **Home** tab, in the **Editing** group, click **Sort & Filter** drop down arrow and do one of the following:

  - To sort in ascending or smallest to largest order, click

  - To sort in descending or largest to smallest order, click



- Your data will be sorted based on the value in the column that you initially clicked on.



Sorting data contd.

To sort data in a single column contd:

- Sorting Table 1 by:
  - **class** (alphabetically from A to Z) gives Table 2
  - **age** (in ascending order) gives Table 3 as shown below.

Table 1: Default data

F24

	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
2	115	14	js3a	41.00	1.08
3	160	11	p2b	35.00	1.03
4	122	12	p5a	30.00	1.04
5	135	10	p3a	24.00	1.03
6	11	12	p4a	29.00	1.04
7	128	16	p6a	44.00	1.05
8	145	17	js1a	49.00	1.06
9	34	10	p5b	30.00	1.04
10	111	17	p5a	51.00	1.07
11	12	8	p2a	16.00	1.01
12	9	10	p2a	29.00	1.05
13	91	10	p3a	24.00	1.03
14	162	11	p4a	21.00	1.03
15	107	11	p1a	22.00	1.03
16	35	13	p2a	46.00	1.05
17	6	14	p5a	36.00	1.06
18	93	12	p4a	29.00	1.04
19	140	14	js1a	50.00	1.07
20	10	11	p2a	24.00	1.03

Table 2: Sorted by class (A to Z)

H27

	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
2	145	17	js1a	49.00	1.06
3	140	14	js1a	50.00	1.07
4	22	16	js1a	50.00	1.06
5	44	13	js1a	36.00	1.05
6	102	17	js1a	47.00	1.06
7	105	15	js1a	50.00	1.06
8	83	14	js1a	35.00	1.05
9	104	12	js1a	26.00	1.03
10	169	9	js2a	30.00	1.06
11	89	12	js2a	30.00	1.04
12	115	14	js3a	41.00	1.08
13	161	14	js3a	35.00	1.05
14	126	12	js3a	49.00	1.04
15	101	15	js3a	56.00	1.09
16	80	18	js3a	39.00	1.05
17	53	16	js3a	35.00	1.06
18	107	11	p1a	22.00	1.03
19	153	9	p1a	20.00	1.10
20	50	10	p1a	24.00	1.02

Table 3: Sorted by age

C30 p3b

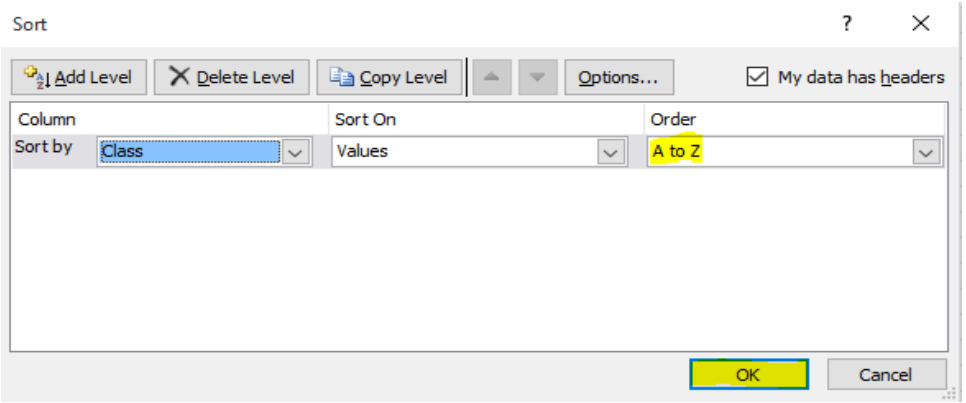
	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
2	131	7	p1a	26.00	1.04
3	76	7	p1b	15.00	1.00
4	118	7	p1b	21.00	1.02
5	12	8	p2a	16.00	1.01
6	87	8	p2b	20.00	1.01
7	88	8	p3a	24.00	1.02
8	169	9	js2a	30.00	1.06
9	153	9	p1a	20.00	1.10
10	79	9	p1a	25.00	1.03
11	58	9	p1b	21.00	1.02
12	142	9	p2b	20.00	1.02
13	67	9	p4a	20.00	1.02
14	50	10	p1a	24.00	1.02
15	56	10	p1a	49.00	1.02
16	7	10	p1a	26.00	1.02
17	68	10	p1a	20.00	1.02
18	94	10	p1a	25.00	1.03
19	9	10	p2a	29.00	1.05
20	70	10	p2a	34.00	1.08

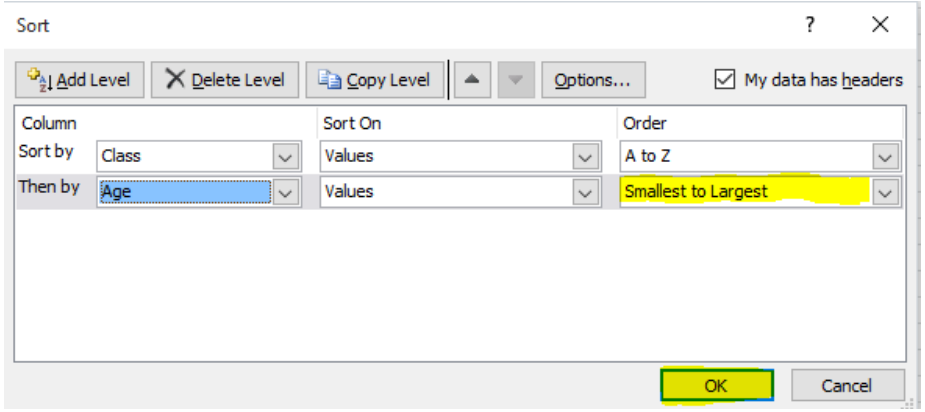
Sorting data contd.

