

**DEPARTMENT OF  
MANAGEMENT ACCOUNTING**

**PRACTICAL ACCOUNTING DATA PROCESSING  
DPA202T**

Tutorial letter 103/2010  
**ADDITIONAL GUIDANCE FOR  
STUDY UNIT 4 (MICROSOFT OFFICE EXCEL)**

**SECOND SEMESTER**

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Dear Student

This tutorial letter is the manual for achieving the aim of study unit four. It is only available in English. The examination will include questions based on the competencies learned in this tutorial letter.

As stipulated in the yearbook under the heading "General Information" we expect you to have access to the Microsoft Office Excel spreadsheet software or Open Office Calc (which can be downloaded free of charge from the Internet). It is not our intention to give you a comprehensive knowledge of the Microsoft Office Excel or Open Office package, but rather to equip you with some basic principles so that you will be able to operate a spreadsheet package with ease. Please note this tutorial letter is based on Microsoft Office Excel 2007 and you will need to make some adjustments if you are using Microsoft Office Excel 2003 or Open Office.

You will find, when using the help key (F1), that there is more than one way of executing a command (e.g. mouse, keyboard and menu). We will only show you some of the options, but in the exam, you are welcome to write down any command option you know. However, for your answer to be correct, the command should be written down correctly and in the right order.

A Microsoft Office Excel file, *DPA202T\_2010\_TL103\_1\_E\_activities data.xlsx*, containing the data used in the activities, is available for download from myUnisa under *Additional resources*. Please note this file only contains data and not any formulas or functions. The Microsoft Office Excel file containing both the data and the completed formulas and functions are available from the lecturers. The completed file will however only be made available to you if we receive your Microsoft Office Excel file with your attempts to complete **all** the activities.

The best way to learn Microsoft Office Excel is to use it in your day-to-day work. Always ask, "How can I do this task quicker and easier by using Microsoft Office Excel?" There will be a Microsoft Office Excel discussion forum on myUnisa. Please post your questions on this forum and please help your fellow students with answers to their questions. Please also post Microsoft Office Excel functions and examples you personally found very useful in your day-to-day work. Note this discussion forum is not limited to the functions covered in this tutorial letter. We will check the discussion forum at least once a week and make sure you are still on the right track.

Finally, we sincerely hope you enjoy the course, and that you will continue to benefit from it in the future. All the best and every success with your studies - *remember the only place where success is before work, is in the dictionary.*

Microsoft product screen shots used in this tutorial letter is reprinted with permission from Microsoft Corporation.

Kind regards,

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12.	Frequent mistakes in Microsoft Office Excel questions (and how not to lose hard earned marks)

Note:

There are a number of shortcuts available in Microsoft Office Excel. We have included some of these, under the heading shortcut.

Where applicable TL103 will refer to this tutorial letter and ISBE will refer to the prescribed textbook, *Information systems in a business environment (fourth edition)*.

**To get the most benefit out of this tutorial letter you should study it while working through all the examples and activities on Microsoft Office Excel. (Yes! You really do need to have a computer for this! 😊)**

For additional Microsoft Excel training guides, visit the Internet and do the following:

- Type the following URL: <http://www.microsoft.com/>
- Select the 'Help and How-to' tab
- At the left hand side of the webpage, find and click on 'Training'
- At the left hand side of the webpage, find and click on '2007 Office System'
- Click on the 'Excel 2007' link
- Now click on the course you want to complete

The above-mentioned link can also be found under **Additional resources** on myUnisa

## 1. **BASIC PRINCIPLES TO REVISE BEFORE WORKING ON MICROSOFT OFFICE EXCEL**

**For this subject it is a given that you have certain pre-existing mathematical and accounting knowledge and are able to apply that knowledge. Paragraph 1 of TL103 is only emphasising some basic mathematics, accounting, etc. knowledge you already should have.**

### 1.1. **Signs/operators**

Refer to paragraph 7.4.6.3 in ISBE

Microsoft Office Excel uses in some instances different signs/operators than usually seen in mathematics. Always use the applicable Microsoft Office Excel signs/operators and not the mathematical signs/operators when writing a Microsoft Office Excel formula. The table below indicates the mathematical signs/operators with its associated Microsoft Office Excel signs/operators:

	<b>Mathematics</b>	<b>Microsoft Office Excel</b>
Addition	+	+
Subtraction	-	-
Multiplication	x	*
Division	÷	/
Equal	=	=
Brackets/parentheses	( )	( )
Greater than	>	>
Exponents	a <sup>2</sup>	^
Less than	<	<
Greater than or equal to	>=	>=
Less than or equal to	<=	<=
Not equal to	≠	<>

## 1.2. Order of operation

The order of operation is the sequence of computation a formula follows to get to an answer. Microsoft Office Excel uses the same order of operations as mathematics and will therefore perform computations in the following sequence:

- **First:** Computations/calculations in parentheses/brackets, no matter where they are in the formula
- **Second:** Computations with exponents
- **Third:** Computations involving multiplication (\*) and division (/) from left to right
- **Fourth:** Computations involving addition and subtraction from left to right

$10 + 10 * 5 = ?$  What do you think the answer will be? Microsoft Office Excel will first calculate  $10 * 5 = 50$  and then add the 10 to the answer i.e.  $10 + 10 * 5 = 60$

How do you write the formula if you want Microsoft Office Excel to first add the two 10's together and then multiply the answer with 5? What do you think? Per the order of operation, we know Microsoft Office Excel will first perform computations in brackets/parentheses. By inserting, the 10+10 in parentheses, Microsoft Office Excel will calculate the amount and then multiply the answer with 5, as multiplication is third in the sequence and after parentheses. Your formula will change to  $(10+10)*5 = 100$

In which order will Microsoft Office Excel perform this formula?  $150 + 150 / (2 + 12) * 12 / 4 = 182.14$

Sequence	Formula	Reason
1st	$(2 + 12) = 14$	Computations/calculations in parentheses/brackets, no matter where they are in the formula.
2nd	$150 / 14 = 10.714$	Computations involving multiplication (*) and division (/) from left to right. The 14 relates to the answer calculated in the 1 <sup>st</sup> sequence.
3rd	$10.714 * 12 = 128.568$	Computations involving multiplication (*) and division (/) from left to right. The <b>10.714</b> relates to the answer calculated in the 2nd sequence.
4th	$128.568 / 4 = 32.142$	Computations involving multiplication (*) and division (/) from left to right. The <b>128.568</b> relates to the answer calculated in the 3rd sequence.
5th	$150 + 32.142 = 182.142$	Computations involving addition and subtraction from left to right. The <b>32.142</b> relates to the answer calculated in the 4th sequence.

Look at the following examples. Can you get to the same answer?

$$100 + 100 / 2 = 150$$

$$(100+100)/2 = 100$$

$$25 * 4 / 2 + 10 = 60$$

$$25 * 4 / (2 + 10) = 8.333$$

$$150 + 150 / 2 + 12 * 12 / 4 = 261$$

$$(150 + 150) / 2 + 12 * 12 / 4 = 186$$

$$(150 + 150) / (2 + 12) * 12 / 4 = 64.29$$

## 1.3. Changing the sign of an amount:

To change the sign of an amount from a positive to a negative, or alternatively from a negative to a positive, the amount can be multiplied by -1 for example  $+50 * -1 = -50$  and  $-100 * -1 = +100$

#### 1.4. Percentages %

If a whole cake is equal to 100% and you and your 4 friends need to share it equally, each one of you will get 20% of the cake. How did we calculate it? 1 person/ 5 persons i.e.  $1/5 = 0.2$  or 20%

A percentage is a fraction where 1 equals the whole or 100%. In Microsoft Office Excel and maths  $1 = 100\%$  ( $100/100 = 1$ ) and everything less than 1 (but more than 0) is a % thereof. Please use the applicable fraction and not the % when working with percentages in Microsoft Office Excel. Refer to the table below:

%	How to write it in Microsoft Office Excel
33.33%	0.3333
100%	1
14%	0.14

When you see a cell on a spreadsheet reflected as a percentage, please remember the underlying value of the cell is still a fraction. The format of the cell (refer to paragraph 6.1.1 of TL103) was only changed to **display** the fraction as a percentage, but the underlying value did not change i.e. 50% underlying value in the cell is 0.50. When you use a cell displaying a % format in any of your formulas/functions **DO NOT** multiply or divide the value with 100.

#### 1.5. Working with VAT% and Gross profit%

You should be able to calculate amounts inclusive and exclusive of VAT as well as the VAT amount by using the applicable VAT percentage. You should also be able to calculate sales amounts, cost of sales and gross profit and gross profit%. You can use the following formula, or any other formula you are comfortable with, to help you with these calculations:

**The amount you need to calculate = the amount you need to calculate in percentage *divided* by the amount you have in percentage *multiply* with the amount you have in Rand**

##### EXAMPLE 1 – VAT

	R	%	Microsoft Office Excel underlying value
Selling price (excluding VAT)	500	100	1.00
VAT	70	14	0.14
Selling price (including VAT)	570	114	1.14

Calculate the **selling price excluding VAT** using the selling price including VAT and the VAT%

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 1.00 (you need to calculate the selling price excluding VAT)
- The amount you have in % = 1.14 (you have the selling price including VAT)
- The amount you have in R = R570 (you have the selling price including VAT in Rand)
- $1.00/1.14 * R570 = R500$   
(Using math rules this formula can be simplified to:  $R570/1.14 = R500$ )

Calculate the **selling price including VAT** using the selling price excluding VAT and the VAT%

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 1.14 (you need to calculate the selling price including VAT)
- The amount you have in % = 1.00 (you have the selling price excluding VAT)
- The amount you have in R = R500 (you have the selling price excluding VAT in Rand)
- $1.14/1.00 * R500 = R570$   
(Using math rules this formula can be simplified to:  $1.14 * R500 = R570$ )

Calculate the **VAT amount** using the selling price including VAT and the VAT%

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 0.14 (you need to calculate the VAT amount)
- The amount you have in % = 1.14 (you have the selling price including VAT)
- The amount you have in R = R570 (you have the selling price including VAT in Rand)
- $0.14/1.14 * R570 = R70$

Calculate the **selling price including VAT** using the VAT amount and the VAT%

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 1.14 (you need to calculate the selling price including VAT)
- The amount you have in % = 0.14 (you have the VAT%)
- The amount you have in R = R70 (you have the VAT amount in Rand)
- $1.14/0.14 * R70 = R570$

## GROSS PROFIT

Basic Principles:

- Gross profit = sales – cost of sales
- Sales = cost of sales + gross profit
- Gross profit% based on cost of sales = Gross profit / cost of sales
- Gross profit% based on selling price = Gross profit / sales

### EXAMPLE 2 – Gross profit based on cost of sales

The gross profit% (mark-up %), in this example, is 20% on **cost of sales**.

	R	%	Microsoft Office Excel underlying value
Cost of sales	1,580	100	1.00
Gross profit	316	20	0.20
Sales	1,896	120	1.20

Calculate the **cost of sales amount** using the sales amount of R1,896 and the gross profit%.

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 1.00 (you need to calculate the cost of sales)
- The amount you have in % = 1.20 (you have the sales)
- The amount you have in R = R1,896 (you have the sales amount in Rand)
- $1.00/1.20 * R1,896 = R1,580$   
(Using math rules this formula can be simplified to:  $R1,896/1.20 = R1,580$ )

Calculate the **sales amount** using the cost of sales amount of R1,580 and gross profit%.

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 1.20 (you need to calculate the sales amount)
- The amount you have in % = 1.00 (you have the cost of sales)
- The amount you have in R = R1,580 (you have the cost of sales amount in Rand)
- $1.20/1.00 * R1,580 = R1,896$   
(Using math rules this formula can be simplified to:  $R1,580 * 1.20 = R1,896$ )



Calculate the **gross profit amount** using the sales amount of R1,896 and gross profit%.

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 0.20 (you need to calculate the gross profit amount)
- The amount you have in % = 1.20 (you have the sales)
- The amount you have in R = R1,896 (you have the sales amount in Rand)
- $0.20/1.20 * R1,896 = R316$

Calculate the **sales amount** using the gross profit amount of R316 and gross profit%.

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 1.20 (you need to calculate the sales amount)
- The amount you have in % = 0.20 (you have the gross profit)
- The amount you have in R = 316 (you have the gross profit amount in Rand)
- $1.20/0.20 * 316 = R1,896$

### EXAMPLE 3 – Gross profit based on selling price

The gross profit% (mark-up %), in this example, is 20% based on **sales**.

	R	%	Microsoft Office Excel underlying value
Cost of sales	2,000	80	0.80
Gross profit	500	20	0.20
Sales	2,500	100	1.00

Calculate the **cost of sales amount** using the sales amount of R2,500 and the gross profit%.

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 0.80 (you need to calculate the cost of sales)
- The amount you have in % = 1.00 (you have the sales)
- The amount you have in R = R2,500 (you have the sales amount in Rand)
- $0.80/1.00 * R2,500 = R2,000$   
(Using math rules this formula can be simplified to:  $0.80 * R2,500 = R2,000$ )

Calculate the **sales amount** using the cost of sales amount of R2,000 and gross profit%

The amount you need in R = the amount you need in % / the amount you have in % X the amount you have in R

- The amount you need in % = 1.00 (you need to calculate the sales amount)
- The amount you have in % = 0.80 (you have the cost of sales)
- The amount you have in R = R2,000 (you have the cost of sales amount in Rand)
- $1.00/0.80 * R2,000 = R2,500$   
(Using math rules this formula can be simplified to:  $R2,000/0.80 = R2,500$ )

## 2. HOW TO SOLVE A PROBLEM IN MICROSOFT OFFICE EXCEL

Here are a few simple guidelines to keep in mind before you start with your spreadsheet:

- Understand the business problem you are faced with. What is the problem? What should I calculate? What is it based on? Which amounts do I have? What assumptions should I make?
- How will you solve/fix the problem? Formulate your desired results.
- Plan your spreadsheet before you create it in Microsoft Office Excel.
- Now go to Microsoft Office Excel and prepare the spreadsheet in such a manner it will give you the required output/deliverable.
- Use neighbouring columns and rows when organising your information.
- Do not skip columns or rows just because you want to “spread” the information, rather use the formatting functions.
- Use a single column at the left of the table for row headings.
- Use a single row at the top of the table for column headings.
- If your table requires a title, put it in the row above the column heading and in the same column as the row heading.
- Put all your assumptions/variables on the face of your spreadsheet. As far as possible do not “hard code” any formulas i.e. entering an amount or percentage in a formula. Rather refer to a cell where the amount or percentage is displayed.
- Keep the spreadsheet logical.

*TIP: if you are struggling to write a formula using cell references, first write the formula using amounts and replace the amount with the relevant cell reference.*

## 3. BACKGROUND

### 3.1. What is a spreadsheet

A spreadsheet is a grid of columns and rows that crosses each other, much like a chessboard. Columns appear vertically and are usually identified by a letter e.g. A, B, C, etc. while rows appear horizontally and are identified by a number 1, 2, 3, etc. Where a column and a row intersect, a cell is formed. Each cell has a unique address based on the specific column and row it can be found in. A cell's reference is always expressed as first the column reference and then the row reference. Cell B6 will refer to a cell found where column **B** and row **6** intersect. B6 is called a cell reference. A cell address can never change but the data entered in a cell can change.

	A	B	C
1	Type of fruit	Number of fruit	
2	Appels	50	
3	Pears	77	
4	Peaches	45	
5	Guavas	89	
6	Bananas	125	
7	Pineapples	25	
8	Melon	36	
9	Watermelon	16	
10	Kiwi's	95	
11	Total number of fruit	558	
12			

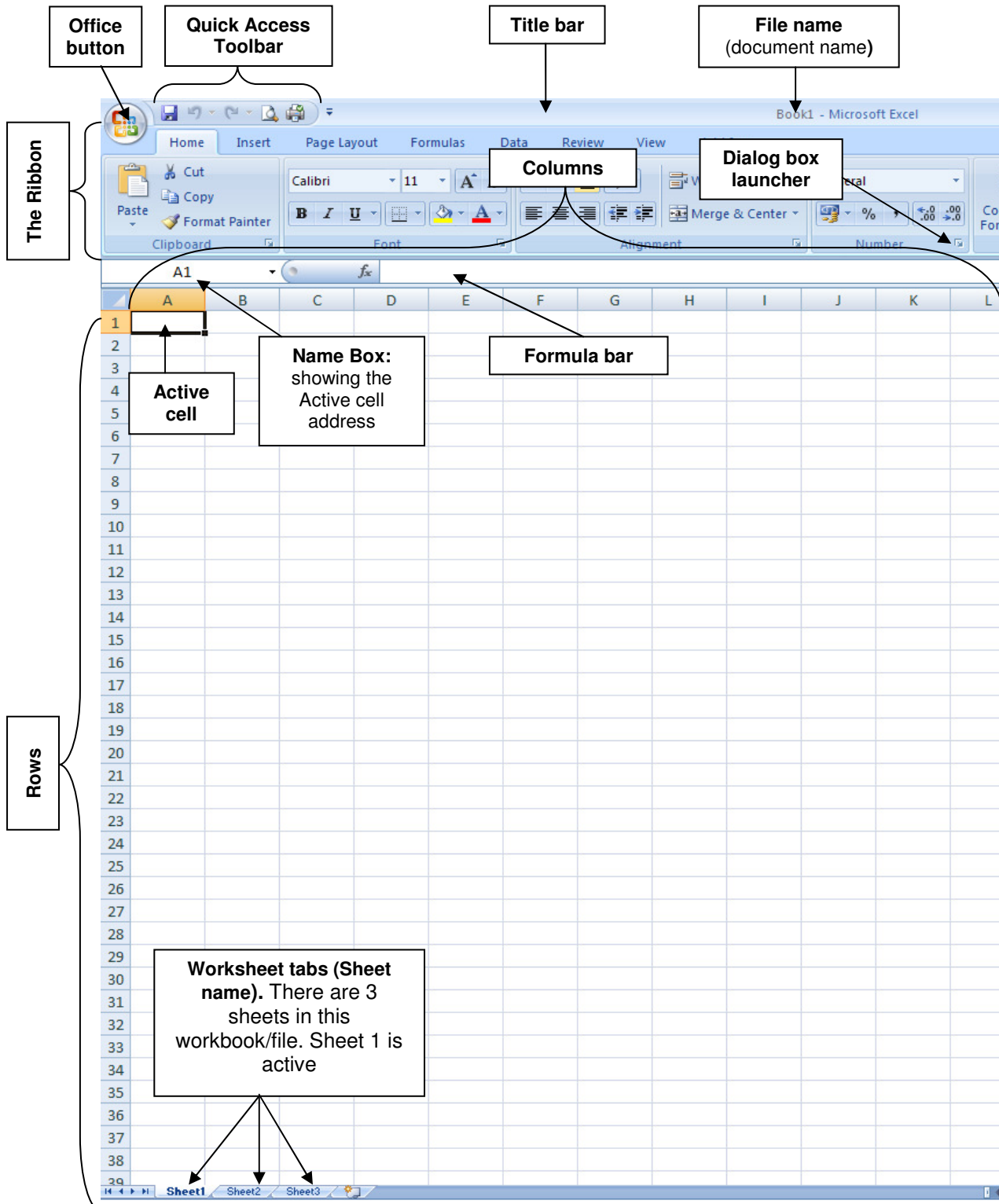
### 3.2. Components/layout of a spreadsheet

Refer to paragraph 7.4.4 in ISBE for an overview of the components of a spreadsheet window.