- Data can also be sorted based on two or more criteria (columns).

To sort data in multiple columns (i.e., Custom Sort):

- Click in the data table or select the cells to be sorted.
- On the **Home** tab, in the **Editing** group, select **Sort & Filter**. And choose **Custom Sort**. The Sort Window will open.





- In the **Sort by** field, use the drop-down arrow to select the column that you want to sort by and the order (e.g., Smallest to Largest) to be used.
- If you want to add another sort criterion, then click the **Add Level** button, and a second details row will appear in the window. Again choose the sort column and sort order.
- Add more levels (or **Delete Level**) as required.
- When you click the **OK** button at the bottom of the window, your data will be sorted.

The **Sort** function is also available from the **Data** tab

Sorting data contd.

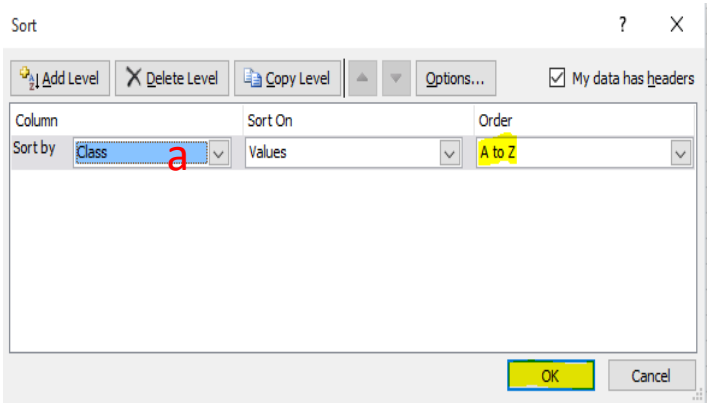
To sort data in multiple columns (i.e., Custom Sort) contd.:

- Sorting Table 1 by both **class** [a] and **age** [b]gives Table 2 as shown below.

Table 1: Default data

F24

	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
2	115	14	js3a	41.00	1.08
3	160	11	p2b	35.00	1.03
4	122	12	p5a	30.00	1.04
5	135	10	p3a	24.00	1.03
6	11	12	p4a	29.00	1.04
7	128	16	p6a	44.00	1.05
8	145	17	js1a	49.00	1.06
9	34	10	p5b	30.00	1.04
10	111	17	p5a	51.00	1.07
11	12	8	p2a	16.00	1.01
12	9	10	p2a	29.00	1.05
13	91	10	p3a	24.00	1.03
14	162	11	p4a	21.00	1.03
15	107	11	p1a	22.00	1.03
16	35	13	p2a	46.00	1.05
17	6	14	p5a	36.00	1.06
18	93	12	p4a	29.00	1.04
19	140	14	js1a	50.00	1.07
20	10	11	p2a	24.00	1.03



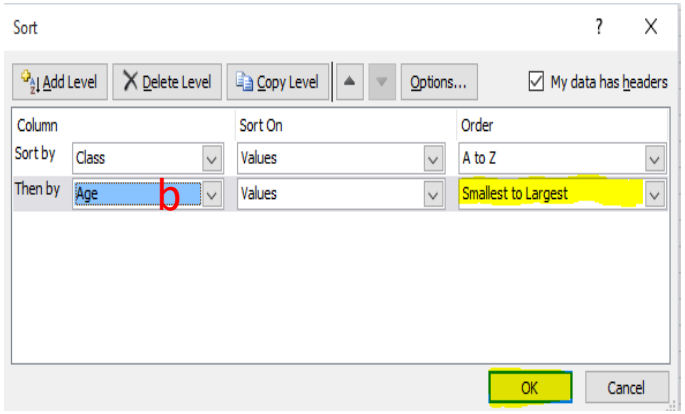


Table 2: Sorted by Class & age

C30 p1a

	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
2	104	12	js1a	26.00	1.03
3	44	13	js1a	36.00	1.05
4	140	14	js1a	50.00	1.07
5	83	14	js1a	35.00	1.05
6	105	15	js1a	50.00	1.06
7	22	16	js1a	50.00	1.06
8	145	17	js1a	49.00	1.06
9	102	17	js1a	47.00	1.06
10	169	9	js2a	30.00	1.06
11	89	12	js2a	30.00	1.04
12	126	12	js3a	49.00	1.04
13	115	14	js3a	41.00	1.08
14	161	14	js3a	35.00	1.05
15	101	15	js3a	56.00	1.09
16	53	16	js3a	35.00	1.06
17	80	18	js3a	39.00	1.05
18	131	7	p1a	26.00	1.04
19	153	9	p1a	20.00	1.10
20	79	9	p1a	25.00	1.03

Filtering data

- The filter function lets you view just the records that you want to see. The other records in your data table will still be there, but hidden.

To filter data:

- On the **Home** tab, in the **Editing** group, select **Sort & Filter**, and select the **Filter** option.

- In the first row of your data table, a drop-down arrow will appear on the right of each column heading. When you click on the drop-down arrow, you'll see a list of all the values occurring in that column. Press [ESC] to close the filter list.

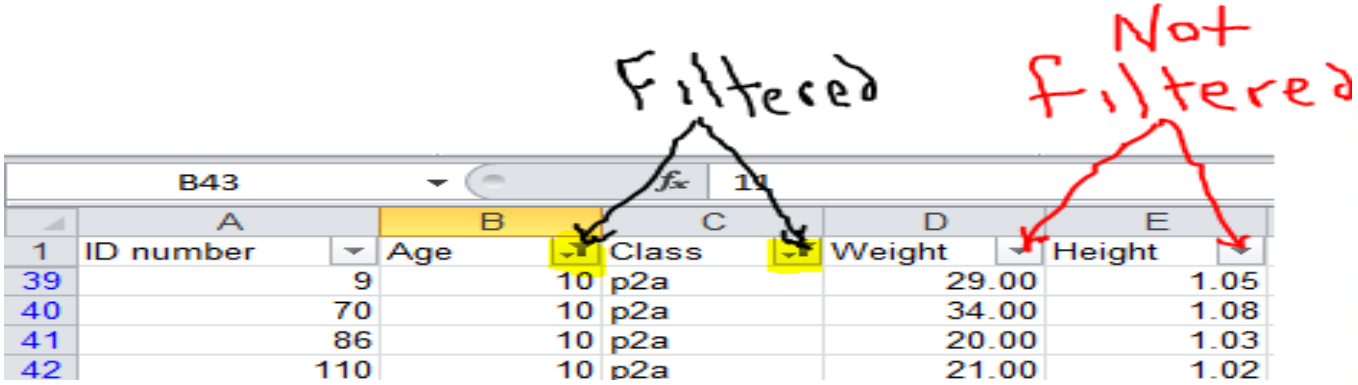
C30 | p1a

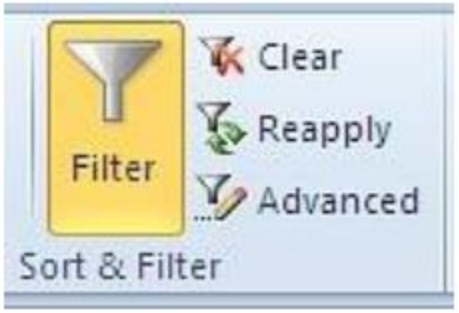
	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
2	104	12	js1a	26.00	1.03
3	44	13	js1a	36.00	1.05
4	140	14	js1a	50.00	1.07
5	83	14	js1a	35.00	1.05
6	105	15	js1a	50.00	1.06
7	22	16	js1a	50.00	1.06

Filtering data contd.

To filter data contd.:

- If you want to view records with a particular value only, click to uncheck the **Select All** option, and then check one or more values that you want to view. Click the **OK** button.
- All rows that do not contain the value(s) you checked, will be hidden from view. A column that has been filtered will show a funnel icon next to the drop-down arrow on the heading.





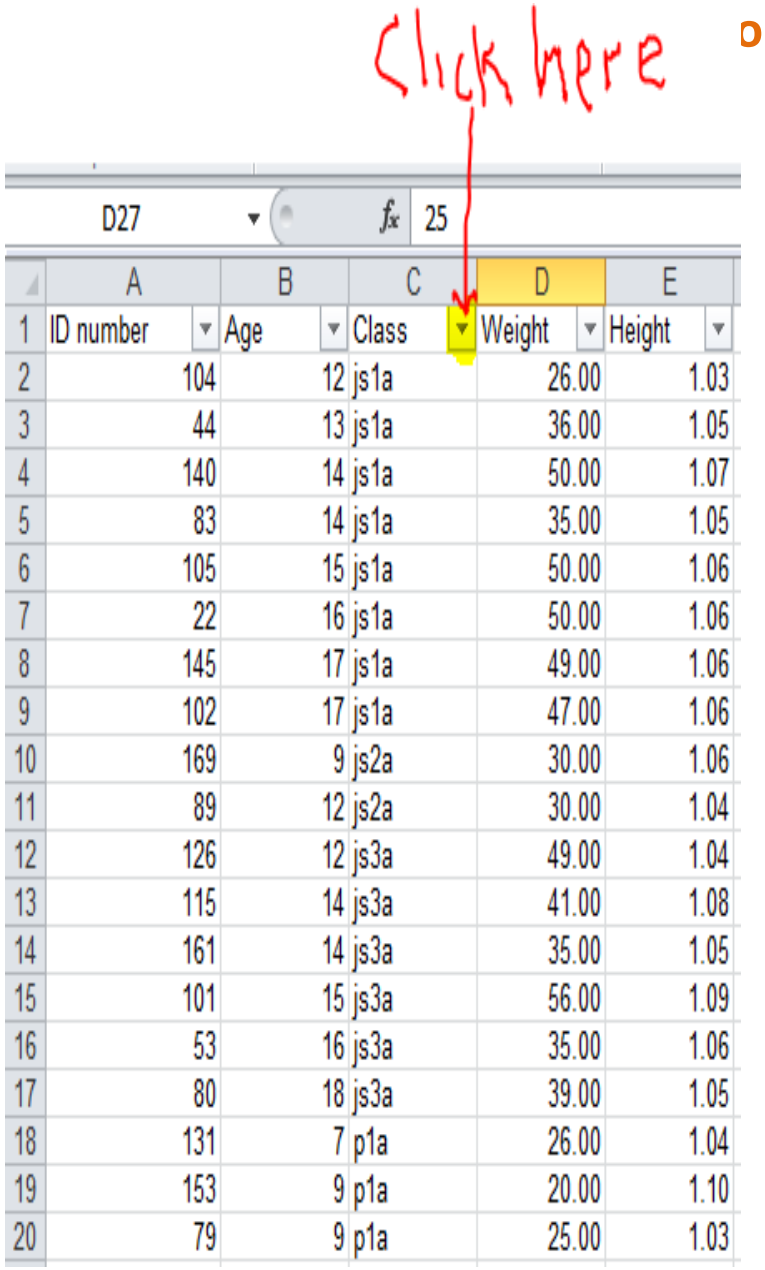
- Repeat the filtering process for as many columns as you need. You can remove a column filter by checking its **Select All** option.