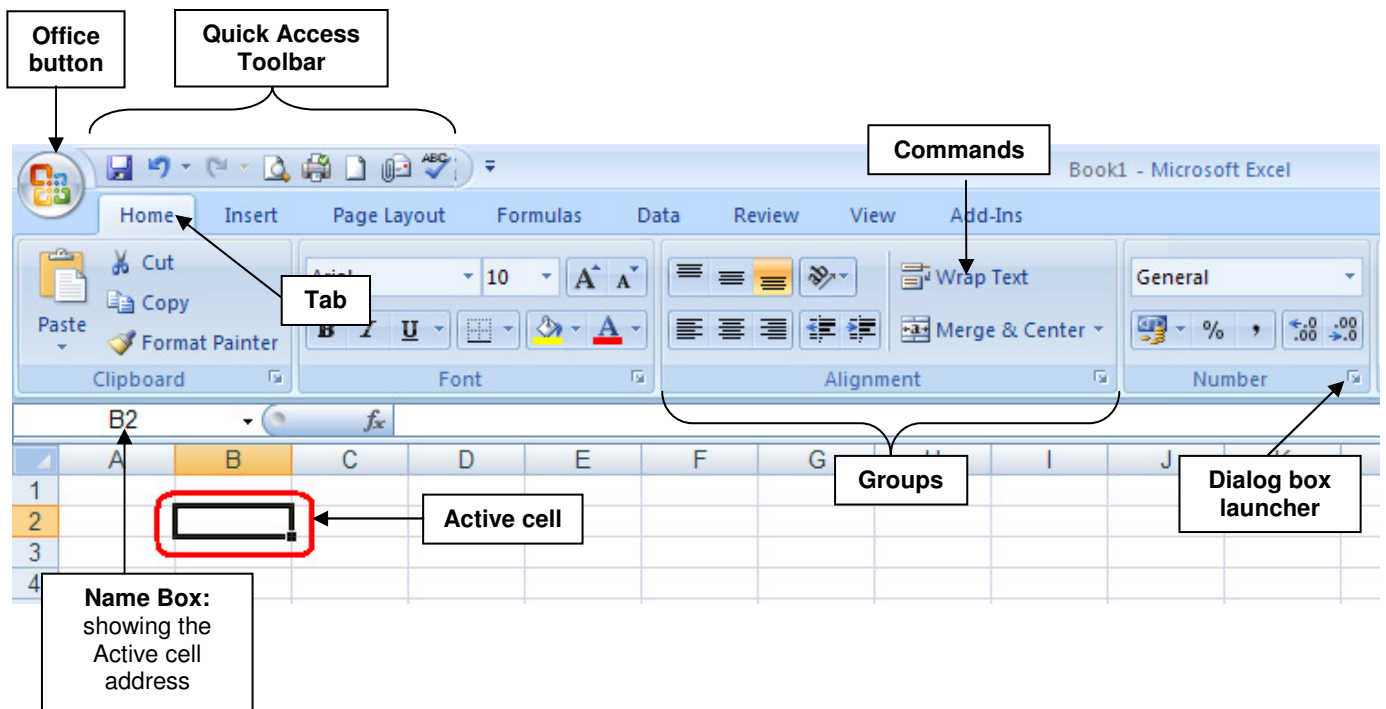
When working in Microsoft Office Excel, you will begin using a workbook/file that contains screens called worksheets. They are identified as Sheet1, Sheet2 and Sheet3. Workbook or file means the same thing and you can use either when working with spreadsheets.

The most recognisable difference between a word-processing document and a spreadsheet is that the spreadsheet uses rows and columns. Numerical data entered into a spreadsheet is easier to read, understand and manipulate when presented in rows and columns.

Below is a typical Microsoft Office Excel 2007 layout.



An Active cell, Ribbon, Dialogue box launcher, Office button and Quick access toolbar will now be explained in more detail.



### 3.2.1. Active cell

A cell becomes active when you select/click on that cell. The active cell is outlined in black and the headings for the column and the row in which the cell is located are highlighted. In the example above a cell in column B on row 2 was selected. The headings on column B and row 2 are highlighted, and cell B2 is outlined. The outlined cell and the highlighted column and row headings make it easier to see that cell B2 is the active cell. The cell reference of the active cell (B2 in this example) will also appear in the **Name Box** in the upper-left corner of the worksheet.

### 3.2.2. Ribbon

The **Ribbon** is new to Microsoft Excel 2007 and has three basic components: Tabs, Groups and Commands.

- **Tabs:** The seven tabs (*Home, Insert, Page Layout, Formulas, Data, Review, View*) each represent core tasks in Excel. The commands on the *Home* tab are those Microsoft identified as the most common used when you do basic tasks in worksheets. [Tabs are similar to the Menu bar in Microsoft Excel 2003.](#)
- **Groups:** Each tab has different groups that show related commands together. [Groups are similar to the different Toolbars in Microsoft Excel 2003.](#)
- **Commands:** This is a button or a menu. Commands are more commonly known as icons and each icon performs a particular function when you click on it with the mouse. (Tip: [Hovering with your mouse pointer over an icon/command will make the description of the icon appear.](#))

The commands on the Ribbon are the ones most used. Excel 2007 shows some commands in response to an action you take instead of showing every command all the time. For example, if there isn't a chart in your worksheet, the commands to work with charts aren't visible. But after a chart was created, the **Chart Tools** will appear, with three tabs: Design, Layout, and Format. When you complete the chart and click outside the chart area, the **Chart Tools** tabs go away. To get the tabs back, click inside the chart and the tabs reappear. (Creating and editing charts will be explained in detail in paragraph 11 of TL103.)

Don't worry if you don't see all the commands all the time, as the commands will appear as soon as you've taken the first step.

### 3.2.3. **Dialog Box Launcher**

When you see the **Dialog Box Launcher** arrow in the lower-right corner of a group, there are more options available for that group. When you click on the arrow with your mouse it will open a dialog box or a task pane.

### 3.2.4. **Microsoft Office Button**

The **Microsoft Office Button (Office Button)** in the upper-left corner of the window will open a menu with commands used to open, save, print, send and close your workbooks/files. The **Excel Options** button at the bottom of the menu will give you access to set options such as R1C1 reference style or showing the Formula Bar in the program window.

### 3.2.5. **Quick Access Toolbar**

The commands on the Quick Access Toolbar are always visible. You can add commands you often use, to this toolbar by right-clicking on the command/icon you want to add and click on **Add to Quick Access Toolbar**. To remove a button from that toolbar, right-click the button on the toolbar, and click **Remove from Quick Access Toolbar**.

## 4. **WORKBOOK BASICS**

We will now take you through various activities to help you understand workbook basics.

### 4.1. **Starting a workbook**

You will be able to start working with Microsoft Office Excel by following these steps:

#### **Activity 1:**

- Click on the Windows start icon
- Select **Programs**
- Select **Microsoft Office**
- Select **Microsoft Office Excel 2007**

**OR**

- Select the Microsoft Office Excel icon from the desktop if visible

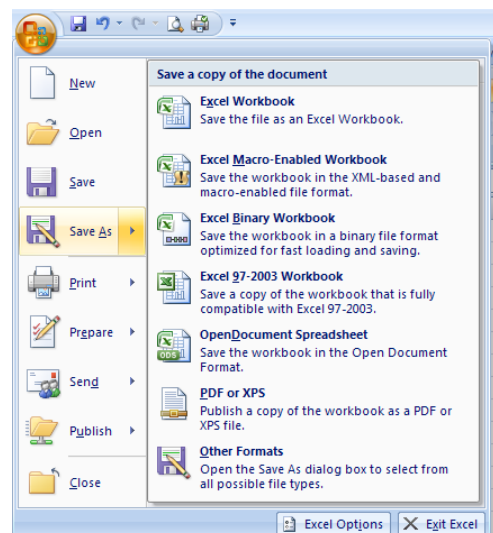
The Microsoft Office Excel window with a full size workbook window will open. The workbook will be displayed as discussed under the layout of the workbook. The workbook will contain a file titled "Book 1".

### 4.2. **Saving a file**

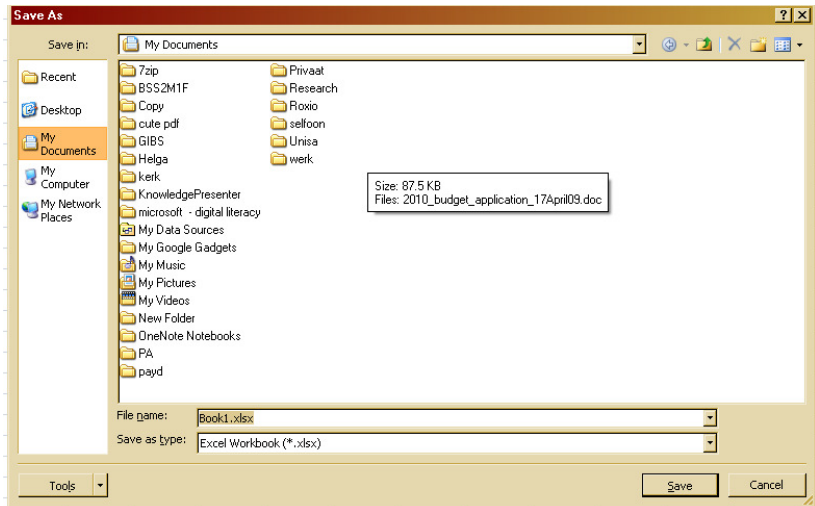
Refer to paragraph 7.4.5.1 in the ISBE for how to save a file.

#### **Activity 2:**

- Click on the **Office Button**
- Click on the **arrow** next to **Save As**
- This will open the **Save As** menu options
  - **Saving the workbook as an Excel Workbook**, will save the file in Excel 2007 format. **Selecting Excel 97-2003 Workbook** will save the workbook in Excel 2003 format. Please note that you'll need to download a convertor to be able to open Excel 2007 formatted workbooks if you are using Excel 2003 on your computer.



- Select **Excel Workbook**. This will open the Save As dialogue box
- Beside **Save In:** select the folder where the workbook/file should be saved
- Type the name of the file ("Test01") into the file name text box which is beside **File name**.
- Click the **Save** button



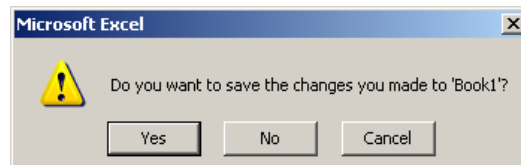
#### 4.3. Close a file and exit Microsoft Office Excel

Refer to 7.4.5.2 in ISBE for how to close a file and exit Microsoft Office Excel.

##### 4.3.1. *Only close the file you are working in while Microsoft Office Excel is kept open*

###### **Activity 3:**

- Click on the **Office Button**
- Select **Close**
- Select **Yes** to save the changes



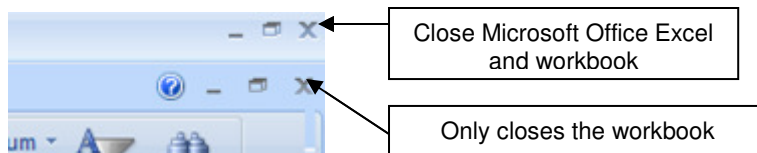
##### 4.3.2. *Close the file as well as Microsoft Office Excel*

###### **Activity 4:**

- Click on the **Office Button**
- Select **Exit Excel** (lower-right corner)
- Select **Yes** to save the changes

###### **Shortcut**

- ❖ Closing only the file – click on the X in the right hand corner of the tab bar
- ❖ Closing the file and Microsoft Office Excel – click on the X in the right hand corner of the title bar



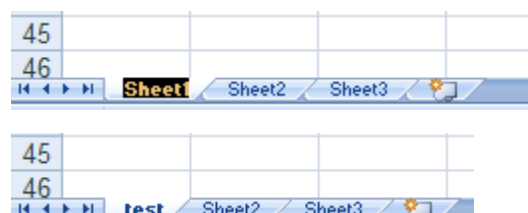
**Before you start the next section, start the Microsoft Office Excel Program and open the existing workbook file "Test01".**

#### 4.4. Naming/renaming worksheets

Refer to paragraph 7.4.5.3 in ISBE for inserting, naming and deleting worksheets.

###### **Activity 5:**

- On the Sheet tab bar, right-click on the sheet tab for **Sheet1**
- Click on **Rename**. **Sheet1** will now be highlighted
- Type **the name** "test"
- Press **Enter**



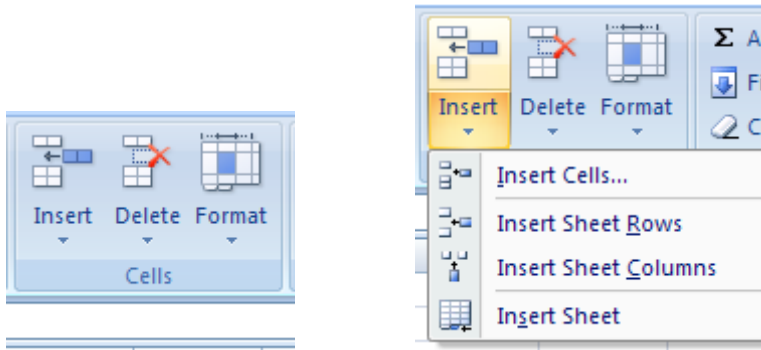
###### **Shortcut**

- ❖ Double click on **Sheet1**
- ❖ Type the name "test"
- ❖ Press **Enter**

#### 4.5. Inserting worksheets

##### **Activity 6:**

- Click on the **Home** tab
- In the **Cells** group, click on the arrow next to **Insert**
- On the drop-down menu click on **Insert Sheet**



A new Worksheet will be added to your workbook called, **Sheet4**.

##### **Shortcut**

- ❖ Press Shift + F11 or
- ❖ Click on the Insert worksheet icon

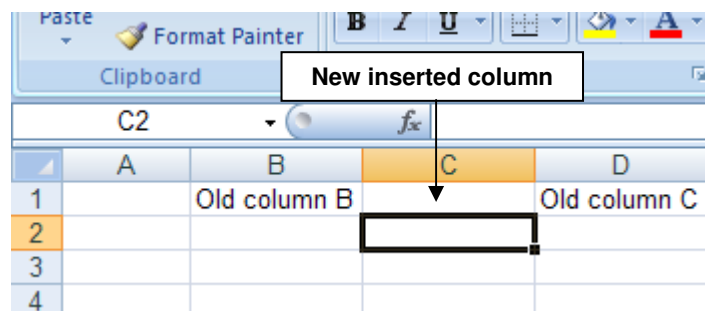


#### 4.6. Inserting columns or rows

To insert a single column, click on any cell in the column immediately to the right of where you want the new column to be inserted and click on the applicable command.

##### **Activity 7:**

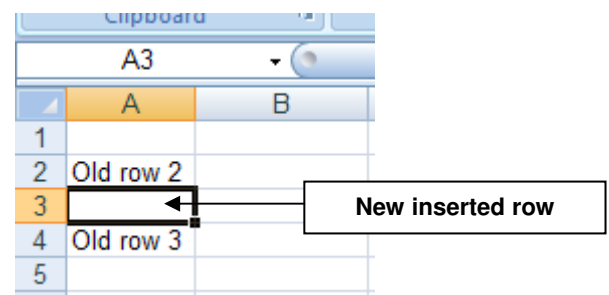
- On **sheet test** enter “Old column B” in cell B1 and “Old column C” in cell C1
- Click on cell C2
- Click on the **Home** tab
- In the **Cells** group, click on the arrow next to **Insert**
- On the drop-down menu click on **Insert Sheet Columns**
- The spreadsheet will appear as follows:



To insert a single row, click any cell in the row immediately below where you want the new row to be inserted and click on the applicable command.

##### **Activity 8:**

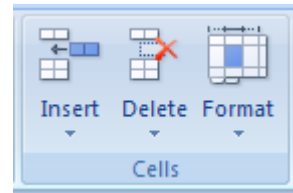
- On **Sheet 2** enter “Old row 2” in cell A2 and “Old row 3” in cell A3
- Click on cell A3
- Click on the **Home** tab
- In the **Cells** group, click on the arrow next to **Insert**
- On the drop-down menu click on **Insert Sheet Rows**
- The spreadsheet will appear as follows:



#### 4.7. Deleting worksheets

##### **Activity 9:**

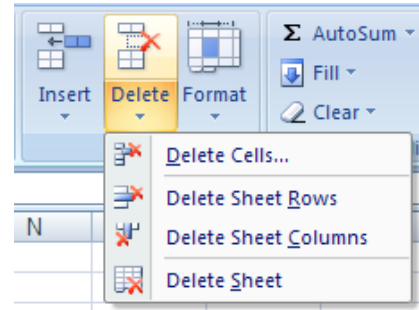
- Click on **Sheet 3** (the worksheet you want to delete)
- Click on the **Home** tab
- In the Cells group, click on the arrow next to **Delete**
- Click on **Delete Sheet**



Sheet3 will be deleted.

##### **Shortcut**

- ❖ Click on the sheet you want to delete (Sheet 3 in this instance)
- ❖ Right click and select **Delete**



#### 4.8. Deleting columns or rows

To delete a single column, click on any cell in that column and click on the applicable command.

##### **Activity 10:**

- On **sheet test** click on cell **C2**
- Click on the **Home** tab
- In the **Cells** group, click on the arrow next to **Delete**
- On the drop-down menu click on **Delete Sheet Columns**
- The spreadsheet will appear as follows:

	A	B	C
1		Old column B	Old column C
2			

To delete a single row, click on any cell in that row and click on the applicable command.

##### **Activity 11:**

- On **sheet 2** click on cell A3
- Click on the **Home** tab
- In the **Cells** group, click on the arrow next to **Delete**
- On the drop-down menu click on **Delete Sheet Rows**
- The spreadsheet will appear as follows:

	A	B
1		
2	Old row 2	
3	Old row 3	
4		

#### 4.9. Moving around in a spreadsheet

Refer to paragraph 7.4.5.4 in ISBE for moving around in a spreadsheet.

Except for using the mouse to move around in a spreadsheet the following keyboard keys can also be used:

- CTRL + HOME      Move the active cell to A1
- CTRL + END      Move the active cell to the last used cell (right bottom) in the worksheet
- END + →        Move to the last column
- END + ↓        Move to the last row
- Page Up         Move one screen up
- Page Down      Move one screen down
- F5                Specify the cell position to go to.

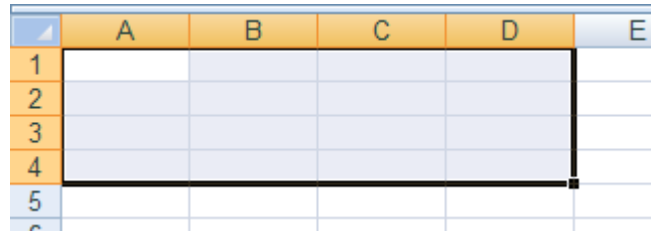


#### 4.10. Selecting a worksheet range

Refer to paragraph 7.4.5.5 in ISBE on how to select a worksheet range.

##### **Activity 12:**

- Anchor the Cell Pointer:
  - Click in Cell A1
  - Press and hold the Mouse button (left button) in Cell A1
- Highlight the range A1:D4
  - While holding down the mouse button, drag across the Worksheet to Cell D4
- Release the mouse button
- The range address highlighted is A1:D4.



### 5. OPERATING THE WORKBOOK

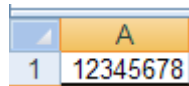
#### 5.1. Entering data

Refer to paragraph 7.4.5.6 in ISBE for how to enter data.

##### 5.1.1. Entering numbers

##### **Activity 13:**

- Click in Cell A1
- Enter the number "12345678"
- Press **Enter**

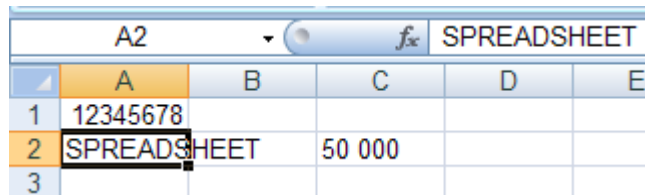


##### 5.1.2. Entering text

If the first character you enter is a letter, Microsoft Office Excel automatically proceeds the entry with a label-prefix character ('). If you want to enter numbers as a label, you should start your entry with a label-prefix character (').

##### **Activity 13 (continued):**

- Click in Cell A2
- Enter the text "Spreadsheet"
- Click in Cell B2
- Enter the value "50 000" as a label
- Press **Enter**



#### 5.2. Editing data

Refer to paragraph 7.4.5.10 in ISBE for how to edit data. Data can be corrected in two stages:

##### 5.2.1. Correcting errors while data is being entered

##### **Activity 14:**

- Click in Cell A5
- Enter the text "**DECENBER**" (do not press Enter)

You realize you have spelled the word DECEMBER incorrectly.

- Click with the mouse pointer to the left of the character **N**
- Press the **Delete** key
- Type the character **M**
- Confirm the entry by pressing **Enter** on the keyboard

### 5.2.2. **Correcting errors after data has being entered**

#### **Activity 15:**

- Click in Cell A6
- Enter the text "**DECENBER** "
- Confirm the entry by pressing **Enter** on the keyboard

You realize that you have spelled the word DECEMBER incorrectly.