➢ To clear your previous filter settings, select **Sort & Filter**, and then **Clear**.

➢ To turn off filtering, select **Sort & Filter**, and then **Filter** (the same option that you originally used to turn it on).

The **Sort** function is also available from the **Data** tab

Filtering data contd.



o filter data contd.:

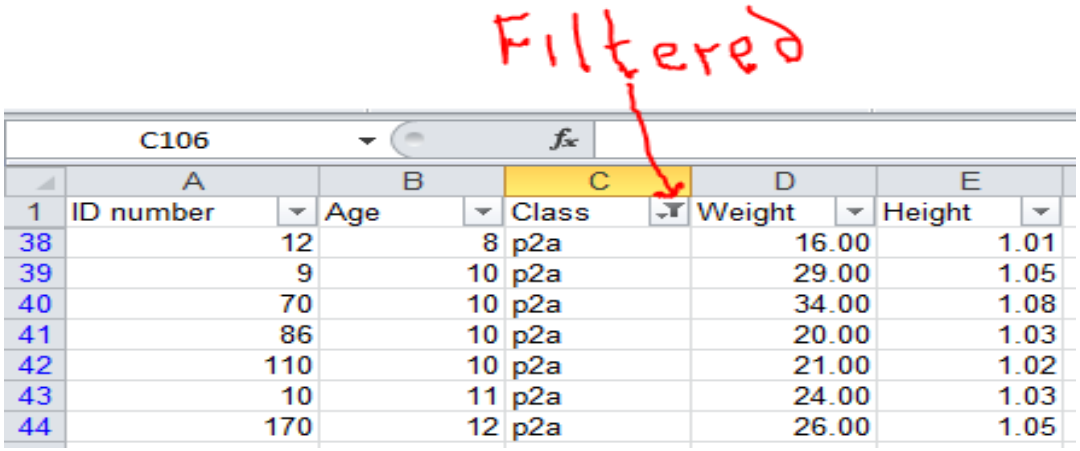
To view the data of only the students in Primary 2a (**p2a**), click on the data table and carry out the following:

On the **Home** tab, in the **Editing** group, select **Sort & Filter**, and select the **Filter** option (a drop-down arrow will appear on the right of each column heading).

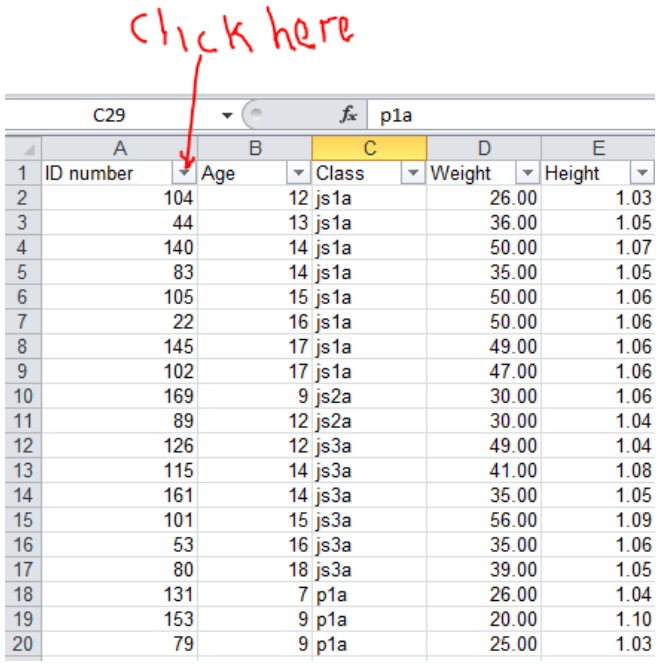
Click on the drop down arrow on the right of class column.

In the dialog box that appears, deselect the **Select All** option, select **p2a** and click **OK**. A funnel icon appears next to the drop-down arrow on the filtered column.

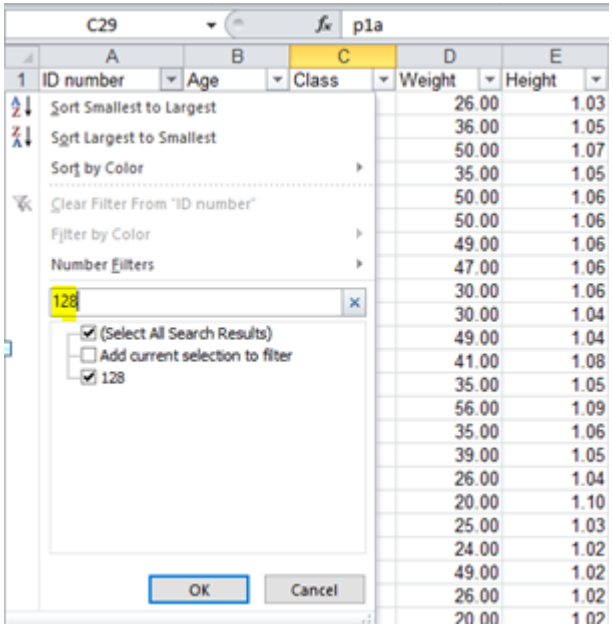
Only the students Primary 2a (**p2a**) are displayed.



Filtering data contd.

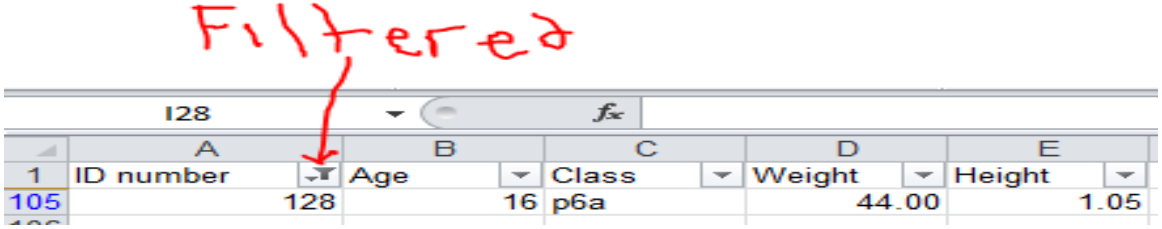


	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
2	104	12	js1a	26.00	1.03
3	44	13	js1a	36.00	1.05
4	140	14	js1a	50.00	1.07
5	83	14	js1a	35.00	1.05
6	105	15	js1a	50.00	1.06
7	22	16	js1a	50.00	1.06
8	145	17	js1a	49.00	1.06
9	102	17	js1a	47.00	1.06
10	169	9	js2a	30.00	1.06
11	89	12	js2a	30.00	1.04
12	126	12	js3a	49.00	1.04
13	115	14	js3a	41.00	1.08
14	161	14	js3a	35.00	1.05
15	101	15	js3a	56.00	1.09
16	53	16	js3a	35.00	1.06
17	80	18	js3a	39.00	1.05
18	131	7	p1a	26.00	1.04
19	153	9	p1a	20.00	1.10
20	79	9	p1a	25.00	1.03



To filter data contd.:

- To view the data of a patient coming for follow up visit at the hospital without the hospital card but could remember the file number; click on the data table and carry out the following:
- On the **Home** tab, in the **Editing** group, select **Sort & Filter**, and select the **Filter** option (a drop-down arrow will appear on the right of each column heading).
- Click on the drop down arrow on the right of ID number.
- In the dialog box that appears, deselect the **Select All** option, type in the patient's **ID number** (**128**) in the Search box that appears, the typed ID number will appear among the options, select it and click **OK**. A funnel icon will appear next to the drop-down arrow on the filtered column.
- Names of patients' coming to the hospital without the hospital card and couldn't remember the file number can also be used. If it is only one patient that bears the name in the data base, only the name is displayed. If there are other patients with the same name, all of them are displayed, you can then use other criteria in the data to identify the data of the patient being considered.



	A	B	C	D	E
1	ID number	Age	Class	Weight	Height
105	128	16	p6a	44.00	1.05

GENERATING RANDOM NUMBERS
&
RANDOMIZATION INTO GROUPS

Simple random sample

- A simple random sample is a subset of a statistical population in which each member of the subset has an equal probability of being chosen.
- This process and technique is known as **simple random sampling**.

Simple random sampling is a basic type of sampling, since it can be a component of other more complex probability sampling methods.

Traditional drawing (simple random sampling) methods:

Several traditional drawing (simple random sampling) methods exist, but they are only feasible for smaller numbers. They include:

- rolling of dice
- shuffling of playing cards
- coin flipping
- lucky dip

- Because of the mechanical nature of these methods, generating large numbers of sufficiently **random numbers** (important in statistics) required a lot of work and/or time. **Random number generators** are now used instead of the traditional drawing (simple random sampling) methods.

Random numbers

These are numbers that occur in a sequence such that two conditions are met.

- The values are uniformly distributed over a defined interval or set.
- It is impossible to predict future values based on past or present ones.

Random numbers are a set of digits (i.e., 0,1,2,3,4,5,6,7,8,9) arranged in random order. Because they are randomly ordered, no individual digit can be predicted from knowledge of any other digit or group of digits

Use of random number generators:

Random number generators are used in:

- Statistical sampling
- Completely randomized design
- Computer simulation
- Cryptography
- Gambling
- Other areas where producing an unpredictable number is desired.

A **random number generator** is a process that produces random numbers.
Any random process (e.g., flip of a coin or the toss of a die) can be used to generate random numbers.
Statistical algorithm is used to produce computer generated random numbers

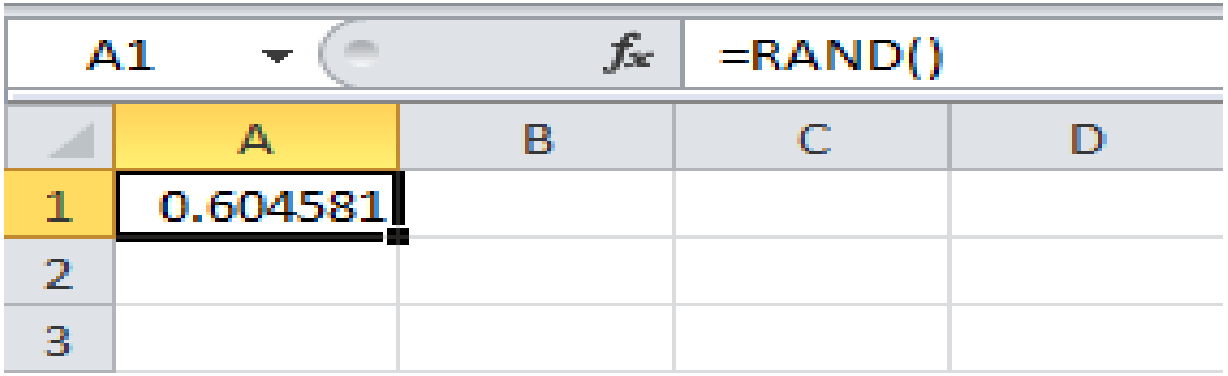
Generating random numbers in Excel

- Excel has two functions when it comes to generating random numbers, the **RAND** and **RANDBETWEEN** functions.