- Double click with the mouse pointer on the word or press F2
- Click with the mouse pointer to the left of the character N
- Press the **Delete** key
- Type the character **M**
- Confirm the entry by pressing **Enter** on the keyboard

### 5.3. **Removing data**

Refer to paragraph 7.4.5.11 in ISBE for how to remove data.

#### **Activity 16:**

- Click in Cell A1
- Select range A1:J10 with the mouse
- Press the **Delete** key

### 5.4. **Copying data**

Refer to paragraph 7.4.5.7 in ISBE for how to copy data.

#### **Activity 17:**

- Click in Cell A1
- Type the data **JANUARY**
- Click in cell A2
- Type the data **FEBRUARY**
- Select range A1:A2 with the mouse
- Click on the **Home** tab
- In the **Clipboard** group, click on **Copy**

**Note:** The range contents will be placed on the CLIPBOARD, which is a temporary storage area.

- Click on C1, the destination cell
- Click on the **Home** tab
- In the Clipboard group, click on **Paste**
- The data is copied to the new destination and will appear as follows:

	A	B	C
1	JANUARY		JANUARY
2	FEBRUARY		FEBRUARY

**Note:** When you copy data, you will not remove the data from the cell, but merely make a copy. The copy will be pasted at another location. When the contents of the cell are pasted, it overwrites the existing cell contents where it is pasted.

#### **Shortcut**

- ❖ Copy: Press CTRL + C
- ❖ Paste: Press CTRL + V

## 5.5. Moving of text

### **Activity 18:**

- Select range A1:A2 with the mouse
- Click on the **Home** tab
- In the **Clipboard** group, click on **Cut**

**Note:** The range contents will be placed on the **CLIPBOARD**, which is a temporary storage area.

- Click on E1, the destination cell
- Click on the **Home** tab
- In the **Clipboard** group, click on **Paste**
- The data is moved to the new destination and will look as follows:

	A	B	C	D	E	F
1			JANUARY		JANUARY	
2			FEBRUARY		FEBRUARY	

**Note:** When you cut data, you will remove the data from the cell and paste at another location. When the contents of the cell are pasted, it overwrites the existing cell contents.

### **Shortcut**

- ❖ Cut: Press CTRL + X
- ❖ Paste: Press CTRL + V

## 6. WORKBOOK & CELL FORMATTING

Refer to paragraph 7.4.5.8 in ISBE for how to format data.

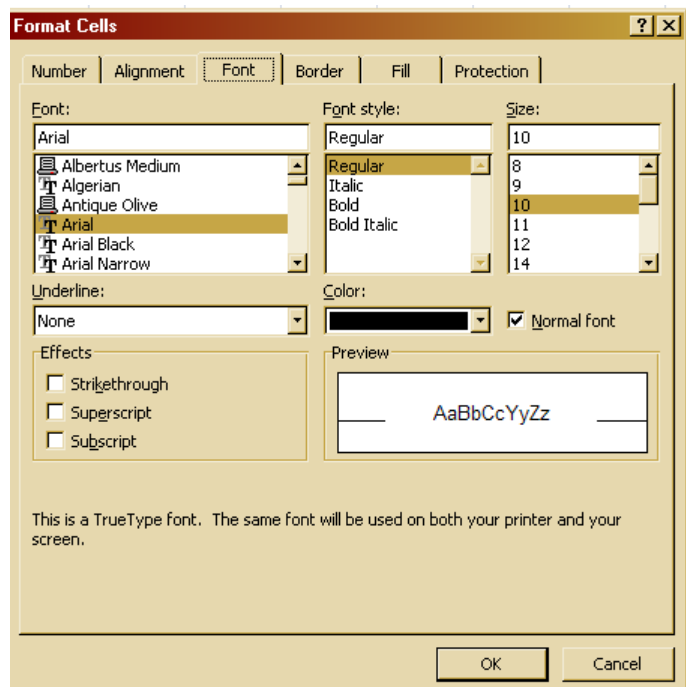
Every time when a new file is created, the default setting is applicable. If you exit the program and return to it, the settings in the dialog will be the default settings.

### 6.1. Cell formatting

The best way to understand how these settings work is to enter data in a range and see what happens if the settings in the dialog box are changed. You can either use an icon (refer to paragraph 7.4.4 – *Formatting toolbar* in ISBE for description of some of these icons) on the **Home** tab in the **Fonts**, **Alignment** and **Number** groups or click on the **Dialog Box Launcher** in one of these groups to open the **Format Cells** dialog box which appears as follow:

Right clicking with your mouse on a cell and selecting **Format Cells** will also open the abovementioned dialog box.

We will cover the more frequently used formatting options in section 6.1.1 to 6.1.6 of this tutorial letter.



**Activity 19:**

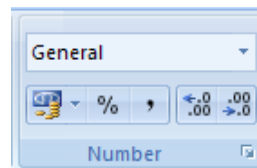
- Open a New Workbook
- In cell A1 enter “Microsoft Excel 2007 Formats”
- In cell A2 enter “JANUARY”
- In cell A3 enter “Format cells”. Do not change the column width to reflect the whole word.
- In cell B2 enter 100000
- In cell B3 enter 50000
- In cell B5 enter 0.02
- In cell B6 enter 2
- In cell C2 enter 80000
- In cell C3 enter 6500.54

**6.1.1. Number formatting**

Use number format to differentiate one kind of numeric data from another for example, currency (R), percentage (%) etc. There are a few different ways to get to the different menus needed.

**Activity 19 (continued):**

- Select cell B2
- Click on the **Home** tab
- In the **Number** group, click on **Comma Style** icon



- Select cell B3
- Click on the **Home** tab
- In the **Number** group, click on the arrow next to the **Accounting Number Format** icon. In the drop-down menu select **R English (South African)**.
- Select cell C2
- Click on the **Home** tab
- In the **Number** group, click on the **Dialog Box Launcher** arrow. This will open the **Format Cells** dialog box.
- Select the **Number** tab
- Under **Category** select **Number**
- Select 3 decimal places, tick the 1000 separator, and leave the negative numbers on the first option (**-1,234.210**).
- Select **OK** to change the format
  
- Select cell C3
- Right click on your mouse and select **Format Cells**
- Select the **Number** tab
- Under **Category** select **Currency**
- Under **Symbol** select **\$ English (US)**
- Select 1 decimal places and leave the negative numbers on the first option (**-\$1,234.1**).
- Select **OK** to change the format
  
- Select cell B5
- Click on the **Home** tab
- In the **Number** group, click on **Percent Style** icon
  
- Select cell B6
- Click on the **Home** tab
- In the **Number** group, click on the **Dialog Box Launcher** arrow. This will open the **Format Cells** dialog box.
- Select the **Number** tab
- Under **Category** select **Percentage**
- Select 2 decimal places
- Click on **OK**
- Does cell B5 or B6 reflects 2% after the % format was applied to it?
- Cell B5 which value was entered as 0.02.

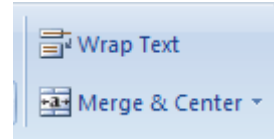
**It is VERY important to remember that the underlying value of a cell formatted as a % is a fraction i.e. the underlying value of cell B5 is 0.02 and not 2 and the underlying value of cell B6 is 2 and not 200 in Microsoft Office Excel. Please refer to paragraph 1.4 of TL103.**

### 6.1.2. Alignment of data

This will give you options regarding Text Alignment, Text Control and Text direction.

#### Activity 19 (continued):

- Select range A1:C1
  - Click on the **Home** tab
  - In the **Alignment** group, click on the arrow next to the **Merge & Centre**
  - On the drop-down menu select **Merge & Centre**
  - Merge combines the selected cells into 1 cell
- 
- Select range A2:A3
  - Click on the **Home** tab
  - In the **Alignment** group, click on the **Wrap text** icon



### 6.1.3. To change fonts and attributes

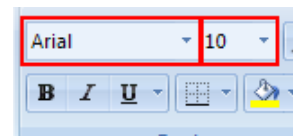
Under the **Font** tab, you will find the following default settings for the workbook: (This may differ from your default)

- Font name: Arial
- Font style: Regular
- Size: 10
- Colour: Automatic
- Underline: None

Under this tab, you can change any of the above-mentioned settings and also add bold, italics and underlining to the text.

#### Activity 19 (continued):

- Select cell A1
  - Click on the **Home** tab
  - In the **Font** group, click on the arrow next to the **Font** icon
  - On the drop-down menu select Comic Sans MS
  - In the **Font** group, click on the arrow next to the **Font size** icon
  - On the drop-down menu select 12
  - In the **Font** group, click on the **Bold** icon
- 
- Select range A2:C6
  - In the **Font** group, click on the **Dialog Box Launcher** arrow. This will open the **Format Cells** dialog box.
  - Select the **Font** tab
  - Under **Font** select Arial
  - Under **Size** select 11
  - Select **OK** to change the format

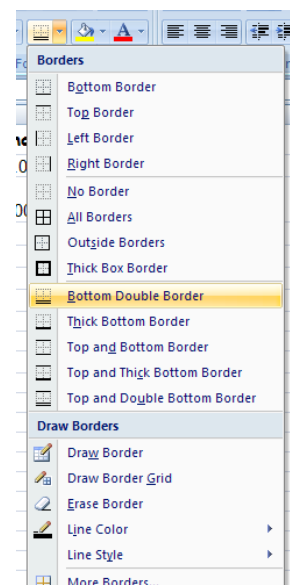


### 6.1.4. Borders

You can frame the data with borderlines and different edges.

#### Activity 19 (continued):

- Select cell B3
  - Click on the **Home** tab
  - In the **Font** group, click on the arrow next to the **Border** icon
  - On the drop-down menu select the **Bottom Double Border** icon
- 
- Select cell C3
  - Click on the **Home** tab
  - In the **Font** group, click on the arrow next to the **Border** icon
  - On the drop-down menu select the **Top and Double Bottom Border** icon



### 6.1.5. Fill

Here you can set the background colour and pattern of the cells selected. (**Do not change any for this Activity**)

### 6.1.6. Protection

Here you can lock cells so that it cannot be changed when a worksheet is protected. (**Do not change any for this Activity**)

#### Activity 19 (continued):

➤ Your results for Activity 19 should appear as follow:

	A	B	C
1	<b>Microsoft Excel 2007 Formats</b>		
2	January	100,000.00	80,000.000
3	Format cells	R 50,000.00	\$6,500.5
4			
5		2%	
6		200.00%	

### 6.2. Column width

The column width should be set to fit the largest set of characters in a cell. If you see the following in a cell ##### (hashers), it means the column width is too small.

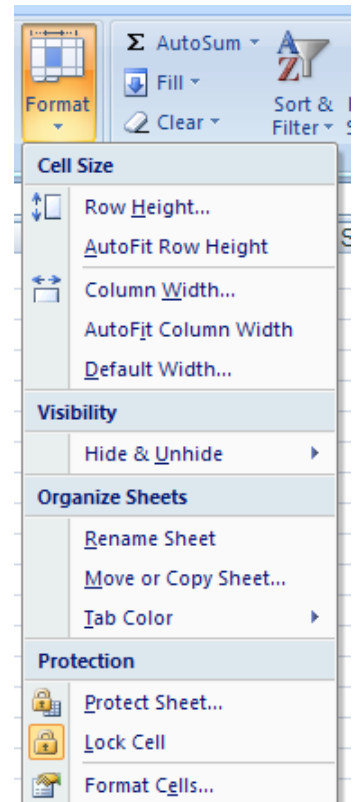
	A	B
1	January	#####

There are two ways of correcting this problem:

- Using an icon/command:
  - Click on the **Home** tab
  - In the **Cells** group, click on the arrow next to the **Format** icon
  - On the drop-down menu select **Column Width** and set the column width until the data appears, or
- Using the mouse:
  - Move the mouse pointer to the letter “B” of the column header
  - Point to the right of the column border
  - The mouse pointer changes to a black two headed vertical arrow
  - Click the mouse and drag to the right to set the width of the column, or
  - If you double click the mouse, the width will be set to fit the largest data cell

The data will be displayed.

	A	B
1	January	100000



### 6.3. Row height

The row height should be set to fit the largest set of characters in a cell. If you cannot see all the text in a cell, it means the row height is too small.

	A	B
1	January	100000

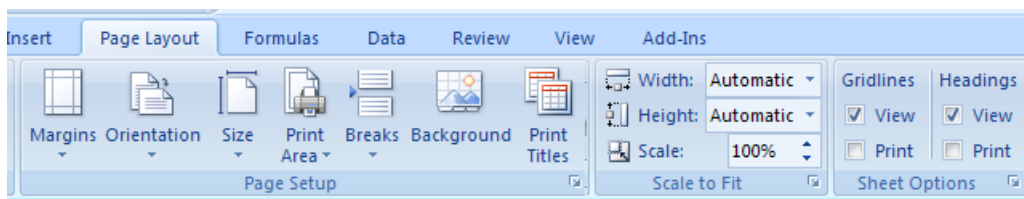
There are two ways of correcting this problem:

- Using an icon/command:
  - Click on the **Home** tab
  - In the **Cells** group, click on the arrow next to the **Format** icon
  - On the drop-down menu select **Row Height** and set the row height until the data appears, or
- Using the mouse:
  - Move the mouse pointer to the number “1” of the row header
  - Point to the bottom of the row border
  - The mouse pointer changes to a black two headed horizontal arrow
  - Click the mouse and drag down to set the width of the column

The data will then be displayed.

## 7. PRINTING & PAGE LAYOUT

Refer to paragraph 7.4.5.9 in ISBE on how to print.



### 7.1. Print area

This defines/selects which area of a worksheet you want to print. **Always** define the area you want to print before you continue with the rest of the page setup (refer to paragraph 7.2 of TL103).

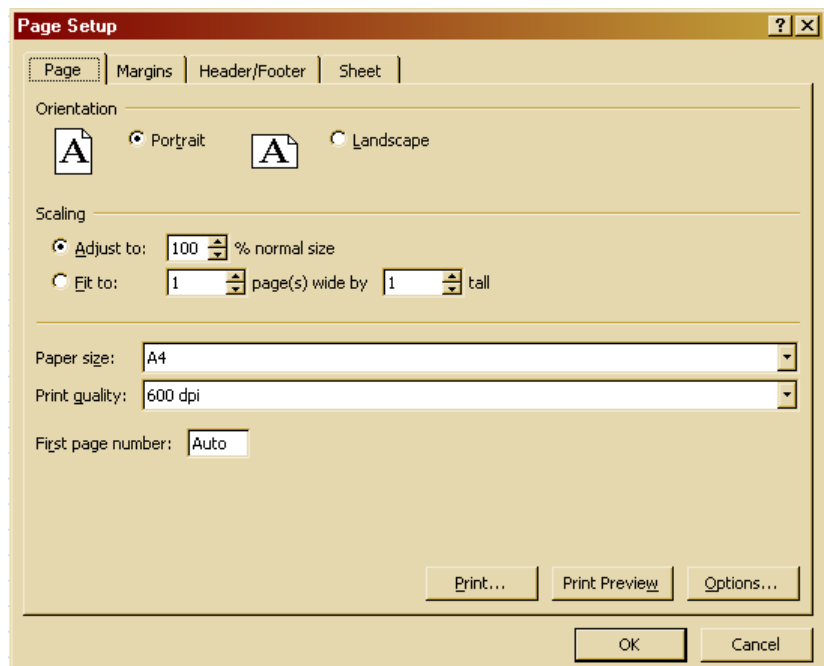
#### **Activity 20:**

- Select the area you want to print
- Click on the **Page Layout** tab
- In the **Page Setup** group, click on the arrow next to the **Print Area** icon
- On the drop-down menu select **Set Print Area**

### 7.2. Page setup

Setting the layout of a worksheet that needs to be printed can be set by either:

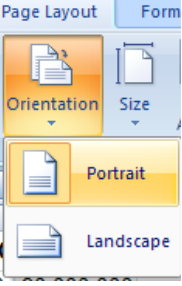
- Using the applicable tab and icon on the **Ribbon** or
- Using the **Page set-up** dialog box by clicking on the **Dialog Box Launcher** arrow in the **Page Setup** group on the **Page Layout** tab.
- **Page set-up** dialog box will appear as follow:



### 7.2.1. Page

- **Orientation**

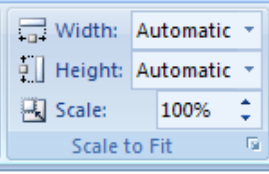
Orientation is used to set whether you want to print the printed worksheet in a portrait or landscape format.

<b>Ribbon:</b> <b>Page Layout tab</b>	<b>Dialog Box Launcher:</b> <b>Page set-up dialog box</b>
<ul style="list-style-type: none"> <li>○ Click on the <b>Page Layout</b> tab</li> <li>○ In the <b>Page Setup</b> group, click on the arrow next to the <b>Orientation</b> icon</li> <li>○ On the drop-down menu select either <b>Portrait</b> or <b>Landscape</b></li> </ul>	 <ul style="list-style-type: none"> <li>○ Select the <b>Page</b> tab in the Page set-up dialog box</li> <li>○ Click on either Portrait or Landscape</li> </ul>

- Leave the default selection

- **Scaling**

Scaling is used to set the width or height of a printed worksheet to a maximum number of pages or to stretch or shrink the printed worksheet to a percentage of its actual size.

<b>Ribbon:</b> <b>Page Layout tab</b>	<b>Dialog Box Launcher:</b> <b>Page set-up dialog box</b>
<ul style="list-style-type: none"> <li>○ Click on the <b>Page Layout</b> tab</li> <li>○ In the <b>Scale to Fit</b> group: <ul style="list-style-type: none"> <li>▪ By clicking on the arrow next to <b>Scale</b> you can increase or decrease the size in relation to the normal size</li> <li>▪ By clicking on the arrow next to <b>Width</b> you can define over how many pages <b>wide</b> you want to print the selected area</li> <li>▪ By clicking on the arrow next to <b>Height</b> you can define over how many pages <b>tall</b> you want to print the selected area</li> </ul> </li> </ul>	 <ul style="list-style-type: none"> <li>○ Select the <b>Page</b> tab in the <b>Page set-up</b> dialog box</li> <li>○ By selecting "<b>Adjust to</b>" you can stretch or shrink the printed worksheet to a percentage of its actual size</li> <li>○ By selecting "<b>Fit to</b>" you can reduce the width and/or the height of the printed worksheet to fit a maximum number of pages wide and/or tall. For example if you set both wide and tall to 1 your selected print area will print the print area set in par 7.1 of TL103 to one page only.</li> </ul>

- Leave the default selection

- **Paper size**

Select the size of paper you are printing to.

<b>Ribbon:</b> <b>Page Layout tab</b>	<b>Dialog Box Launcher:</b> <b>Page set-up dialog box</b>
<ul style="list-style-type: none"> <li>○ Click on the <b>Page Layout</b> tab</li> <li>○ In the <b>Page Setup</b> group, click on the arrow next to the <b>Size</b> icon</li> <li>○ On the drop-down menu select the applicable paper size</li> </ul>	<ul style="list-style-type: none"> <li>○ Select the <b>Page</b> tab in the <b>Page set-up</b> dialog box</li> <li>○ Select the applicable paper size from the drop-down menu</li> </ul>

- Select A4



### 7.2.2. Margins

Here you can change the margin size of the printed worksheet.