RAND function

The RAND function generates a random decimal number between 0 and 1.

- Select cell A1
- Type **=RAND()** and press **Enter**. The RAND function takes no argument.

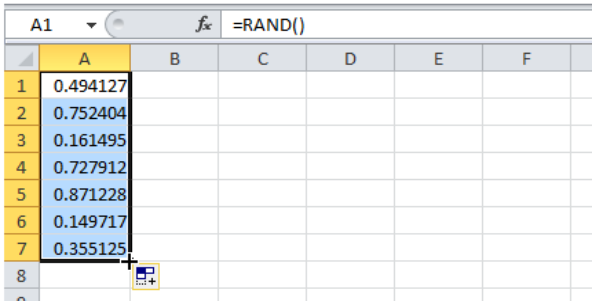


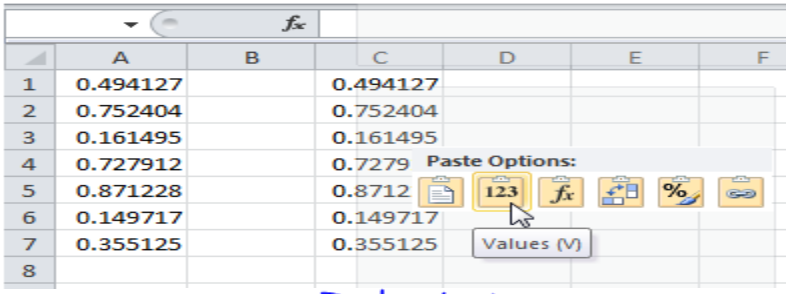
Generating random numbers in Excel contd.

A listing of random numbers is called **random number table**

To generate a list of random numbers

- Generate a random number in cell A1 as earlier described
- Select cell A1 and then move the cursor over the small square in the bottom right-hand corner (the fill handle).
- The cursor will change from a white cross ✜ to a black cross +.

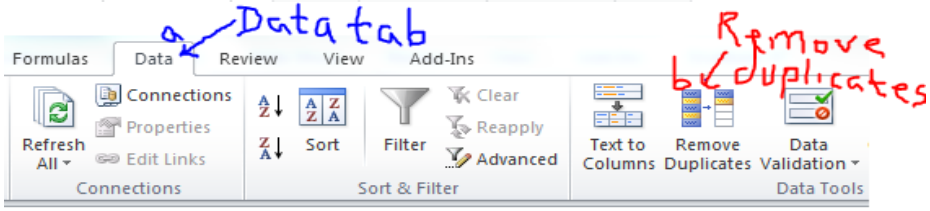




To remove duplicate values:

*** Click on Data tab, select Remove duplicates**

***Select the column(s) with duplicate values in the dialog box that appears and click OK**



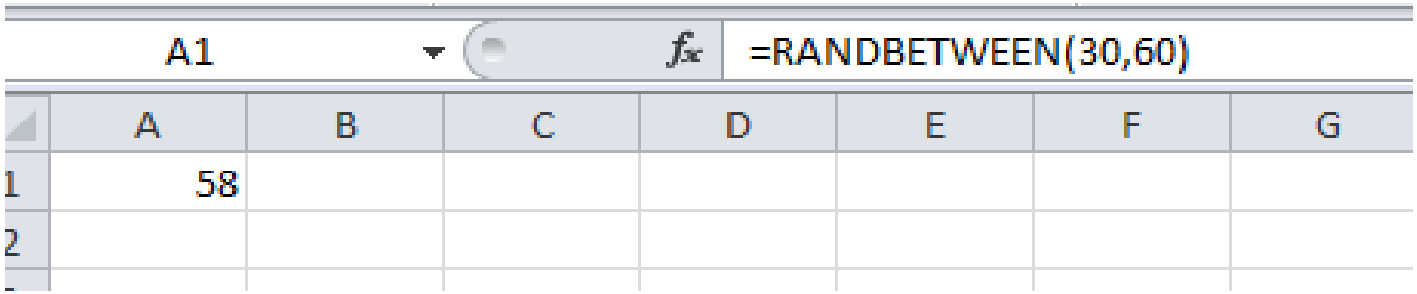
- Hold down the left mouse button and drag it down.
- Note that cell A1 has changed, because random numbers change every time a cell is calculated.
- If you don't want the random numbers to change subsequently, simply copy and paste them as values, clicking on any of the cells will show the value in the cell and not the RAND function.

Generating random numbers in Excel contd.

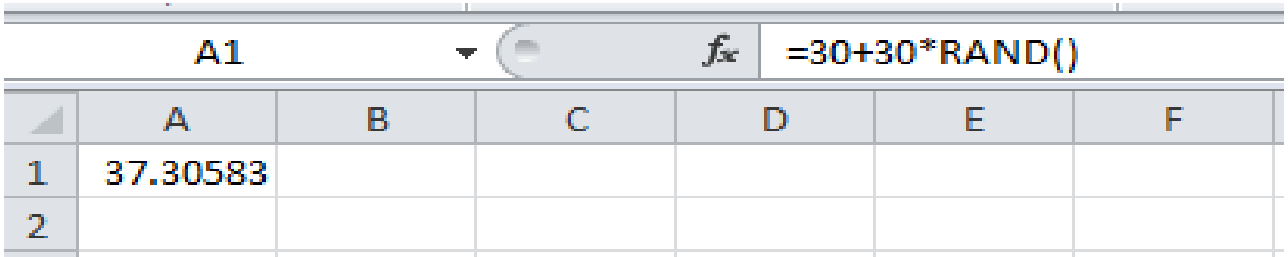
RANDBETWEEN function

The RANDBETWEEN function generates a random whole number between two boundaries.