<b>Ribbon:</b> <i>Page Layout tab</i>	<b>Dialog Box Launcher:</b> <i>Page set-up dialog box</i>
<ul style="list-style-type: none"> <li>○ Click on the <b>Page Layout</b> tab</li> <li>○ In the <b>Page Setup</b> group, click on the arrow next to the <b>Margin</b> icon</li> <li>○ On the drop-down menu select the applicable margins or select Custom Margins to open the Page set-up dialog box</li> </ul>	<ul style="list-style-type: none"> <li>○ Select the <b>Margins tab</b> in the <b>Page set-up</b> dialog box</li> <li>○ Increase or decrease the margins to the required size</li> </ul>

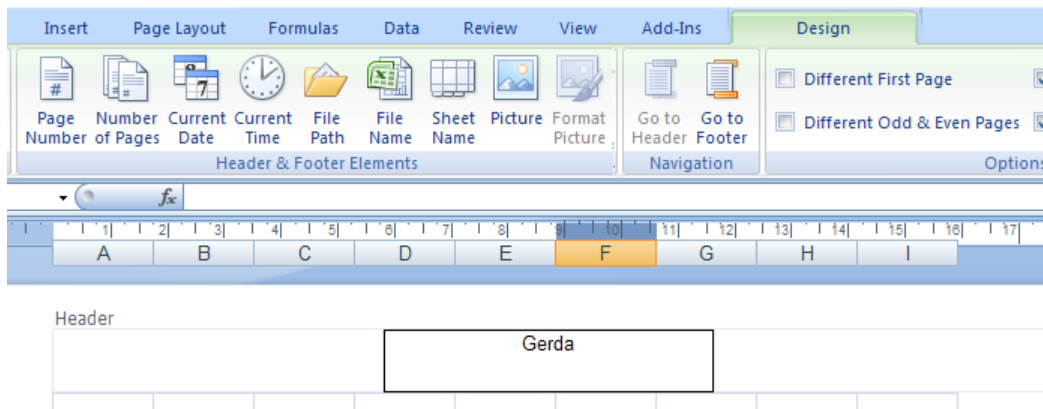
- Select Normal margins

### 7.2.3. Header/footer

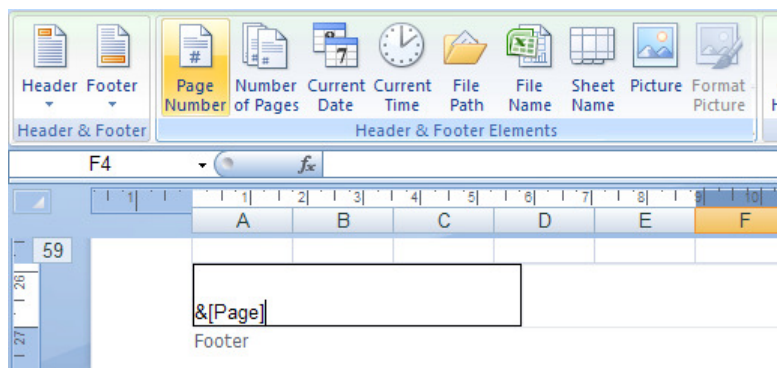
Headers or footers can be included to provide useful information in your worksheet printouts such as page numbers, the date and time, and the file name or other predefined information.

<b>Ribbon:</b> <i>Insert tab</i>	<b>Dialog Box Launcher:</b> <i>Page set-up dialog box</i>
<ul style="list-style-type: none"> <li>○ Click on the <b>Insert</b> tab</li> <li>○ In the <b>Text</b> group, click on the <b>Header &amp; Footer</b> icon</li> <li>○ Click the left, centre, or right header or footer text box at the top or at the bottom of the worksheet page.</li> <li>○ Type the text you want</li> <li>○ Clicking on any of the text boxes will display the <b>Design</b> tab.</li> <li>○ On the <b>Design</b> tab, in the <b>Header &amp; Footer Elements</b> group, click the element that you want to include</li> </ul>	<ul style="list-style-type: none"> <li>○ Select the <b>Header/Footer tab</b> in the <b>Page set-up</b> dialog box</li> <li>○ Include the applicable Header and or Footer</li> </ul>

- Include your name as a **Header**



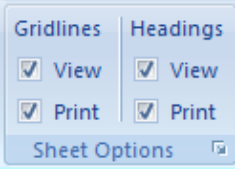
- Include the page number as a **Footer** by clicking on **Page number** icon on the **Design** tab, in the **Header & Footer Elements** group



To return to Normal view, click on the **View** tab, in the **Workbook Views** group, click on the **Normal** icon.

### 7.2.4. Sheet (Gridlines and Row & Column headings)

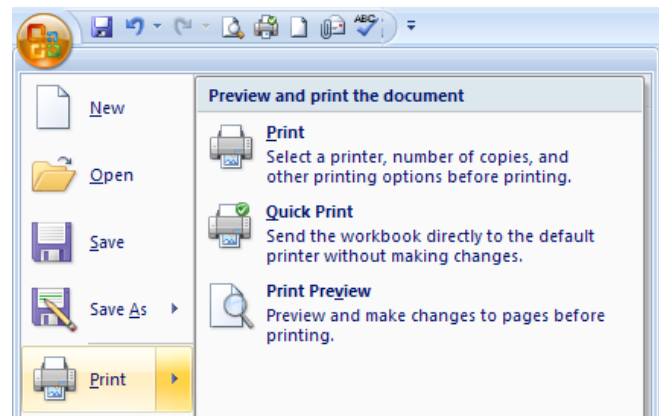
Gridlines, row headings (1, 2, 3, etc) and column headings (A, B, C, etc) are displayed by default in Page Layout view, but they are not printed automatically when printing a worksheet. To print the gridlines and/or row and column headings do the following:

Ribbon: <i>Page Layout tab</i>	Dialog Box Launcher: <i>Page set-up dialog box</i>
<ul style="list-style-type: none"> <li>○ Click on the <b>Page Layout</b> tab</li> <li>○ In the <b>Sheet Options</b> group</li> <li>○ Tick <b>Print</b> under <b>Gridlines</b> to print gridlines</li> <li>○ Tick <b>Print</b> under <b>Headings</b> to print Row and column headings</li> </ul> 	<ul style="list-style-type: none"> <li>○ Select the <b>Sheet tab</b> in the <b>Page set-up dialog box</b></li> <li>○ Under <b>Print</b> <ul style="list-style-type: none"> <li>▪ Click on <b>Gridlines</b> to print gridlines</li> <li>▪ Click on <b>Row and column headings</b> to print the headings</li> </ul> </li> </ul>

### 7.3. Print & Print preview

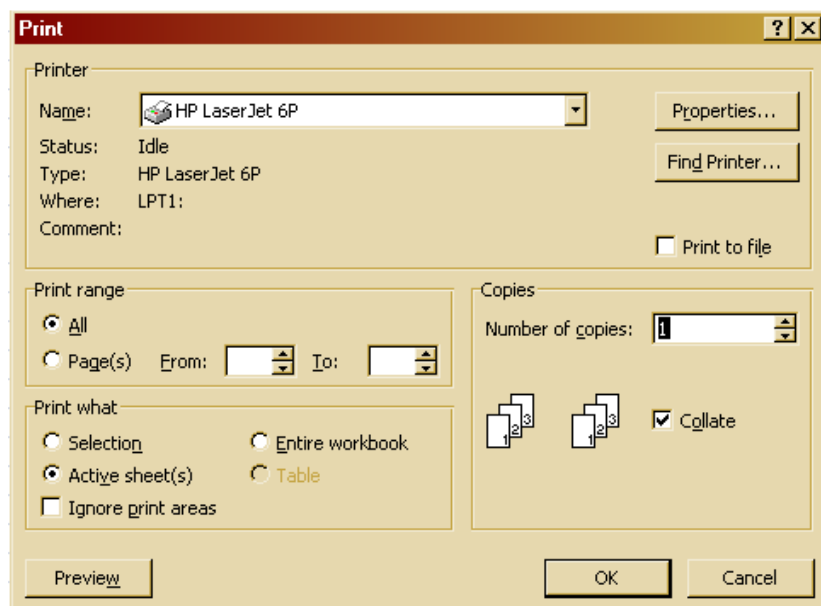
#### **Activity 20 (continued):**

- Click on the **Office Button**
- Select **P**rint
- Select **P**rint **P**review
  - In this view you will see how your worksheet will look like when it's printed on paper
  - Select **C**lose **P**rint **P**review to close the window and return to your worksheet



#### **Activity 20 (continued):**

- Click on the **Office Button**
- Select **P**rint
- The **P**rint dialog box will appear, with the following options:



- **“Printer”**
  - To which printer do you want to print your document
  - Leave the default selection

- **“Print range”**
  - Define if you want to print everything (**All**) or just certain pages (**Pages: From – To**)
  - Leave the default selection
- **“Copies”**
  - Set the number of copies you want to print
- **“Print what”**
  - **Active Sheet** (Print the sheet which is displayed)
  - **Entire workbook** (Print all the sheets in the file)
  - **Select selection** (Print the range you have selected)
- Select the **Preview** button to see the print online, or
- Select **OK** to print

## 8. **WORKING WITH FORMULAS**

Refer to paragraph 7.4.6 in ISBE on how to work with formulas.

**A formula in Microsoft Office Excel always start with an = sign!**

### 8.1. **Common errors when using formulas and functions**

Once an error shows up in a cell, you have to find the cause of the error and edit the worksheet to correct the error. Below are common errors displays found in Microsoft Office Excel and the reasons for it:

#### **#DIV/0!**

This error occurs when the formula calls for division by a cell that either contains the value 0 or, as is more often the case, is empty. Division by zero is not possible according to maths.

#### **#NAME?**

This error occurs when Microsoft Office Excel doesn't recognize text in a formula.

#### **#NULL!**

This error occurs most often when you insert a space where you should have used a comma to separate cell references used as arguments for functions.

#### **#NUM!**

This error occurs when Microsoft Office Excel encounters a problem with a number in the formula, such as the wrong type of argument in a Microsoft Office Excel function or a calculation that produces a number too large or too small to be represented in the worksheet.

#### **#REF!**

This error occurs when Microsoft Office Excel encounters an invalid cell reference, such as when you delete a cell referred to in a formula or paste cells over cells referred to in a formula.

#### **#VALUE!**

Appears when you use the wrong type of argument in a function, the wrong type of operator, or when you call for a mathematical operation that refers to cells that contain text entries.

#### **#N/A!**

This error occurs when a value is not available to a function or a formula.

## 8.2. Entering formulas

### 8.2.1. *Adding, subtracting, dividing and multiplying values*

#### **Activity 21:**

- Open a new workbook/file
- Rename worksheet "Sheet 1" to **Practice**
- Click on cell A1 in worksheet "**Practice**"
- Type the value 100 and **Enter**
- Click on cell A2
- Type the value **20** and **Enter**

	A	B	C
1	100		
2	20		
3			

**Add** the two values together in cell **A3**. The answer of adding the 2 cells will be displayed in cell A3.

#### **Activity 21 (continued):**

- Click on cell A3 (chosen for the formula)
- Enter = to begin the formula
- Enter the first operand (cell A1) by using the arrow key or by clicking on the cell with the mouse
- Enter the first operator ( + )
- Enter the next operand (cell A2) by using the arrow key or by clicking on the cell with the mouse
- Press **Enter**
- The answer that appears is **120**

Repeat the above Activity, but instead of adding the two values, now subtract them from each other in cell A4, multiply the 2 values in cell A5 and divide the two values by each other in cell A6.

This can be achieved by merely changing the operator every time, but keeping the same format of operations i.e. using cell A1 as first operand and cell A2 as second operand. The answer should look like this:

	A
1	100
2	20
3	120
4	80
5	2000
6	5
7	

	A
1	100
2	20
3	=A1+A2
4	=A1-A2
5	=A1*A2
6	=A1/A2
7	

### 8.2.2. *Adding values in two separate worksheets*

#### **Activity 22:**

- Rename worksheet "Sheet2" to **Test**
- Click on cell A1 in worksheet "**Test**"
- Type the value 200 and **Enter**
- Click on cell A2
- Type the value **40** and **Enter**.

	A	B
1	200	
2	40	
3		

- Click on cell A3 in worksheet "**Test**" (chosen for the formula)
- Enter = to begin the formula
- Enter the first operand (sheet **Test** cell **A1**) by using the arrow key
- Enter the first operator ( + )
- Enter the next operand (sheet **Test** cell **A2**) by using the arrow key
- Enter the second operator ( + )
- Click on sheet tab "**Practice**"
- Click on cell A1 in worksheet "**Practice**"
- Enter the third operator ( + )
- Click on cell A2 in worksheet "**Practice**"
- Press **Enter**
- The answer that appears is **360**

The formula in cell A3 on sheet "**Test**" will be:  
**=A1+A2+Practice!A1+Practice!A2**

	A
1	200
2	40
3	=A1+A2+Practice!A1+Practice!A2

### 8.2.3. Combing text and values (&)

Using "&" will reflect the contents of the cells/value/text combined beside each other e.g. =2000&100 will reflect as 2000100. Spaces and other symbols can be added by inserting it in the formula using quotes e.g. =2000&"-"100 will reflect as 2000-100.

#### Activity 23:

- Rename worksheet "Sheet3" to **Add**
- Enter the following data in the worksheet

	A	B	C
1	Nissan	Hardbody	
2	1985	12	
3	Toyota	Corolla	
4	Ford	200	

- In cell C1 enter =A1&A2 and in cell C2 enter =A2&B2.
  - Observe the results displayed in cell C1 (NissanHardbody) and in cell C2 (198512).
  - Note using "&" in the formula in cell C2 did not sum the two values but display the values beside each other.
- In cell C3 enter =A3&" "&A3 and in cell C4 enter =A4&"-"&B4.
  - Observe the results displayed in cell C3 (Toyota Corolla) and in cell C4 (Ford-200)
  - Note using " " inserted a space in the displayed answer (C3) while inserting "-" included a dash in the displayed answer (C4)
- The answer should appear as follow:

	A	B	C
1	Nissan	Hardbody	NissanHardbody
2	1985	12	198512
3	Toyota	Corolla	Toyota Corolla
4	Ford	200	Ford-200
5			

	A	B	C
1	Nissan	Hardbody	=A1&B1
2	1985	12	=A2&B2
3	Toyota	Corolla	=A3&" "&B3
4	Ford	200	=A4&"-"&B4
5			

### 8.3. Copying formulas

#### 8.3.1. Relative reference

Where the column and row reference of a cell reference in a formula changes when copied down and/or across, the cell address is referred to as being a **relative reference**.

A formula or a function can be copied by using the steps in paragraph 5.4 of TL103 or by the following:

- Click on the cell where the formula is which you want to copy.
- With your mouse pointer stand on the right-hand bottom corner of the cell until the mouse pointer turns to a black cross.
- Click and drag the formula down or across to the cells you want to copy the formula to and release the mouse button.

##### 8.3.1.1. Copy down

When a formula is copied **down (over rows)** in a spreadsheet, the cell's **row** reference will increase with the number of rows the formula is copied down with e.g.

- a formula =A1\*B1 copied down **1 row** will change to =A2\*B2 i.e. cell A1 + 1row = cell A2 and cell B1 + 1row = cell B2
- a formula =A1\*B1 copied down **3 rows** will change to =A4\*B4 i.e. cell A1 + 3rows = cell A4 and cell B1 + 3rows = cell B4

	A	B
1		
2		
3		
4		
5		

Number of rows copied down (3 rows)

**Activity 24:**

➤ Enter the following data into a spreadsheet:

	A	B	C	D
1		<b>Number of items</b>	<b>Price per item</b>	<b>Total Price</b>
2	Shoes	6	5	
3	T-shirts	4	15	
4	Jackets	2	20	
5	Jeans	5	18	

- In cell D2 calculate the total price for shoes by entering the formula =B2\*C2
- Copy the formula in cell D2 to cells D3, D4 and D5
- What happened to the formula in cell D3? Is it still =B2\*C2 or did it change?
  - The **row** reference in the cell reference increased with the number of rows the formula was copied down with i.e. 1. Cell **B2** + 1row = cell **B3** and cell **C2** + 1row = cell **C3**. The formula therefore changed from =B2\*C2 to =B3\*C3.
- What happened with the formula in cell D5? Is it still =B2\*C2 or did it change?
  - The **row** reference in the cell reference increased with the number of rows the formula was copied down with i.e. 3 rows. Cell **B2** + 3rows = cell **B5** and cell **C2** + 3rows = cell **C5**. The formula therefore changed from =B2\*C2 to =B5\*C5.

➤ The answer should appear as follows:

	A	B	C	D
1		<b>Number of items</b>	<b>Price per item</b>	<b>Total Price</b>
2	Shoes	6	5	30
3	T-shirts	4	15	60
4	Jackets	2	20	40
5	Jeans	5	18	90

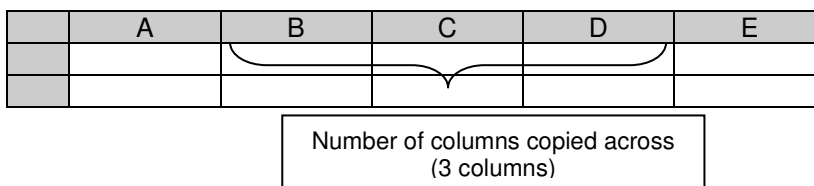
  

	A	B	C	D
1		<b>Number of items</b>	<b>Price per item</b>	<b>Total Price</b>
2	Shoes	6	5	=B2*C2
3	T-shirts	4	15	=B3*C3
4	Jackets	2	20	=B4*C4
5	Jeans	5	18	=B5*C5

8.3.1.2. Copy across

When a formula is copied **across (over columns)** in a spreadsheet the cell's **column** reference will increase with the number of columns the formula is copied across with e.g.

- a formula =A1+A2 copied across **1 column** will change to =B1+B2 i.e. cell **A1** + 1column = cell **B1** and cell **A2** + 1column = cell **B2**.
- a formula of =A1+A2 copied across **3 columns** will change to =D1+D2 i.e. cell **A1** + 3columns = cell **D1** and cell **A2** + 3columns = cell **D2**.



**Activity 25:**

➤ Enter the following data into a spreadsheet:

	A	B	C	D	E
1		<b>March</b>	<b>April</b>	<b>May</b>	<b>June</b>
2	<b>Shoes</b>	500	1005	580	730
3	<b>T-shirts</b>	700	650	408	840
4	<b>Total</b>				

- In cell B4 calculate the total for March by entering the formula =B2+B3
- Copy the formula in cell B4 to cells C4, D4 and E4
- What happened with the formula in cell C4? Is it still =B2+B3 or did it change?
  - The **column** reference in the cell reference was increased with the number of columns the formula was copied across with i.e. 1. Cell **B2** + 1column = cell **C2** and cell **B3** + 1column = cell **C3**. The formula therefore changed from =B2+B3 to =C2+C3.

- What happened with the formula in cell E4? Is it still =B2+B3 or did it change?
  - The **column** reference in the cell reference was increased with the number of columns the formula was copied across with i.e. **3** columns. Cell **B2** + **3**columns = cell **E2** and cell **B3** + **3**columns = cell **E3**. The formula therefore changed from =B2+B3 to =E2+E3.
- The answer should appear as follows:

C4		fx =C2+C3			
	A	B	C	D	E
1		March	April	May	June
2	Shoes	500	1005	580	730
3	T-shirts	700	650	408	840
4	Total	1200	1655	988	1570

C4		fx =C2+C3			
	A	B	C	D	E
1		March	April	May	June
2	Shoes	500	1005	580	730
3	T-shirts	700	650	408	840
4	Total	=B2+B3	=C2+C3	=D2+D3	=E2+E3

8.3.1.3. Copy across & down

**Activity 26:**

- Enter the following data into a spreadsheet:

	A	B	C
1	<b>Number sold</b>	<b>January</b>	<b>February</b>
2	Shoes	20	25
3	T-shirts	50	80
4	Jackets	35	32
5	Jeans	60	70
6			
7	<b>Selling price per item</b>	<b>January</b>	<b>February</b>
8	Shoes	100	100
9	T-shirts	50	55
10	Jackets	300	310
11	Jeans	150	100
12			
13	<b>Total sales per item</b>	<b>January</b>	<b>February</b>
14	Shoes		
15	T-shirts		
16	Jackets		
17	Jeans		

- Calculate the total sales per item by multiplying the number sold with the price of the item.
- Calculate in cell B14 the total sales for Shoes sold in January by entering the formula =B2\*B8
- Copy the formula in cell B14 to cells B15, B16 and B17.
- What happened with the formula in cell B16? Is it still =B2\*B8 or did it change?
  - The **row** reference in the cell reference increased with the number of rows the formula was copied down i.e. **2** rows. Cell **B2** + **2**rows = cell **B4** and cell **B8** + **2**rows = cell **B10**. The formula therefore changed from =B2\*B8 to =B4\*B10.
- The answer should appear as follows:

B16		fx =B4*B10	
	A	B	C
1	<b>Number sold</b>	<b>January</b>	<b>February</b>
2	Shoes	20.00	25.00
3	T-shirts	50.00	80.00
4	Jackets	35.00	32.00
5	Jeans	60.00	70.00
6			
7	<b>Selling price per item</b>	<b>January</b>	<b>February</b>
8	Shoes	100.00	100.00
9	T-shirts	50.00	55.00
10	Jackets	300.00	310.00
11	Jeans	150.00	100.00
12			
13	<b>Total sales per item</b>	<b>January</b>	<b>February</b>
14	Shoes	2,000.00	
15	T-shirts	2,500.00	
16	Jackets	10,500.00	
17	Jeans	9,000.00	

B16		fx =B4*B10	
	A	B	C
1	<b>Number sold</b>	<b>January</b>	<b>February</b>
2	Shoes	20	25
3	T-shirts	50	80
4	Jackets	35	32
5	Jeans	60	70
6			
7	<b>Selling price per item</b>	<b>January</b>	<b>February</b>
8	Shoes	100	100
9	T-shirts	50	55
10	Jackets	300	310
11	Jeans	150	100
12			
13	<b>Total sales per item</b>	<b>January</b>	<b>February</b>
14	Shoes	=B2*B8	
15	T-shirts	=B3*B9	
16	Jackets	=B4*B10	
17	Jeans	=B5*B11	

- **Copy** the formula in cell **B14** to cells C14, C15, C16 and C17.
- What happened with the formula in cell C14? Is it still =B2\*B8 or did it change?
  - The **column** reference in the cell reference increased with the **number of columns** the formula was copied across i.e.1 column. Cell **B2**+1column = cell C2 and cell **B8** + 1column = cell **C8**. The formula therefore changed from =B2\*B8 to =C2\*C8.
- What happened to the formula in cell C17? Is it still =B2\*B8 or did it change?
  - Not only was the column reference in the cell reference increased with the **number of columns** the formula was copied across (1 column) but the row reference was also increased with the **number of rows** the formula was copied down (3 rows). The formula therefore changed from =B2\*B8 to =C5\*C11 i.e.
    - cell **B2** + 1column + 3rows = **C5**
    - cell **B8** + 1column + 3rows = **C11**
- The answer should appear as follows:

C17		fx =C5*C11	
	A	B	C
1	Number sold	January	February
2	Shoes	20.00	25.00
3	T-shirts	50.00	80.00
4	Jackets	35.00	32.00
5	Jeans	60.00	70.00
6			
7	Selling price per item	January	February
8	Shoes	100.00	100.00
9	T-shirts	50.00	55.00
10	Jackets	300.00	310.00
11	Jeans	150.00	100.00
12			
13	Total sales per item	January	February
14	Shoes	2,000.00	2,500.00
15	T-shirts	2,500.00	4,400.00
16	Jackets	10,500.00	9,920.00
17	Jeans	9,000.00	7,000.00

C17		fx =C5*C11	
	A	B	C
1	Number sold	January	February
2	Shoes	20	25
3	T-shirts	50	80
4	Jackets	35	32
5	Jeans	60	70
6			
7	Selling price per item	January	February
8	Shoes	100	100
9	T-shirts	50	55
10	Jackets	300	310
11	Jeans	150	100
12			
13	Total sales per item	January	February
14	Shoes	=B2*B8	=C2*C8
15	T-shirts	=B3*B9	=C3*C9
16	Jackets	=B4*B10	=C4*C10
17	Jeans	=B5*B11	=C5*C11

### 8.3.2. Absolute reference

In contrast with a relative reference, (refer to paragraph 8.3.1 of TL103) the column and/or row reference in an absolute reference is “fixed” and does not change when a formula is copied down and/or across. Inserting a \$ in front of the row or/and column reference will make the reference absolute. Inserting a dollar sign (\$) in front of a column or a row will ensure the column or row reference is absolute (“fixed”) and will not change when the formula is copied across or down. There are 3 types of absolute references:

- **Absolute row reference** - Insert the \$ in front of the **row** reference **only** e.g. B\$5. When copied only the column reference (B) will change but the row reference (5) is fixed and will not change. Refer to paragraph 8.3.2.1 of TL103.
- **Absolute column reference** - Insert the \$ in front of the **column** reference **only** e.g. \$B5. When copied only the row reference (5) will change but the column reference (B) is fixed and will not change. Refer to paragraph 8.3.2.2 of TL103.
- **Absolute column and row reference** - Insert the \$ in front of **both** the **column** and **row** reference e.g. \$B\$5. When copied both the column reference (B) and the row reference (5) is fixed and will not change. Refer to paragraph 8.3.2.3 of TL103.

The \$ can be inserted by:

- changing your formula to include the \$ **or**
- highlight the cell reference in the formula/function and press the F4 function key until the \$ is displayed. Each time the F4 key is pressed it will change where the \$ is displayed i.e. in front of both the column and row reference, in front of the row reference only or in front of the column reference only.



8.3.2.1. Absolute row reference e.g. B\$5**Activity 27:**

- Enter the following data into a spreadsheet:

	A	B	C
1	<b>VAT Rate</b>	<b>14%</b>	
2			
3		<b>Sales excluding VAT</b>	<b>Sales including VAT</b>
4	<i>January</i>	1500	
5	<i>February</i>	1200	
6	<i>March</i>	1300	
7	<i>April</i>	500	
8	<i>May</i>	800	
9	<i>June</i>	1400	

- Calculate the sales amount, per month, including VAT by using the provided VAT%. The formula will be entered **once** and copied to the rest of the cells. What formula will you enter in cell C4?
- In cell C4 enter  $= (B4 * B1) + B4$  i.e. sales including VAT = (sales excluding VAT x VAT) + sales excluding VAT.
- Copy the formula in cell C4 to cell C5 and observe how the formula changes. As explained in paragraph 8.3.1.1 of TL103 relative row references, in a formula, will increase with the number of rows the formula is copied down i.e. the formula will change from  $= (B4 * B1) + B4$  to  $= (B5 * B2) + B5$ .
  - However, we did not want cell reference B1, in the formula, to change to B2 because the VAT% was entered in cell B1.
  - How do you think cell reference **B1** should change to ensure, when copied down, it still refers to cell B1 and will not change? The row reference should be made absolute (fixed) by inserting a \$ sign in front of the row reference (**B\$1**).
- Delete the formula copied to cell C5.
- In cell C4 change cell reference B1 to include the applicable absolute reference i.e.  $= (B4 * B$1) + B4$ .
- Now copy the formula to range C5:C9 and observe how the formula changes.
- What happened with the formula in cell C6? How did it change?
  - The row reference of the relative cell reference changed as explained in 8.3.1.1 of TL103 (**B4** to **B6**). However, the row reference in B\$1 did not change, as it was absolute/fixed. The formula therefore changed from  $= (B4 * B$1) + B4$  to  $= (B6 * B$1) + B6$ .
- The answer should appear as follows:

	A	B	C	D
1	VAT rate	14%		
2				
3		<b>Sales excluding VAT</b>	<b>Sales including VAT</b>	
4	<i>January</i>	1,500.00	1,710.00	
5	<i>February</i>	1,200.00	1,368.00	
6	<i>March</i>	1,300.00	1,482.00	
7	<i>April</i>	500.00	570.00	
8	<i>May</i>	800.00	912.00	
9	<i>June</i>	1,400.00	1,596.00	

	A	B	C
1	VAT rate	0.14	
2			
3		<b>Sales excluding VAT</b>	<b>Sales including VAT</b>
4	<i>January</i>	1500	$= (B4 * B$1) + B4$
5	<i>February</i>	1200	$= (B5 * B$1) + B5$
6	<i>March</i>	1300	$= (B6 * B$1) + B6$
7	<i>April</i>	500	$= (B7 * B$1) + B7$
8	<i>May</i>	800	$= (B8 * B$1) + B8$
9	<i>June</i>	1400	$= (B9 * B$1) + B9$

Please note when the VAT rate was entered into the spreadsheet it was entered as 0.14 and the format of the cell changed to display a % format. The format of the numbers was changed to number format with 2 decimals. Refer to paragraph 6.1.1 of TL103.



8.3.2.3. Absolute column and row references e.g. \$B\$5**Activity 29:**

- Enter the following data into a spreadsheet:

	A	B	C	D	E
1	VAT rate	14%			
2					
3	<b>Sales Excl Vat</b>	<b>January</b>	<b>February</b>	<b>March</b>	<b>April</b>
4	Shoes	2,000.00	2,500.00	3,000.00	2,900.00
5	T-shirts	500.00	800.00	700.00	400.00
6	Jackets	3,500.00	3,200.00	3,800.00	4,000.00
7	Jeans	6,000.00	7,000.00	4,000.00	3,000.00
8	Hats	150.00	200.00	300.00	250.00
9					
10					
11	<b>Sales incl Vat</b>	<b>January</b>	<b>February</b>	<b>March</b>	<b>April</b>
12	Shoes				
13	T-shirts				
14	Jackets				
15	Jeans				
16	Hats				

- Calculate the sales amount, per month, including VAT by using the provided VAT%. The formula will be entered **once** and copied to the rest of the cells. What formula will you enter?
- In cell B12 enter  $=(B4*B1)+B4$ .
- **Copy** the formula to cell **D15** and observe how the formula changes. As explained in paragraph 8.3.1.3 of TL103 relative column and row references, in a formula, will increase with the number of columns/rows the formula is copied across/down. The formula will change from  $=(B4*B1)+B4$  to  $=(D7*D4)+D7$ .
  - However, we did not want cell reference B1, in the formula, to change to D4 because the VAT% was entered in cell B1.
  - How do you think cell reference **B1** should change to ensure, when copied across and down, it still refers to cell B1 and will not change? The column **and** the row reference should be made absolute (fixed) by inserting a \$ sign in front of the column and row reference (**\$B\$1**).
- Delete the formula you have copied to cell **D15**.
- In cell B12 change cells reference B1 to include the applicable absolute references i.e.  $=(B4*$B$1)+B4$
- Now copy the formula to range B13:B16 and range C12:E16 and observe how the formula changes.
- What happened with the formula in cell **D15**? How did it change?
- The column and row references of the relative cell references changed as explained in 8.3.1.3 of TL103 (**B4 to D7**). However, the column and row reference in **\$B\$1** did not change, as it was absolute/fixed. The formula therefore changed from  $=(B4*B1)+B4$  to  $=(D7*$B$1)+D7$ .
- The answer should appear as follows:

D15		fx $=(D7*$B$1)+D7$			
	A	B	C	D	E
1	VAT rate	14%			
2					
3	<b>Sales Excl Vat</b>	<b>January</b>	<b>February</b>	<b>March</b>	<b>April</b>
4	Shoes	2,000.00	2,500.00	3,000.00	2,900.00
5	T-shirts	500.00	800.00	700.00	400.00
6	Jackets	3,500.00	3,200.00	3,800.00	4,000.00
7	Jeans	6,000.00	7,000.00	4,000.00	3,000.00
8	Hats	150.00	200.00	300.00	250.00
9					
10					
11	<b>Sales incl Vat</b>	<b>January</b>	<b>February</b>	<b>March</b>	<b>April</b>
12	Shoes	2,280.00	2,850.00	3,420.00	3,306.00
13	T-shirts	570.00	912.00	798.00	456.00
14	Jackets	3,990.00	3,648.00	4,332.00	4,560.00
15	Jeans	6,840.00	7,980.00	4,560.00	3,420.00
16	Hats	171.00	228.00	342.00	285.00

D15		fx =(D7*\$B\$1)+D7			
	A	B	C	D	E
1	VAT rate	0.14			
2					
3	<b>Sales Excl Vat</b>	<b>January</b>	<b>February</b>	<b>March</b>	<b>April</b>
4	Shoes	2000	2500	3000	2900
5	T-shirts	500	800	700	400
6	Jackets	3500	3200	3800	4000
7	Jeans	6000	7000	4000	3000
8	Hats	150	200	300	250
9					
10					
11	<b>Sales incl Vat</b>	<b>January</b>	<b>February</b>	<b>March</b>	<b>April</b>
12	Shoes	=(B4*B1)+B4	=(C4*\$B\$1)+C4	=(D4*\$B\$1)+D4	=(E4*\$B\$1)+E4
13	T-shirts	=(B5*\$B\$1)+B5	=(C5*\$B\$1)+C5	=(D5*\$B\$1)+D5	=(E5*\$B\$1)+E5
14	Jackets	=(B6*\$B\$1)+B6	=(C6*\$B\$1)+C6	=(D6*\$B\$1)+D6	=(E6*\$B\$1)+E6
15	Jeans	=(B7*\$B\$1)+B7	=(C7*\$B\$1)+C7	=(D7*\$B\$1)+D7	=(E7*\$B\$1)+E7
16	Hats	=(B8*\$B\$1)+B8	=(C8*\$B\$1)+C8	=(D8*\$B\$1)+D8	=(E8*\$B\$1)+E8
17					

## 9. FUNCTIONS

Refer to paragraph 7.4.7.1 - 7.4.7.3 in ISBE for how to work with functions.

A function is a short cut to make calculations easier and quicker. Functions should **always** be used if available.

### 9.1. Structure of a function

A function ALWAYS begins with an equal sign (=), followed by the function name, the opening parenthesis, the arguments for the function separated by commas and the closing parenthesis.

Let us break the following examples down in the above-mentioned structure.

**=sum(cell1:cell2)**

Structure	The formula
Begins with = sign	=
Function name	sum
Opening parenthesis	(
The arguments for the function	cell1:cell2
Closing parenthesis	)

**=PMT(rate,nper,pv,fv,type)**

Structure	The formula
Begins with = sign	=
Function name	PMT
Opening parenthesis	(
The arguments for the function separated by commas	rate,nper,pv,fv,type
Closing parenthesis	)

**=IF(Logical\_test,value\_if\_true,value\_if\_false)**

Structure	The formula
Begins with = sign	=
Function name	IF
Opening parenthesis	(
The arguments for the function separated by commas	Logical_test,value_if_true,value_if_false
Closing parenthesis	)

## 9.2. Reference operators – when to use : or ,

### 9.2.1. Colon :

A colon ( : ) is used to select **all** the cells from and including the 1<sup>st</sup> cell reference to and including the last cell reference. A1:A9 will therefore include all the cells from and including A1 to A9. (see the highlighted cells below).

	A
1	125
2	77
3	45
4	89
5	36
6	25
7	50
8	95
9	16
10	

Include all the cells

### 9.2.2. Comma ,

A comma ( , ) is used if you want to select specified cells and is placed between each cell reference. A1,A4,A6 will therefore only include/select only cells A1, A4 and A6. (see highlighted cells below)

	A
1	125
2	77
3	45
4	89
5	36
6	25
7	50
8	95
9	16
10	

Only include the highlighted cells

A comma is also used to separate the arguments of a function e.g. =IF(condition,value\_if\_true,value\_if\_false)

### 9.2.3. Combining a colon : and a comma ,

A comma ( , ) and a colon ( : ) can be combined. This is used when combining 2 different ranges for example A1:A3,A6:A8 will select/include cells A1, A2, A3, A6, A7 and A8. (see highlighted cells below)

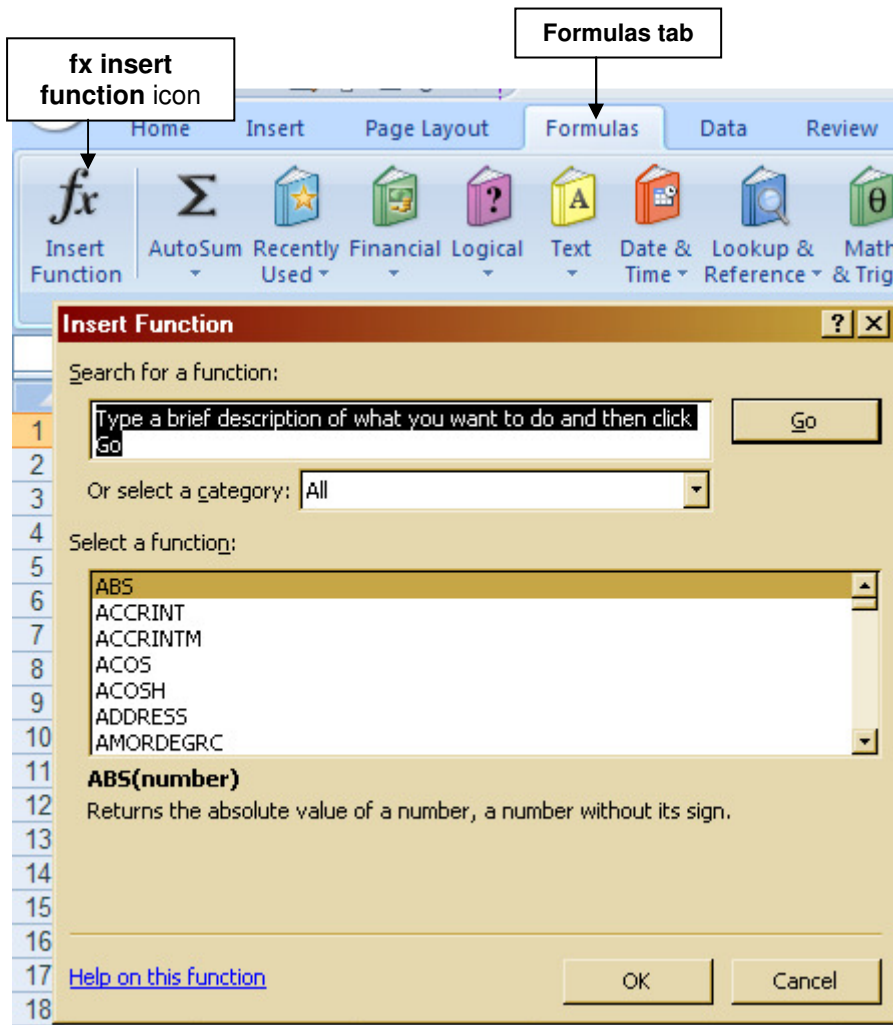
	A
1	125
2	77
3	45
4	89
5	36
6	25
7	50
8	95
9	16

Include both the highlighted cell ranges

### 9.3. Insert a function

#### **Activity 30:**

- Click on the **Formulas tab**
- Click on the **fx insert function icon**
- At “**Or select a category**” choose **All**
- The dialog box will now display as follows:



**Note:** By changing the **Category** the = **Functions** for that specific category will be displayed in the **Select a function** box. By clicking on the **Function** a description appears at the bottom of the dialog box, explaining the operation of the command.

### 9.4. Commonly used functions

Here are some examples of commonly used functions in the financial environment:

#### 9.4.1. **Mathematical functions**

Please note cell1 refers to the first cell in the range and cell2 to the last cell in the range and cell11, cell12, cell13 refers to selected cells. Refer to paragraph 9.2 of TL103 for the difference in using a comma or colon.

9.4.1.1. SUM

This function **adds** values in individual cells or cells ranges together.

**=SUM(cell1:cell2)**

Adds all the values in a specified **range of cells**

**=SUM(cell11,cell12,cell13)**

Adds all the values for specified **cells**

**Activity 31:**

- Create a worksheet and enter the following data

	A	B
1	<b>T-shirts in stock per different type of T-shirt</b>	
2		
3	<b>Type of sport T-shirt</b>	<b>Number of T-shirt</b>
4	Soccer	125
5	Rugby	77
6	Swimming	65
7	Cricket	45
8	Tennis	89
9	Netball	36
10	Basketball	25
11	Hockey	50
12	Athletics	95
13	Table tennis	16

- In cell **B14** calculate the total number of T-shirts for **all** the types of T-shirts.
- In cell **B16** calculate the total number of T-shirts for the **swimming, netball and hockey** T-shirts only.
- In cell **B18** calculate the total number of T-shirts for the **rugby, swimming, cricket, hockey and athletic** T-shirts only.
- The answer should appear as follows:

B18		fx	=SUM(B5:B7,B11:B12)
	A	B	
1	<b>T-shirts in stock per different type of T-shirt</b>		
2			
3	<b>Type of sport T-shirt</b>	<b>Number of T-shirt</b>	
4	Soccer	125	
5	Rugby	77	
6	Swimming	65	
7	Cricket	45	
8	Tennis	89	
9	Netball	36	
10	Basketball	25	
11	Hockey	50	
12	Athletics	95	
13	Table tennis	16	
14	<b>Total number of all T-shirts</b>	<b>623</b>	
15			
16	<b>Total number of swimming, netball and hockey T-shirts</b>	<b>151</b>	
17			
18	<b>Total number of rugby, swimming, cricket, hockey and athletics t-shirts</b>	<b>332</b>	
19			

B18		fx	=SUM(B5:B7,B11:B12)
	A	B	
1	<b>T-shirts in stock per different type of T-shirt</b>		
2			
3	<b>Type of sport T-shirt</b>	<b>Number of T-shirt</b>	
4	Soccer	125	
5	Rugby	77	
6	Swimming	65	
7	Cricket	45	
8	Tennis	89	
9	Netball	36	
10	Basketball	25	
11	Hockey	50	
12	Athletics	95	
13	Table tennis	16	
14	<b>Total number of all T-shirts</b>	<b>=SUM(B4:B13)</b>	
15			
16	<b>Total number of swimming, netball and hockey T-shirts</b>	<b>=SUM(B6,B9,B11)</b>	
17			
18	<b>Total number of rugby, swimming, cricket, hockey and athletics t-shirts</b>	<b>=SUM(B5:B7,B11:B12)</b>	
19			

9.4.1.2. ROUND

This function **rounds** the value in the specified cell to the specified number of digits.