- Select cell A1
- Type **=RANDBETWEEN(30,60)** and press **Enter**.



- If you want to generate random decimal numbers between 30 and 60, modify the RAND function as **=30+30*RAND()**



You may use the fill handle to fill additional rows and columns as desired

Randomization

- Randomization is a method based on chance alone by which study participants are assigned to treatment groups.
- Randomization minimizes the differences among groups by equally distributing people with particular characteristics among all trial arms.

Types of randomization techniques:

The types of randomization techniques include:

- Simple randomization
- Stratified randomization
- Block randomization
- Covariate adaptive randomization

Randomization contd.

Simple randomization

- This refers to randomization based on a single sequence of random assignments.

- This technique maintains complete randomness of the assignment of a subject to a particular group.

- The most common and basic method of simple randomization is flipping a coin. For example, with two treatment groups (control versus treatment) the side of the coin (i.e., heads-control, tails-treatment) determines the assignment of each subject.

Randomization contd.

Stratified randomization

- This is a randomization procedure in which strata are identified and subjects are randomly allocated within each.

- Stratification is the process of , or result of separating a sample into several subsamples according to specified criteria such as age groups, socio-economic status etc.

- The effect of confounding variables can be controlled by stratifying the analysis of result using **Mantel-Haenszel Chi-square**.

- For example, lung cancer is known to be associated with smoking. To examine the possible association between urban atmospheric pollution and lung cancer, while controlling for smoking, the population may be divided into strata according to smoking status. The association between air pollution and lung cancer can then be appraised separately within each stratum.
- Confounding variables can also be controlled by **multivariate analysis**.

Randomization contd.

Block randomization

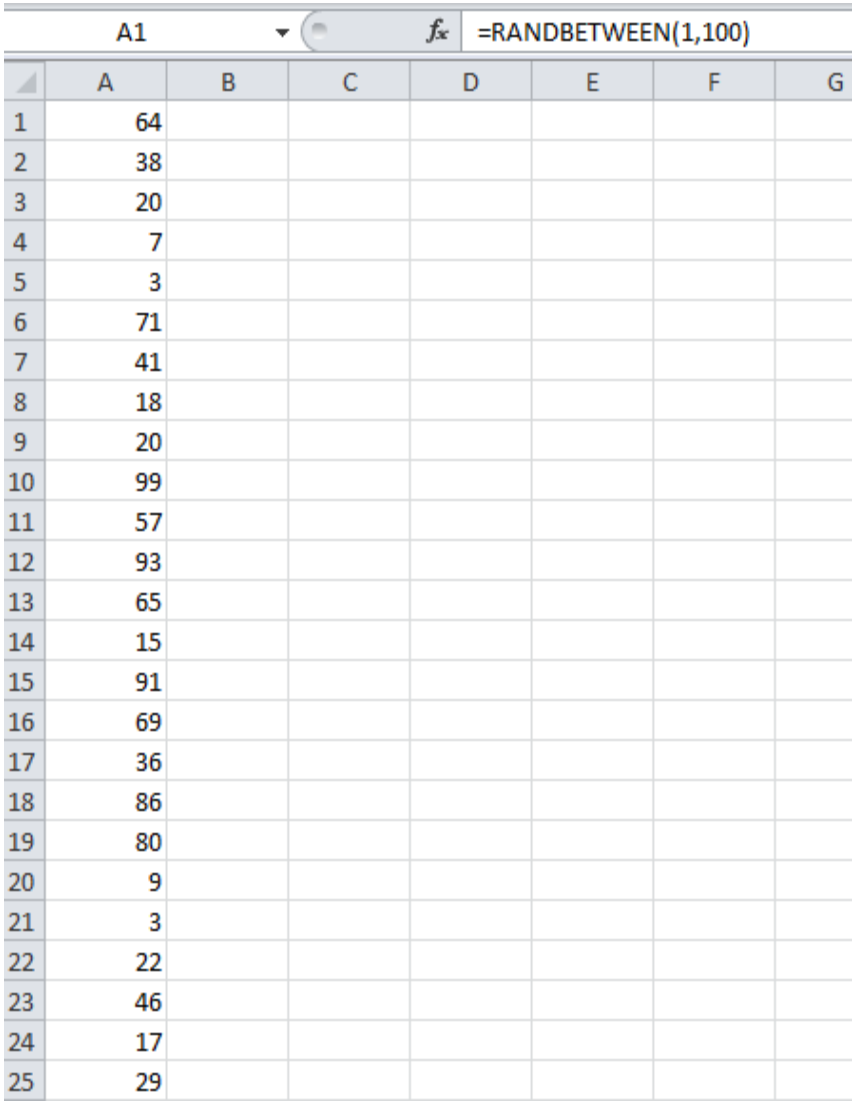
- The block randomization method is designed to randomize subjects into groups that result in equal sample sizes. Blocks are small and balanced with predetermined group assignments which keeps the numbers of subjects in each group similar at all times.
- The block size is determined by the researcher and should be a multiple of the number of groups (i.e., with two treatment groups, block size of either 4, 6, or 8).
- After block size has been determined, all possible balanced combinations of assignment within the block (i.e., equal number for all groups within the block) must be calculated.
- Blocks are then randomly chosen to determine the patients' assignment into the groups.
- Although balance in sample size may be achieved with this method, groups may be generated that are rarely comparable in terms of certain covariates. For example one group may have more participants with chronic diseases (e.g., diabetes, cancer, hypertension etc) that could confound the data and negatively influence the results of the clinical trial.