**=ROUND(cell1,number\_of\_digits)**

**Cell1** refers to cell that will be rounded. **Number\_of\_digits** refer to the number of digits the answer should be rounded to.

**Activity 32:**

- Use the data entered in **Activity 31**.
- In column C divide the number of T-shirts for **soccer, swimming, basketball, and table tennis** by 3.
- Use the round function and in column D round the answer, calculated in column C, as follow.
  - round soccer T-shirts to 1 digit
  - round swimming T-shirts to 2 digits
  - round basketball T-shirts to 3 digits
  - round table tennis T-shirts to 4 digits
- The answer should appear as follows:

D13      fx      =ROUND(C13,4)				
	A	B	C	D
1	T-shirts in stock per different type of T-shirt			
2				
3	Type of sport T-shirt	Number of T-shirt	Number of T-shirts divided by 3	Round
4	Soccer	125	41.66666667	41.7
5	Rugby	77		
6	Swimming	65	21.66666667	21.67
7	Cricket	45		
8	Tennis	89		
9	Netball	36		
10	Basketball	25	8.333333333	8.333
11	Hockey	50		
12	Athletics	95		
13	Table tennis	16	5.333333333	5.3333
14	Total number of all T-shirts	623		
15				
16	Total number of swimming, netball and hockey T-shirts	151		
17				
18	Total number of rugby, swimming, cricket, hockey and athletics t-shirts	332		
19				

D13      fx      =ROUND(C13,4)				
	A	B	C	D
1	T-shirts in stock per different type of T-shirt			
2				
3	Type of sport T-shirt	Number of T-shirt	Number of T-shirts divided by 3	Round
4	Soccer	125	=B4/3	=ROUND(C4,1)
5	Rugby	77		
6	Swimming	65	=B6/3	=ROUND(C6,2)
7	Cricket	45		
8	Tennis	89		
9	Netball	36		
10	Basketball	25	=B10/3	=ROUND(C10,3)
11	Hockey	50		
12	Athletics	95		
13	Table tennis	16	=B13/3	=ROUND(C13,4)
14	Total number of all T-shirts	=SUM(B4:B13)		
15				
16	Total number of swimming, netball and hockey T-shirts	=SUM(B6,B9,B11)		
17				
18	Total number of rugby, swimming, cricket, hockey and athletics t-shirts	=SUM(B5:B7,B11:B12)		
19				

It is not always necessary to round the answer of a cell in a separate cell. The round function can be used with a formula in a cell: **=ROUND(formula,number\_of\_digits)**

**Formula** refers to the formula you want to calculate. **Number\_of\_digits** refer to the number of digits the answer should be rounded to.

**Activity 33:**

- Use the data entered in **Activity 32**.
- Delete the formulas and functions entered in columns C and D.
- In column C, divide the number of T-shirts for **soccer, swimming, basketball, and table tennis** by 3 and round the answer of formula as follows:
  - round soccer T-shirts to 1 digit
  - round swimming T-shirts to 2 digits
  - round basketball T-shirts to 3 digits
  - round table tennis T-shirts to 4 digits



➤ The answer should appear as follows:

C13      fx      =ROUND(B13/3,4)			
	A	B	C
1	T-shirts in stock per different type of T-shirt		
2			
3	Type of sport T-shirt	Number of T-shirt	Number of T-shirts divided by 3
4	Soccer	125	41.7
5	Rugby	77	
6	Swimming	65	21.67
7	Cricket	45	
8	Tennis	89	
9	Netball	36	
10	Basketball	25	8.333
11	Hockey	50	
12	Athletics	95	
13	Table tennis	16	5.3333
14	Total number of all T-shirts	623	
15			
16	Total number of swimming, netball and hockey T-shirts	151	
17			
18	Total number of rugby, swimming, cricket, hockey and athletics t-shirts	332	

C13      fx      =ROUND(B13/3,4)			
	A	B	C
1	T-shirts in stock per different		
2			
3	Type of sport T-shirt	Number of T-shirt	Number of T-shirts divided by 3
4	Soccer	125	=ROUND(B4/3,1)
5	Rugby	77	
6	Swimming	65	=ROUND(B6/3,2)
7	Cricket	45	
8	Tennis	89	
9	Netball	36	
10	Basketball	25	=ROUND(B10/3,3)
11	Hockey	50	
12	Athletics	95	
13	Table tennis	16	=ROUND(B13/3,4)
14	Total number of all T-shirts	=SUM(B4:B13)	
15			
16	Total number of swimming, netball and hockey T-shirts	=SUM(B6,B9,B11)	
17			
18	Total number of rugby, swimming, cricket, hockey and athletics t-shirts	=SUM(B5:B7,B11:B12)	

**9.4.2. Statistical functions**

Please note cell1 refers to the first cell in the range and cell2 to the last cell in the range and cell11, cell12, cell13 refers to selected cells. Refer to paragraph 9.2 of TL103 for the difference in using a comma or colon.

**9.4.2.1. Average**

This function calculates the average value for the specified cells or ranges.

**=AVERAGE(cell1:cell2)**

Calculates the average of the values in a specified **range of cells**

**=AVERAGE(cell1,cell2,cell3)**

Calculates the average of the values for specified **cells**

**Activity 34:**

- Use the data entered in **Activity 31**.
- Delete the formulas in cells B14, B16, B18.
- In cell **B14** calculate the average number of T-shirts for **all** the types of T-shirts.
- In cell **B16** calculate the average of T-shirts for the **swimming, netball and hockey** T-shirts only.
- In cell **B18** calculate the average of T-shirts for the **rugby, swimming, cricket, hockey and athletic** T-shirts only.
- The answer should appear as follows:

B18      fx      =AVERAGE(B5:B7,B11:B12)		
	A	B
1	T-shirts in stock per different type of T-shirt	
2		
3	Type of sport T-shirt	Number of T-shirt
4	Soccer	125
5	Rugby	77
6	Swimming	65
7	Cricket	45
8	Tennis	89
9	Netball	36
10	Basketball	25
11	Hockey	50
12	Athletics	95
13	Table tennis	16
14	Average number of T-shirts in stock	62.30
15		
16	Average number of swimming, netball and hockey T-shirts in stock	50.33
17		
18	Average number of rugby, swimming, cricket, hockey and athletics t-shirts in stock	66.40

B18      fx      =AVERAGE(B5:B7,B11:B12)		
	A	B
1	T-shirts in stock per different type of T-shirt	
2		
3	Type of sport T-shirt	Number of T-shirt
4	Soccer	125
5	Rugby	77
6	Swimming	65
7	Cricket	45
8	Tennis	89
9	Netball	36
10	Basketball	25
11	Hockey	50
12	Athletics	95
13	Table tennis	16
14	Average number of T-shirts in stock	=AVERAGE(B4:B13)
15		
16	Average number of swimming, netball and hockey T-shirts in stock	=AVERAGE(B6,B9,B11)
17		
18	Average number of rugby, swimming, cricket, hockey and athletics t-shirts in stock	=AVERAGE(B5:B7,B11:B12)

### 9.4.2.2. Maximum

This function is used to identify the maximum (greatest, highest, most, largest) value in a range of cells or in specified cells.

**=MAX(cell1:cell2)**

Calculates the largest value in a specified **range of cells**

**=MAX(cell1,cell2,cell3)**

Calculates the largest value for specified **cells**

#### **Activity 35:**

- Use the data entered in **Activity 31**.
- Delete the formulas in cells B14, B16, B18.
- In cell **B14** calculate the largest number of T-shirts available for **all** the types of T-shirts.
- In cell **B16** calculate the highest number of T-shirts available for the **swimming, netball and hockey** T-shirts only.
- In cell **B18** calculate the greatest number of T-shirts available for the **rugby, swimming, cricket, hockey and athletic** T-shirts only.
- The answer should appear as follows:

B18		fx =MAX(B5:B7,B11:B12)	
	A		B
1	T-shirts in stock per different type of T-shirt		
2			
3	Type of sport T-shirt		Number of T-shirt
4	Soccer		125
5	Rugby		77
6	Swimming		65
7	Cricket		45
8	Tennis		89
9	Netball		36
10	Basketball		25
11	Hockey		50
12	Athletics		95
13	Table tennis		16
14	The largest number of all T-shirts in stock		125
15			
16	The largest number of only swimming, netball and hockey T-shirts in stock		65
17			
18	The largest number of only of rugby, swimming, cricket, hockey and athletics t-shirts in stock		95

B18		fx =MAX(B5:B7,B11:B12)	
	A		B
1	T-shirts in stock per different type of T-shirt		
2			
3	Type of sport T-shirt		Number of T-shirt
4	Soccer		125
5	Rugby		77
6	Swimming		65
7	Cricket		45
8	Tennis		89
9	Netball		36
10	Basketball		25
11	Hockey		50
12	Athletics		95
13	Table tennis		16
14	The largest number of all T-shirts in stock		=MAX(B4:B13)
15			
16	The largest number of only swimming, netball and hockey T-shirts in stock		=MAX(B6,B9,B11)
17			
18	The largest number of only of rugby, swimming, cricket, hockey and athletics t-shirts in stock		=MAX(B5:B7,B11:B12)

### 9.4.2.3. Minimum

This function is used to identify the minimum (smallest, least, lowest, tiniest) value in a range of cells or in specified cells.

**=MIN(cell1:cell2)**

Calculates the smallest value in a specified **range of cells**

**=MIN(cell1,cell2,cell3)**

Calculates the smallest value for specified **cells**

#### **Activity 36:**

- Use the data entered in **Activity 31**.
- Delete the formulas in cells B14, B16, B18.
- In cell **B14** calculate the smallest number of T-shirts available for **all** the types of T-shirts.
- In cell **B16** calculate the lowest number of T-shirts available for the **swimming, netball and hockey** T-shirts only.
- In cell **B18** calculate the least number of T-shirts available for the **rugby, swimming, cricket, hockey and athletic** T-shirts only.

➤ The answer should appear as follows:

B18		fx =MIN(B5:B7,B11:B12)	
	A		B
1	T-shirts in stock per different type of T-shirt		
2			
3	Type of sport T-shirt		Number of T-shirt
4	Soccer		125
5	Rugby		77
6	Swimming		65
7	Cricket		45
8	Tennis		89
9	Netball		36
10	Basketball		25
11	Hockey		50
12	Athletics		95
13	Table tennis		16
14	<b>in stock</b>		<b>16</b>
15			
16	The smallest number of only swimming, netball and hockey T-shirts in stock		36
17			
18	The smallest number of only of rugby, swimming, cricket, hockey and athletics t-shirts in stock		45

B18		fx =MIN(B5:B7,B11:B12)	
	A		B
1	T-shirts in stock per different type of T-shirt		
2			
3	Type of sport T-shirt		Number of T-shirt
4	Soccer		125
5	Rugby		77
6	Swimming		65
7	Cricket		45
8	Tennis		89
9	Netball		36
10	Basketball		25
11	Hockey		50
12	Athletics		95
13	Table tennis		16
14	<b>in stock</b>		<b>=MIN(B4:B13)</b>
15			
16	The smallest number of only swimming, netball and hockey T-shirts in stock		<b>=MIN(B6,B9,B11)</b>
17			
18	The smallest number of only of rugby, swimming, cricket, hockey and athletics t-shirts in stock		<b>=MIN(B5:B7,B11:B12)</b>

### 9.4.3. Financial functions

For all the functions mentioned below, the following definitions apply:

**rate** = the interest rate used

**nper** = the applicable period

**pmt** = the payment/instalment amount

**fv** = future value

**pv** = present value

**type** = **1** if the instalment is paid at the **beginning** of the month

**type** = **0** if the instalment is paid at the **end** of the month

Please make sure the payment period, interest rate period and the applicable period is all the same period/denominator.

Example:

- Payment is an instalment **per month**, the interest rate is a % **per year** and the period is in **years**.
- As the payment period is in months you will need to convert the current yearly interest rate to a monthly interest rate by dividing the yearly interest rate by 12.
- As the payment period is in months you will also need to convert the applicable period currently in years to a number of months by multiplying the period in years 12.

**Please note, for activity 37 to activity 40, the interest rate should be entered in the spreadsheet as 0.14 and formatted to display as 14%. Refer to paragraph 6.1.1 of TL103.**

#### 9.4.3.1. Calculation of payments

**=PMT(rate,nper,pv,fv,type)**

Calculates the payment for a loan based on constant payments and a constant interest rate.

##### Activity 37:

- You want to buy a car for R50 000. Enter the present value in cell B3.
- The bank can finance your car at a constant interest rate of 14% per year over 5 years. Enter the interest rate in cell B4 and the period in cell B5.
- Use the **=PMT** function and calculate the **monthly** payment you need to make to the bank at the **end** of each month.

- Enter the following formula in cell B7 **=PMT(B4/12,B5\*12,B3,0,0)**

Structure	The formula	Explanation
Begins with = sign	=	
Function name	PMT	
Opening parenthesis	(	
rate	B4/12	The interest rate is an <b>annual</b> (yearly) rate and needs to be divided by 12 to make it a <b>monthly</b> rate as the payment value required is a monthly payment.
nper	B5*12	The period is a term in <b>years</b> and needs to be multiplied by 12 to make it a period in <b>months</b> as the payment value required is a monthly payment.
pv	B3	The present value of the loan amount. The amount you want to loan from the bank to finance the vehicle.
fv	0	The future value of the loan. As the loan will be fully paid by the end of the period the future value of the loan is 0.
type	0	The instalment is paid at the <b>end</b> of the month (paid in arrears).
Closing parenthesis	)	

- The answer should appear as follows:

**Note:** As an instalment/payment is regarded as an outflow of cash, it is shown as a negative value.

B7		fx =PMT(B4/12,B5*12,B3,0,0)	
	A	B	C
1	Payment per month for car loan		
2			
3	Car loan (present value of the loan)	R 50,000.00	
4	Interest rate per year	14%	
5	Term in years	5	
6			
7	Payment per month	R -1,163.41	

### Activity 38:

- Use the same information as in *Activity 37*.
- Calculate the monthly amount payable to the bank if you pay the amount at the **beginning** of the month (pay in advance)
  - Enter the following formula in cell B7 **=PMT(B4/12,B5\*12,B3,0,1)**

Structure	The formula	Explanation
Begins with = sign	=	
Function name	PMT	
Opening parenthesis	(	
rate	B4/12	The interest rate is an <b>annual</b> (yearly) rate and needs to be divided by 12 to make it a <b>monthly</b> rate.
nper	B5*12	The period is a term in <b>years</b> and should be multiplied by 12 to make it a period in <b>months</b> .
pv	B3	The present value of the loan amount. The amount you want to loan from the bank to finance the vehicle.
fv	0	The future value of the loan. As the loan will fully be paid by the end of the period the future value of the loan is R0.
type	1	The instalment is paid at the <b>beginning</b> of the month (paid in advance).
Closing parenthesis	)	

The answer should appear as follows:

**Note:** As an instalment/payment is regarded as an outflow of cash, it is shown as a negative value.

B7		fx =PMT(B4/12,B5*12,B3,0,1)	
	A	B	C
1	Payment per month for car loan		
2			
3	Car loan (present value of the loan)	R 50,000.00	
4	Interest rate per year	14%	
5	Term in years	5	
6			
7	Payment per month	R -1,150.00	

### 9.4.3.2. Calculation of Future Value

**=FV(rate,nper,pmt,pv,type)**

Returns the future value of an investment based on constant payments and a constant interest rate.

#### Activity 39:

- You want to save R500 at the **end** of each month and the bank will give you a constant interest rate of 14% per year. Enter the investment amount in cell B3, the investment rate in cell B4 and the period in cell B5.
- Use the **=FV** function and calculate what the value of your savings will be after 5 years.
  - Enter the following formula in cell B7 **=FV(B4/12,B5\*12,B3,0,0)**

Structure	The formula	Explanation
Begins with = sign	=	
Function name	FV	
Opening parenthesis	(	
rate	B4/12	The interest rate is an <b>annual</b> (yearly) rate and needs to be divided by 12 to make it a <b>monthly</b> rate as you save monthly.
nper	B5*12	The period is a term in <b>years</b> and should be multiplied by 12 to make it a period in <b>months</b> as you save monthly.
pmt	B3	The payment amount you want to save each month. Please note that the amount is negative (-R500) as it is an outflow of cash to an investment.
pv	0	The present value of your investment. As you have not saved anything yet the current value (present value) of your investment is 0.
type	0	You save at the end of each month.
Closing parenthesis	)	

The answer should appear as follows:

B7		fx =FV(B4/12,B5*12,B3,0,0)	
	A	B	C
1	<b>Future value of monthly savings</b>		
2			
3	Investment per month	-R 500.00	
4	Interest rate per year	14%	
5	Term in years	5	
6			
7	Future value of monthly investment	<b>R 43,097.56</b>	

### 9.4.3.3. Calculation of Present Value

**=PV(rate,nper,pmt,fv,type)**

Returns the present value of an investment. The total amount a series of total payments is worth today at a constant interest rate and over a constant period.

#### Activity 40:

- You have R500 at the **end** of each month you can use to pay off a loan to the bank. The bank offers you a constant interest rate of 14% per year over 5 years. Enter the payment in cell B3, the interest rate in cell B4 and the period in cell B5.
- Use the **=PV** function and calculate what amount you can borrow from the bank.
  - Enter the following formula in cell B7 **=PV(B4/12,B5\*12,B3,0,0)**

Structure	The formula	Explanation
Begins with = sign	=	
Function name	PV	
Opening parenthesis	(	
rate	B4/12	The interest rate is an <b>annual</b> (yearly) rate and needs to be divided by 12 to make it a <b>monthly</b> rate.
nper	B5*12	The period is a term in <b>years</b> and should be multiplied by 12 to make it a period in <b>months</b> .
pmt	B3	The payment amount you can make each month. Please note the amount is negative (-R500) as it is an outflow of cash to an investment.
fv	0	The future value of the loan. As the loan will be fully paid by the end of the period, the future value of the loan is R0.
type	0	The instalment is paid at the <b>end</b> of the month (paid in arrears).
Closing parenthesis	)	

- The answer should appear as follows:

	A	B	C
1	Present value of payments		
2			
3	Payment per month	-R 500.00	
4	Interest rate per year	14%	
5	Term in years	5	
6			
7	Present value	R 21,488.51	

#### 9.4.4. Logical functions

##### =IF(logical\_test,value\_if\_true,value\_if\_false)

Returns one value if the specified logical test evaluates to be TRUE and another value if the specified logical test evaluates to be FALSE.

##### Logical\_test:

A logical test is any value or expression that can be evaluated to be either TRUE or FALSE. For example,  $A1 < 1000$  is a logical test; if A is equal to 500 then the expression evaluates to be TRUE but if A is equal to 2000 then the expression will evaluate to be FALSE. A logical test can evaluate against text  $A1 = \text{"yes"}$ , a value  $A1 < 1000$ , another cell  $A1 >= B2$  or a formula  $C5 = (A2 * B2)$ .

A logical test usually consists out of 3 parts:

1. a **cell reference**, for example A1
2. a **comparison calculation operator** i.e. Less than (<); Greater than or equal to (>=); Less than or equal to (<=); Not equal to (<>); Equal to(=)
3. a **value, text, cell reference or a formula** to evaluate the cell reference in part 1 against. For example 10000, "YES", B6 or (B5\*B6). Please note when using text, the text should be in quotes ("") and is case sensitive.

##### Value\_if\_true:

Which value should be displayed in the cell if the logical test is evaluated to be TRUE. (The value that is returned if logical\_test is TRUE)

The value can either be:

- text - e.g. "Yes", "Open" etc. Please note text should always be in quotes ("") and is case sensitive.
- a value e.g. 1000.00 or 15090.23. Please note the value does not have any spaces, commas, or currency and that a full stop (.) is use to indicate cents.
- refer to a cell reference e.g. B5 or E18
- be a calculation e.g. B5\*C7 or B5+30 or A10\*0.14

##### Value\_if\_false:

Which value should be displayed in the cell if the logical test is evaluated to be FALSE. (The value that is returned if logical\_test is FALSE)

The value can either be:

- text - e.g. "close", "new" etc. Please note text should always be in quotes ("") and is case sensitive.
- a value e.g. 56789.23 or 9874563. Please note the value does not have any spaces, commas, or currency and that a full stop (.) is use to indicate cents.
- refer to a cell reference e.g. G3 or J50
- be a calculation e.g. A5-B7 or D5/30 or C10\*0.02

##### Activity 41:

- You have invited a few friends and their children to a soccer match. The soccer tickets are R30 per adult and R15 per child. You also want to invite the persons 21 years and older to an after party. The cost of the after-party is R100 per person.
- You want to determine:
- The total cost and cost per person for the **soccer tickets** only.
  - Whom you want to invite to the after-party, indicated with "Invite", and whom you do not want to invite indicated with "Don't invite".
  - The total cost and total cost per person including the after-party and the soccer tickets costs.
- PLEASE TAKE INTO ACCOUNT THAT ALL FORMULAS WILL ONLY BE ENTERED INTO THE FIRST CELL AND COPIED DOWN TO THE FOLLOWING CELLS.
- Please save this file as "Activity 41" as it will be used in a later activity.

- Enter the following data in a spreadsheet:

	A	B	C	D	E	F
1	<b>Soccer match and after party</b>					
2						
3	<b>Price per person</b>					
4	Soccer ticket - Adult	R 30.00				
5	Soccer ticket - Child	R 15.00				
6	After party	R 100.00				
7						
8	<b>Name</b>	<b>Adult/Child</b>	<b>Age</b>	<b>Soccer Ticket price</b>	<b>Invite to after party</b>	<b>Total cost Soccer and After-party</b>
9	Peter	Adult	43			
10	Sarah	Adult	40			
11	Thabo	Child	12			
12	Sandy	Child	10			
13	Thomas	Child	5			
14	Viwe	Adult	32			
15	Abel	Child	8			
16	Rikki	Child	9			
17	Martin	Adult	22			
18	Razia	Adult	19			

- What will the formula in cell **D9** be? Take into account that you will copy the formula to the rows below.
- Enter the following formula in cell D9 and copy to range D10:D18. See what happens. Does the formula give you the desired result?
- =IF(B9="Adult",B\$4,B\$5)

Structure	The formula	Explanation
Begins with = sign	=	
Function name	IF	
Opening parenthesis	(	
logical_test	B9="Adult"	You want to evaluate if the person is an adult (as indicated in cell B9). Please note the relative reference of cell B9. Also note "Adult" is in quotes ("" ) because you evaluate against text.
value_if_the logical test is true	B\$4	You want to return the adult ticket price (entered in cell B4) if the answer to your logical test is <b>true</b> , i.e. the person is an adult. Please note the row reference in the cell reference is absolute (\$4) as you do not want the row reference to increase when the formula is copied downwards.
value_if_the logical test is false	B\$5	You want to return the child ticket price (entered in cell B5) if the answer to your logical test is <b>false</b> i.e. the person is <b>not</b> an adult. Please note the row reference in the cell reference is absolute (\$5) as you do not want the row reference to increase when the formula is copied downwards.
Closing parenthesis	)	

- Delete the formula entered in range D9:D18
- Enter the following formula in cell D9 and copy it to range D10:D18.
- =IF(B9="Child",B\$5,B\$4)

Structure	The formula	Explanation
Begins with = sign	=	
Function name	IF	
Opening parenthesis	(	
logical_test	B9="Child"	You want to evaluate if the person is a child (as indicated in cell B9). Please note the relative reference of cell B9. Also note "Child" is in quotes ("" ) because you evaluate against text.

value_if_the logical test is true	B\$5	You want to return the child ticket price (entered in cell B5) if the answer to your logical test is <b>true</b> i.e. the person is a child. Please note the row reference in the cell reference is absolute (\$5) as you do not want the row reference to increase when the formula is copied downwards.
value_if_the logical test is false	B\$4	You want to return the adult ticket price (entered in cell B4) if the answer to your logical test is <b>false</b> , i.e. the person is <b>not</b> a child. Please note the row reference in the cell reference is absolute (\$4) as you do not want the row reference to increase when the formula is copied downwards.
Closing parenthesis	)	

- See what happens. Does the formula give you the desired result? Is the result different from the previous formula entered or is the result the same?

**Please note there is usually more than one logical test that can apply in IF functions and the true and false value will depend on your logical test.**

- What will the formula in cell **E9** be? Take into account you will copy the formula to the rows below.
- Enter the following formula in cell E9 and copy to range E10:E18. See what happens. Does the formula give you the desired result?
  - =IF(C9>=21, "Invite", "Don't invite")

Structure	The formula	Explanation
Begins with = sign	=	
Function name	IF	
Opening parenthesis	(	
logical_test	C9>=21	You want to evaluate if the person is 21 years and older as per the age indicated in cell C9. Please note the relative reference of cell C9. Also, note that, in contrast to the previous IF formula, the 21 is <b>not</b> in quotes because you evaluate against a value and not text.
value_if_the logical test is true	"Invite"	You want to return, <b>Invite</b> , if the answer to your logical test is <b>true</b> i.e. the person is 21 years and older. Please note "Invite" is in quotes (""") because you want to return text.
value_if_the logical test is false	"Don't invite"	You want to return, " <b>Don't invite</b> ", if the answer to your logical test is <b>false</b> i.e. the person is younger than 21. Please note "Don't invite", is in quotes (""") because you want to return text.
Closing parenthesis	)	

- Delete the formula entered in range E9:E18
- Enter the following formula in cell E9 and copy it to cell E10 to E18.
  - =IF(C9<21, "Don't invite", "Invite")

Structure	The formula	Explanation
Begins with = sign	=	
Function name	IF	
Opening parenthesis	(	
logical_test	C9<21	You want to evaluate if the person is younger than 21 as per the age indicated in cell C9. Please note the relative reference of cell C9. Also, note the 21 is <b>not</b> in quotes because you evaluate against a value and not text.
value_if_the logical test is true	"Don't invite"	You want to return, " <b>Don't invite</b> " if the answer to your logical test is <b>true</b> i.e. the person is younger than 21. Please note "Don't invite" is in quotes (""") because you want to return text.
value_if_the logical test is false	"Invite"	You want to return, <b>Invite</b> , if the answer to your logical test is <b>false</b> i.e. the person is the person is 21 years and older. Please note "Invite", is in quotes (""") because you want to return text.
Closing parenthesis	)	

- See what happens. Does the formula give you the desired result? Is the result different from the previous formula entered or is the result the same?



**As explained previously, more than one logical test can usually apply in IF functions and the true and false value will depend on your logical test.**

- What will the formula in cell **F9** be? Take into account you will copy the formula to the rows below.
- Enter the following formula in cell F9 and copy to range F10:F18. See what happens. Does the formula give you the desired result?
  - =IF(E9="Invite",D9+B\$6,D9)

Structure	The formula	Explanation
Begins with = sign	=	
Function name	IF	
Opening parenthesis	(	
logical_test	E9="Invite"	You want to evaluate if the person is invited to the after party as calculated in cell E9. Please note the relative reference of cell E9. Also note "Invite" is in quotes ("" ) because you evaluate against text.
value_if_the logical test is true	D9+B\$6	You want to return the <b>sum</b> of the ticket price (D9) and the after party cost (B6) if the answer to your logical test is <b>true</b> i.e. the person is invited to the party. Please note the cell reference for D9 is relative while the row reference in cell B\$6 (\$6) is absolute.
value_if_the logical test is false	D9	You want to return only the ticket price (D9) if the answer to your logical test is <b>false</b> i.e. the person is not invited to the party. Please note the relative cell reference for D9.
Closing parenthesis	)	

- Delete the formula entered in range F9:F18
- Enter the following formula in cell F9 and copy it to range F10:F18
  - =IF(E9="Don't invite",D9,D9+B\$6)

Structure	The formula	Explanation
Begins with = sign	=	
Function name	IF	
Opening parenthesis	(	
logical_test	E9="Don't invite"	You want to evaluate if the person is not invited to the after party as calculated in cell E9. Please note the relative reference of cell E9. Also note "Don't invite" is in quotes ("" ) because you evaluate against text.
value_if_the logical test is true	D9	You want to return only the ticket price (D9) if the answer to your logical test is <b>true</b> i.e. the person is not invited to the party. Please note the relative cell reference for D9.
value_if_the logical test is false	D9+B\$6	You want to return the <b>sum</b> of the ticket price (D9) and the after party cost (B6) if the answer to your logical test is <b>false</b> i.e. the person is invited to the party. Please note the cell reference for D9 is relative while the row reference in cell B\$6 (\$6) is absolute.
Closing parenthesis	)	

- **Please save this file as "Activity 41" as it will be used in a later activity**

- The results of Activity 41 should appear as follow:

	A	B	C	D	E	F
1	<b>Soccer match and after party</b>					
2						
3	<b>Price per person</b>					
4	Soccer ticket - Adult	R 30.00				
5	Soccer ticket - Child	R 15.00				
6	After party	R 100.00				
7						
8	<b>Name</b>	<b>Adult/ child</b>	<b>Age</b>	<b>Soccer Ticket price</b>	<b>Invite to after party</b>	<b>Total cost Soccer and After-party</b>
9	Peter	Adult	43	30	Invite	130
10	Sarah	Adult	40	30	Invite	130
11	Thabo	Child	12	15	Don't invite	15
12	Sandy	Child	10	15	Don't invite	15
13	Thomas	Child	5	15	Don't invite	15
14	Viwe	Adult	32	30	Invite	130
15	Abel	Child	8	15	Don't invite	15
16	Rikki	Child	9	15	Don't invite	15
17	Martin	Adult	22	30	Invite	130
18	Razia	Adult	19	30	Don't invite	30
19				225		625

	A	B	C	D	E	F
1	<b>Soccer match and after party</b>					
2						
3	<b>Price per person</b>					
4	Soccer ticket - Adult	30				
5	Soccer ticket - Child	15				
6	After party	100				
7						
8	<b>Name</b>	<b>Adult/ child</b>	<b>Age</b>	<b>Soccer Ticket price</b>	<b>Invite to after party</b>	<b>Total cost Soccer and After-party</b>
9	Peter	Adult	43	=IF(B9="Adult",B\$4,B\$5)	=IF(C9>=21,"Invite","Don't invite")	=IF(E9="Invite",D9+B\$6,D9)
10	Sarah	Adult	40	=IF(B10="Adult",B\$4,B\$5)	=IF(C10>=21,"Invite","Don't invite")	=IF(E10="Invite",D10+B\$6,D10)
11	Thabo	Child	12	=IF(B11="Adult",B\$4,B\$5)	=IF(C11>=21,"Invite","Don't invite")	=IF(E11="Invite",D11+B\$6,D11)
12	Sandy	Child	10	=IF(B12="Adult",B\$4,B\$5)	=IF(C12>=21,"Invite","Don't invite")	=IF(E12="Invite",D12+B\$6,D12)
13	Thomas	Child	5	=IF(B13="Adult",B\$4,B\$5)	=IF(C13>=21,"Invite","Don't invite")	=IF(E13="Invite",D13+B\$6,D13)
14	Viwe	Adult	32	=IF(B14="Adult",B\$4,B\$5)	=IF(C14>=21,"Invite","Don't invite")	=IF(E14="Invite",D14+B\$6,D14)
15	Abel	Child	8	=IF(B15="Adult",B\$4,B\$5)	=IF(C15>=21,"Invite","Don't invite")	=IF(E15="Invite",D15+B\$6,D15)
16	Rikki	Child	9	=IF(B16="Adult",B\$4,B\$5)	=IF(C16>=21,"Invite","Don't invite")	=IF(E16="Invite",D16+B\$6,D16)
17	Martin	Adult	22	=IF(B17="Adult",B\$4,B\$5)	=IF(C17>=21,"Invite","Don't invite")	=IF(E17="Invite",D17+B\$6,D17)
18	Razia	Adult	19	=IF(B18="Adult",B\$4,B\$5)	=IF(C18>=21,"Invite","Don't invite")	=IF(E18="Invite",D18+B\$6,D18)
19				=SUM(D9:D18)		=SUM(F9:F18)

**PLEASE REMEMBER: MICROSOFT OFFICE EXCEL WILL DISPLAY IN A CELL, ON THE FACE OF THE WORKSHEET, A VALUE OR TEXT BUT BEHIND THAT CELL CAN BE A FORMULA OR A FUNCTION.**

To check a formula/function, click on the cell containing the formula/function and press F2. This will indicate to you which cells are used in your formula/function.

### 9.4.5. Text functions

Cell refers to the cell you want this function to apply to.

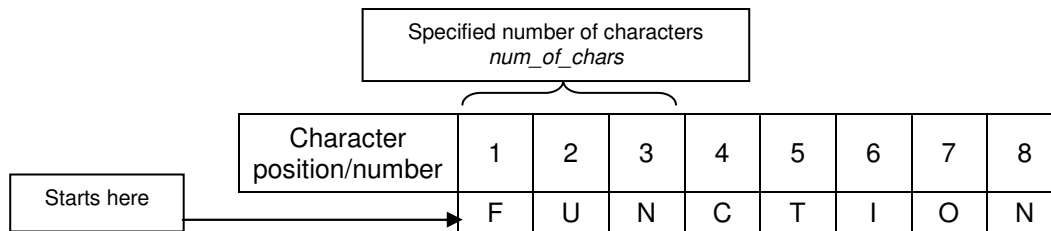
Please also note that a character is defined as **text, number, symbols** and **spaces**.

#### 9.4.5.1. =LEFT(cell,num\_chars)

This function returns a specified number of characters (num\_chars) from the start (left hand side) of the text.

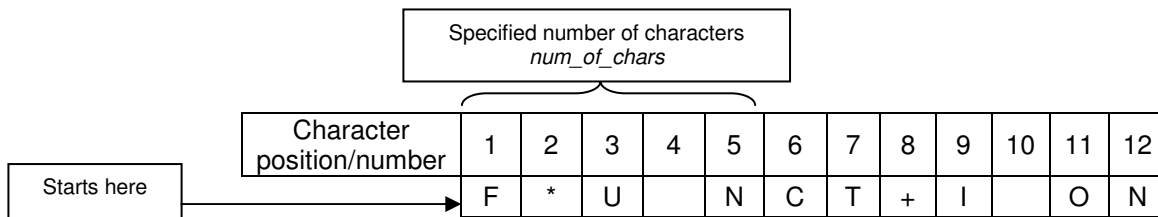
##### Activity 42:

- Create a new worksheet
- Enter the word FUNCTION in cell A3.
- In cell B3 enter the function =left(A3,3)
- The answer returned in cell B3 would be the first 3 characters of the word i.e. FUN.



##### Activity 43:

- Use the same worksheet as in **Activity 42**
- Enter the word "F\*U NCT+I ON" in cell A4.
- In cell B4 enter the function =left(A3,5)
- The answer returned in cell B4 will be the first 5 characters of the word i.e. F\*U N. Please note the space between the "U" and "N" is counted as a character.

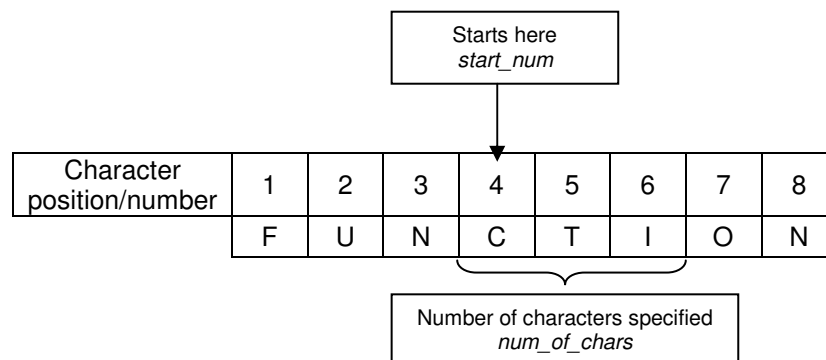


#### 9.4.5.2. =MID(cell,start\_num,num\_chars)

This function returns a specified number of characters from the middle of a text string given a starting position (start\_num) and the length specified (num\_chars).

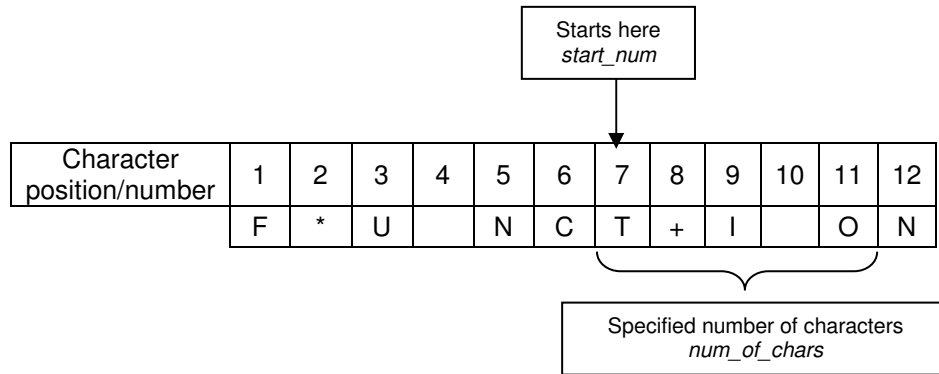
##### Activity 44:

- Use the same worksheet as in **Activity 43**
- In cell C3 enter the function =mid(A3,4,3)
- The answer returned in cell C3 will be "CTI"



**Activity 45:**

- Use the same worksheet as in **Activity 44**
- In cell C4 enter the function **=mid(A4,7,5)**
- The answer returned in cell C4 would be "T+I O". Please note the space between the "U" and "N" and the "I" and "O" is counted as a character.

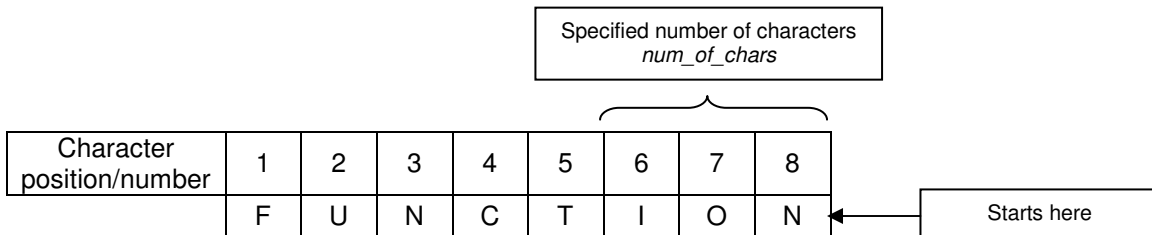


**9.4.5.3. =RIGHT(cell,num\_chars)**

This function returns a specified number of characters (**num\_chars**) from the end (right hand side) of the text.

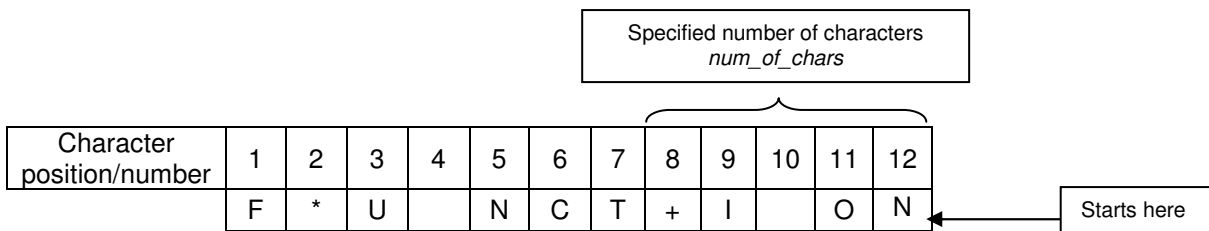
**Activity 46:**

- Use the same worksheet as in **Activity 45**
- In cell D3 enter the function **=right(A3,3)**
- The answer returned in cell D3 will be "ION"



**Activity 47:**

- Use the same worksheet as in **Activity 46**
- In cell D4 enter the function **=right(A3,5)**
- The answer returned in cell **D4** will be "+I ON". Please note the space between the "I" and "O" is counted as a character.