To obtain a random sample of 30 from a statistical population of 100 and randomize into two groups

This is done in two stages

Stage 1: Generate random numbers between 1 and 100

- Select cell A1, type **=RANDBETWEEN(1,100)** and press **Enter**.
- Click on cell A1 and then move the cursor over the small square in the bottom right-hand corner (the fill handle).
- The cursor will change from a white cross ✚ to a black cross +.
- Hold down the left mouse button and drag it down.
- Remove duplicates.

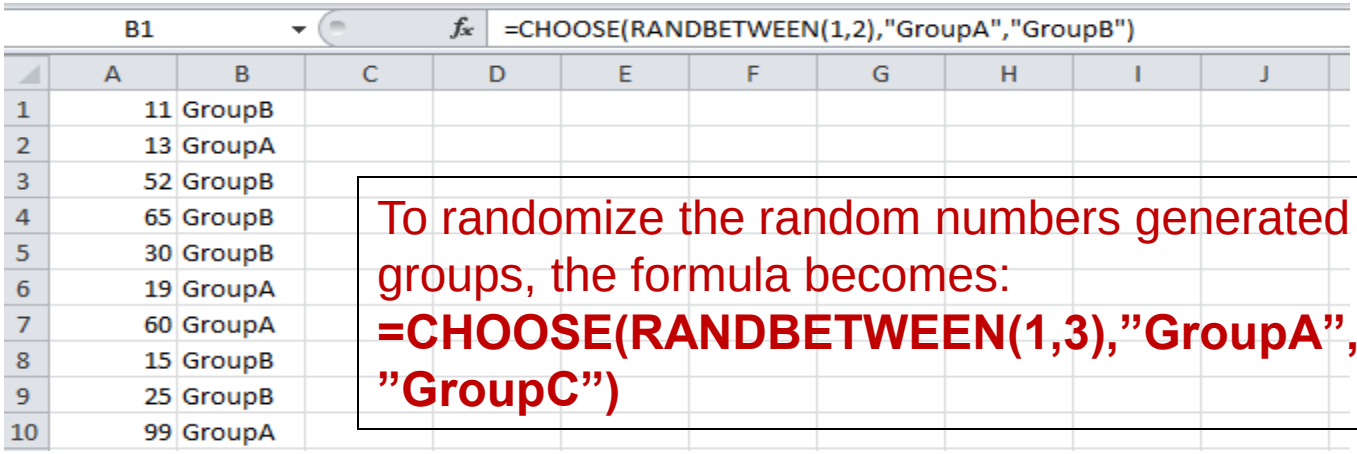


	A	B	C	D	E	F	G
1	64						
2	38						
3	20						
4	7						
5	3						
6	71						
7	41						
8	18						
9	20						
10	99						
11	57						
12	93						
13	65						
14	15						
15	91						
16	69						
17	36						
18	86						
19	80						
20	9						
21	3						
22	22						
23	46						
24	17						
25	29						

To obtain a random sample of 30 from a statistical population of 100 and randomize into two groups contd.

Stage 2: Randomize the random numbers generated into two groups

- Select cell B1, type **=CHOOSE(RANDBETWEEN(1,2),"GroupA","GroupB")** and press **Enter**.
- Click on cell B1 and then move the cursor over the small square in the bottom right-hand corner (the fill handle).
- The cursor will change from a white cross ✜ to a black cross +.
- Hold down the left mouse button and drag it down.



	A	B	C	D	E	F	G	H	I	J
1	11	GroupB								
2	13	GroupA								
3	52	GroupB								
4	65	GroupB								
5	30	GroupB								
6	19	GroupA								
7	60	GroupA								
8	15	GroupB								
9	25	GroupB								
10	99	GroupA								

To randomize the random numbers generated into three groups, the formula becomes:
=CHOOSE(RANDBETWEEN(1,3),"GroupA","GroupB","GroupC")

- Select the first 30 random numbers with their respective groups.

C-International Research Consultancy

Our Services

Design or Review of Protocol / Proposal

We provide technical support in the design of study protocol / proposal. We provide guidance on formulation of research topic, specific objectives, research questions, and research hypothesis. We provide technical support regarding choice of appropriate study design, sample size estimation and sampling technique; as well as choice of appropriate method and instrument of data collection, and data management. We also review protocol / proposal and provide guidance on how to improve the quality in compliance with the guidelines of the institution concerned.

Development of Data Collection Instrument

We provide technical support in the development and validation of data collection instrument. We build questionnaires into the Open Data Kit (ODK) software for data collection with android phones. This saves the cost of printing questionnaires, makes data collection easier, eliminates non-response, enables the researcher to monitor the research assistants recruited for data collection (particularly, when and where each questionnaire was administered, taking pictures of relevant locations, etc), and eliminates the stressful data entry stage that usually follows completion of data collection.

Design of Database, Data Analysis and Interpretation of Results

We provide technical support in the design of database, data entry, data analysis and interpretation of results. However, collecting data with the ODK software (instead of printed questionnaires) removes the need for (and the cost of) designing database and data entry.

Design or Review of Dissertation / Thesis / Project Report

We provide technical support in the design of dissertation / thesis / project report (in compliance with the guidelines of the institution concerned). We provide guidance on data presentation (including creation and formatting of tables and charts). We also review dissertation / thesis / project report and provide guidance on how to improve the quality in compliance with the guidelines of the institution concerned

Manuscript Development

We provide technical support in the development of manuscript (for publication of article extracted from completed Dissertation, Thesis and Project report).