➤ The results of Activity 42 to Activity 47 should appear as follow:

	A	B	C	D
1		<b>FUNCTION</b>		
2		<b>=LEFT</b>	<b>=MID</b>	<b>=RIGHT</b>
3	FUNCTION	FUN	CTI	ION
4	F*U NCT+I ON	F*U N	T+I O	+I ON

	A	B	C	D
1		<b>FUNCTION</b>		
2		<b>=LEFT</b>	<b>=MID</b>	<b>=RIGHT</b>
3	FUNCTION	=LEFT(A3,3)	=MID(A3,4,3)	=RIGHT(A3,3)
4	F*U NCT+I ON	=LEFT(A4,5)	=MID(A4,7,5)	=RIGHT(A4,5)

#### 9.4.6. Lookup functions

##### **Vertical lookup: =VLOOKUP(lookup\_value,table\_array,col\_index\_num,range\_lookup)**

This function searches for a value in the leftmost (first) column of a range of cells, and returns a value in the same row from a column you specify.

##### **Lookup\_value:**

This value is the value you want to search in the first column of the table\_array (refer to table array below). Lookup\_value can be a value, a cell reference or text. VLOOKUP returns the #N/A error value where the lookup\_value is smaller than the smallest value in the first column of table\_array,

##### **Table\_array:**

This range of cells (two or more columns) contains the data you want to look up. The lookup\_value searches the values in the **first column** of the table\_array. The values in the first column of table\_array can be text, numbers or values, uppercase and lower case text are equivalent.

- If the range lookup is set as TRUE then the table\_array **should** be sorted in ascending order based on the first column. Refer to paragraph 10.1 of TL103 on how to sort data.
- If range\_lookup is set as FALSE the table\_array lookup value should be unique (primary key).
- The data in the first column of table\_array should not contain leading spaces, trailing spaces, inconsistent use of quotation marks or nonprinting characters as vlookup might return an incorrect of unexpected value.
- When searching for number or date values make sure the data in the first column of table\_array is not stored as text but as values.

##### **Col\_index\_num:**

This is the column number in table\_array (refer to table\_array above) from which the matching value should be returned. 1 will return the value in the first column of the table\_array while 2 return the value in the second column of the table\_array.

- VLOOKUP will return a #VALUE! error if the col\_index\_num is less than 1.
- VLOOKUP will return a #REF! error if the col\_index\_num is greater than the number of columns in table\_array.

##### **Range\_lookup:**

This specifies whether you want VLOOKUP to find an exact match or an approximate match.

- When set as TRUE an exact or approximate match is returned i.e. if an exact match is not found, the next largest value that is less than lookup\_value is returned.
- When set as FALSE an exact match is found and the error value #N/A returned if no match is found. If there is more than 1 value in the first table\_array that matches the lookup\_value then the first value found is used.

**Activity 48:**

- Create a new worksheet
- Enter the following data in the worksheet

	A	B	C	D
1	<b>Assignment mark list</b>			
2	<b>Student nr</b>	<b>Name</b>	<b>Assignment mark</b>	
3	123456	Peter	80	
4	234567	Sarah	65	
5	345678	Thabo	34	
6	456789	Sandy	56	
7	567890	Thomas	48	
8	678901	Viwe	78	
9	789012	Abel	51	
10	890123	Rikki	49	
11	912345	Martin	63	
12				
13	<b>Exam mark list</b>			
14	<b>Student nr</b>	<b>Name</b>	<b>Exam marks</b>	
15	789012	Abel J	64	
16	912345	Martin Q	57	
17	123456	Peter R	45	
18	890123	Rikki B	49	
19	456789	Sandy D	53	
20	234567	Sarah M	62	
21	345678	Thabo H	72	
22	567890	Thomas V	55	
23	678901	Viwe C	46	

- You want to create one list with both the exam marks and final marks beside each student's name. You have decided to reflect the exam marks beside the assignment marks but you do not want to go and find each student's exam marks manually and then type it beside the assignment marks. You also know the student number is unique to each student and reflected in both sets of data. How can you do this?
- You can use the VLOOKUP. What formula will you enter?
- In cell D3 enter =VLOOKUP(A3,A\$15:C\$23,3,FALSE)

Structure	The formula	Explanation
Begins with = sign	=	
Function name	VLOOKUP	
Opening parenthesis	(	
Lookup_value	A3	The value you want to look up in the exam mark list (table_array) is the student number, which is reflected in cell A3.
Table_array	A\$15:C\$23	You will find the data for the exam marks in this range of cells. Please note the student number is in the 1 <sup>st</sup> column (A) of the data range because the value you are looking for should always be in the 1 <sup>st</sup> column. Also note the row references are absolute as you do not want the data range reference to change when you copy the formula.
Col_index_num	3	The exam marks are in column C, the 3rd column of the table_array.
Range_lookup	FALSE	It is set as FALSE because you want to find the <b>exact</b> match for the student number.
Closing parenthesis	)	

- Copy the formula in cell D3 to range D4:D11.
- Check and see if the formula gave the correct exam mark to the correct student.
- Why was the student name not used as lookup\_value? Because there might be more than one student with the same name and because the student name in the 2 lists are not EXACTLY the same.

➤ The results should appear as follow:

D3      fx      =VLOOKUP(A3,A\$15:C\$23,3,FALSE)

	A	B	C	D	E
1	<b>Assignment mark list</b>				
2	<b>Student nr</b>	<b>Name</b>	<b>Assignment mark</b>	<b>Exam marks</b>	
3	123456	Peter	80	45	
4	234567	Sarah	65	62	
5	345678	Thabo	34	72	
6	456789	Sandy	56	53	
7	567890	Thomas	48	55	
8	678901	Viwe	78	46	
9	789012	Abel	51	64	
10	890123	Rikki	49	49	
11	912345	Martin	63	57	
12					
13	<b>Exam mark list</b>				
14	<b>Student nr</b>	<b>Name</b>	<b>Exam marks</b>		
15	789012	Abel J	64		
16	912345	Martin Q	57		
17	123456	Peter R	45		
18	890123	Rikki B	49		
19	456789	Sandy D	53		
20	234567	Sarah M	62		
21	345678	Thabo H	72		
22	567890	Thomas V	55		
23	678901	Viwe C	46		
24					

**Lookup\_value**  
The value you want to find in the table\_array (exam mark list) 1<sup>st</sup> column

The values (always in the 1<sup>st</sup> column), which the lookup function will search, to see if there is an exact match

**Table\_array**  
Range where you can find the data

**Col\_index\_num: 1**      **Col\_index\_num: 2**      **Col\_index\_num: 3**

D3      fx      =VLOOKUP(A3,A\$15:C\$23,3,FALSE)

	A	B	C	D
1	<b>Assignment mark list</b>			
2	<b>Student nr</b>	<b>Name</b>	<b>Assignment mark</b>	<b>Exam marks</b>
3	123456	Peter	80	=VLOOKUP(A3,A\$15:C\$23,3,FALSE)
4	234567	Sarah	65	=VLOOKUP(A4,A\$15:C\$23,3,FALSE)
5	345678	Thabo	34	=VLOOKUP(A5,A\$15:C\$23,3,FALSE)
6	456789	Sandy	56	=VLOOKUP(A6,A\$15:C\$23,3,FALSE)
7	567890	Thomas	48	=VLOOKUP(A7,A\$15:C\$23,3,FALSE)
8	678901	Viwe	78	=VLOOKUP(A8,A\$15:C\$23,3,FALSE)
9	789012	Abel	51	=VLOOKUP(A9,A\$15:C\$23,3,FALSE)
10	890123	Rikki	49	=VLOOKUP(A10,A\$15:C\$23,3,FALSE)
11	912345	Martin	63	=VLOOKUP(A11,A\$15:C\$23,3,FALSE)
12				
13	<b>Exam mark list</b>			
14	<b>Student nr</b>	<b>Name</b>	<b>Exam marks</b>	
15	789012	Abel J	64	
16	912345	Martin Q	57	
17	123456	Peter R	45	
18	890123	Rikki B	49	
19	456789	Sandy D	53	
20	234567	Sarah M	62	
21	345678	Thabo H	72	
22	567890	Thomas V	55	
23	678901	Viwe C	46	

**Activity 49:**

- Create a new worksheet.
- You have calculated the taxable income for a number of friends and now want to determine their applicable tax rate.
- You have created the following spreadsheet with each person's taxable income as well as the tax table. (Enter the following data in the worksheet)

	A	B	C	D
1	<b>Taxable income</b>			
2	<b>Name</b>	<b>Taxable income</b>	<b>Fixed tax amount</b>	<b>Tax rate</b>
3	Peter	358,000.00		
4	Sarah	279,000.00		
5	Thabo	125,000.00		
6	Sandy	86,000.00		
7	Thomas	198,600.00		
8	Viwe	412,300.00		
9	Abel	567,000.00		
10	Rikki	654,000.00		
11	Martin	220,000.00		
12				
13	<b>Tax table</b>			
14	<b>Taxable income</b>		<b>Fixed tax amount</b>	<b>Tax rate above lower bracket-1</b>
15	<b>Lower bracket</b>	<b>Upper bracket</b>		
16	1.00	122,500.00	0	18%
17	122,501.00	195,000.00	21,960	25%
18	195,001.00	270,000.00	40,210	30%
19	270,001.00	380,000.00	62,710	35%
20	380,001.00	490,000.00	101,210	38%
21	490,001.00		143,010	40%

- You do not want to look up each person's fixed tax amount and tax rate individually but want to use a Microsoft Office Excel formula. Which formula will you enter in cell C3? You will copy this formula to the rows below.
- In cell C3 enter =VLOOKUP(B3,A\$16:D\$21,3,TRUE)

Structure	The formula	Explanation
Begins with = sign	=	
Function name	VLOOKUP	
Opening parenthesis	(	
Lookup_value	B3	The value you want to look up in the tax table (table_array) is the taxable income, which is reflected in cell B3.
Table_array	A\$16:D\$21	You want to look for the values in the tax table, which can be found in this range of cells. Please note the value for which the lookup_value is looking for should be in the 1 <sup>st</sup> column of the data range (column A in this example). Also, note the row references are absolute as the cell references should not change when you copy the formula downwards.
Col_index_num	3	After you find the row with the data you are looking for, this tells the function which column's data you want to be returned. The fixed tax amount is in column C, the 3rd column of the table_array.
Range_lookup	TRUE	It is set as TRUE because you want to find the next largest value that is less than lookup value i.e. you want to find the lower bracket of the tax group.
Closing parenthesis	)	



➤ In cell D3 enter =VLOOKUP(B3,A\$16:D\$21,4,TRUE)

Structure	The formula	Explanation
Begins with = sign	=	
Function name	VLOOKUP	
Opening parenthesis	(	
lookup_value	B3	The value you want to look up in the tax table (table_array) is the taxable income, which is reflected in cell B3.
Table_array	A\$16:D\$21	You want to look for the values in the tax table, which can be found in this range of cells. Please note the value for which the lookup_value is looking to match against should be in the 1 <sup>st</sup> column (column A in this example) of the data range. Also, note the row references are absolute as the cell references should not change when you copy the formula downwards.
Col_index_num	4	This tells the function which column's data you want to be returned of the row the data you are looking for is in. The tax rates are in column D, the 4th column of the table_array.
Range_lookup	TRUE	It is set as TRUE because you want to find the next largest value that is less than lookup value i.e. you want to find the lower bracket of the tax group the taxable amount belongs in.
Closing parenthesis	)	

- Copy the formula in C3 to range C4:C11 and copy the formula in D3 to range D4:D11
- The results should appear as follows:

**Lookup\_value**  
The value you want to find in the table\_array (tax table) 1<sup>st</sup> column

The values (always in the 1<sup>st</sup> column), which the lookup function will look at, to see where the amount is which is just smaller than the lookup\_value

**Table\_array**  
Range where you can find the data

D3      fx =VLOOKUP(B3,A\$16:D\$21,4,TRUE)				
	A	B	C	D
1	<b>Taxable income</b>			
2	<b>Name</b>	<b>Taxable income</b>	<b>Fixed tax amount</b>	<b>Tax rate</b>
3	Peter	358,000	62,710	35%
4	Sarah	279,000	62,710	35%
5	Thabo	125,000	21,960	25%
6	Sandy	86,000	0	18%
7	Thomas	198,600	40,210	30%
8	Viwe	412,300	101,210	38%
9	Abel	567,000	143,010	40%
10	Rikki	654,000	143,010	40%
11	Martin	220,000	40,210	30%
12				
13	<b>Tax table</b>			
14	<b>Taxable income</b>		<b>Fixed tax amount</b>	<b>Tax rate above lower limit-1</b>
15	<b>Lower limit</b>	<b>Upper limit</b>		
16	1	122,500	0	18%
17	122,501	195,000	21,960	25%
18	195,001	270,000	40,210	30%
19	270,001	380,000	62,710	35%
20	380,001	490,000	101,210	38%
21	490,001	-	143,010	40%

Col\_index\_num: 1

Col\_index\_num: 2

Col\_index\_num: 3

Col\_index\_num: 4

D3      fx      =VLOOKUP(B3,A\$16:D\$21,4,TRUE)				
	A	B	C	D
1	<b>Taxable income</b>			
2	<b>Name</b>	<b>Taxable income</b>	<b>Fixed tax amount</b>	<b>Tax rate</b>
3	Peter	358000	=VLOOKUP(B3,A\$16:D\$21,3,TRUE)	=VLOOKUP(B3,A\$16:D\$21,4,TRUE)
4	Sarah	279000	=VLOOKUP(B4,A\$16:D\$21,3,TRUE)	=VLOOKUP(B4,A\$16:D\$21,4,TRUE)
5	Thabo	125000	=VLOOKUP(B5,A\$16:D\$21,3,TRUE)	=VLOOKUP(B5,A\$16:D\$21,4,TRUE)
6	Sandy	86000	=VLOOKUP(B6,A\$16:D\$21,3,TRUE)	=VLOOKUP(B6,A\$16:D\$21,4,TRUE)
7	Thomas	198600	=VLOOKUP(B7,A\$16:D\$21,3,TRUE)	=VLOOKUP(B7,A\$16:D\$21,4,TRUE)
8	Viwe	412300	=VLOOKUP(B8,A\$16:D\$21,3,TRUE)	=VLOOKUP(B8,A\$16:D\$21,4,TRUE)
9	Abel	567000	=VLOOKUP(B9,A\$16:D\$21,3,TRUE)	=VLOOKUP(B9,A\$16:D\$21,4,TRUE)
10	Rikki	654000	=VLOOKUP(B10,A\$16:D\$21,3,TRUE)	=VLOOKUP(B10,A\$16:D\$21,4,TRUE)
11	Martin	220000	=VLOOKUP(B11,A\$16:D\$21,3,TRUE)	=VLOOKUP(B11,A\$16:D\$21,4,TRUE)
12				
13	<b>Tax table</b>			
14	<b>Taxable income</b>		<b>Fixed tax amount</b>	<b>Tax rate above lower limit-1</b>
15	<b>Lower limit</b>	<b>Upper limit</b>		
16	1	=A17-1	0	0.18
17	122501	=A18-1	21960	0.25
18	195001	=A19-1	40210	0.3
19	270001	=A20-1	62710	0.35
20	380001	=A21-1	101210	0.38
21	490001	0	143010	0.4

## WORKING WITH DATA

Refer to paragraph 7.4.5.12 and 7.4.5.13 in ISBE.

### 9.5. Sorting data

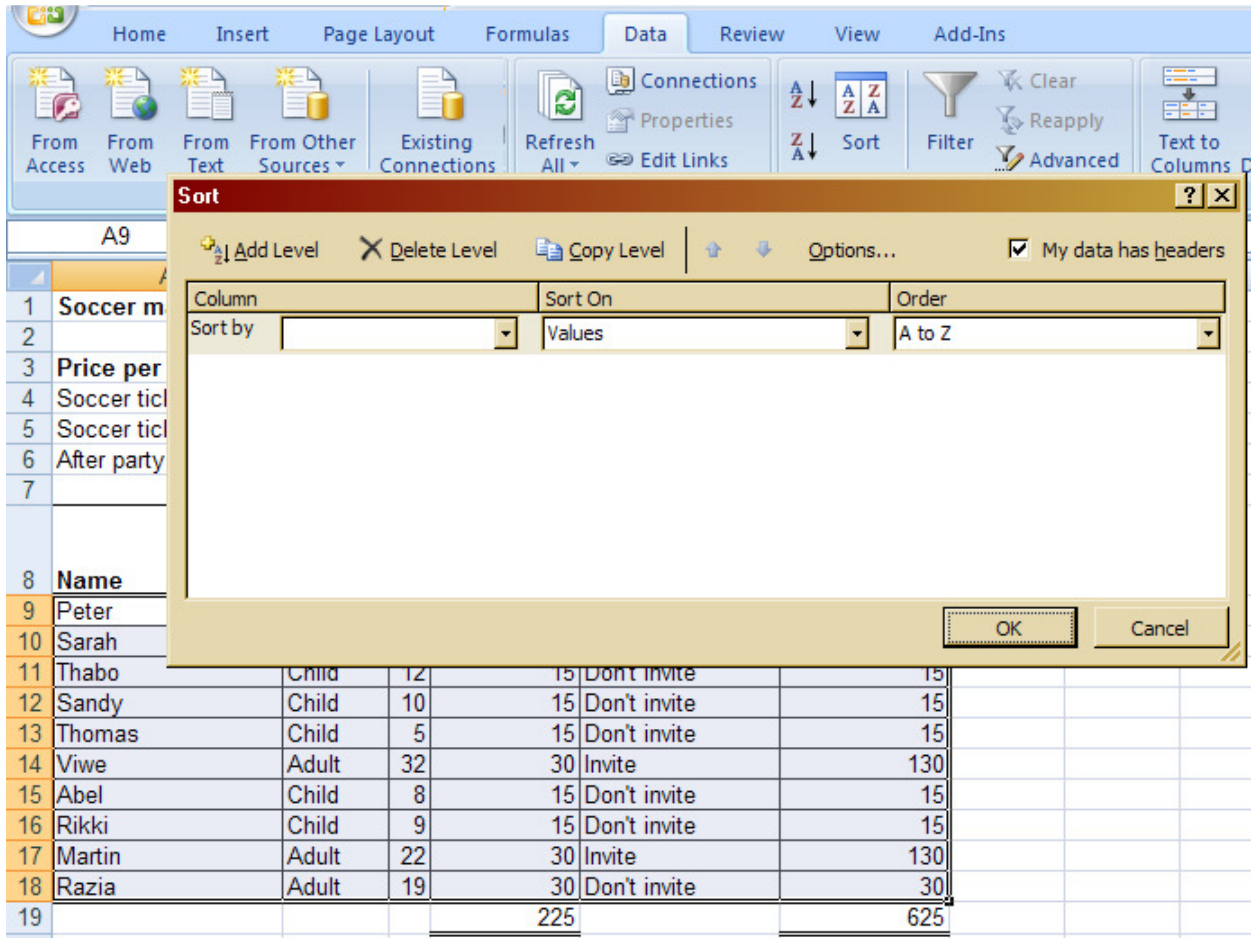
Sorting data is a great tool to use when analysing data. You can use it to put a list of names in alphabetical order, arrange amounts from highest to the lowest or from biggest to smallest or arrange dates from earliest to latest. You can either sort the data in ascending order (going up/lowest to the highest) or descending order (going down/highest to lowest). You can also sort the data based on sorting criteria for more than one column.

Make sure you select the **whole** range you want to sort and not just the column on which you want to base the sort. The data in the other columns beside will not follow the sort if you only select the column you want to base the sort on.

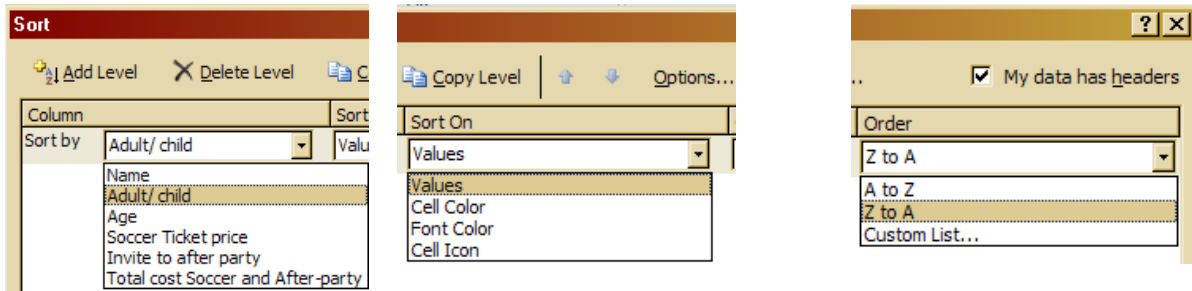
#### **Activity 50:**

- Use the completed spreadsheet of *Activity 41*
- We firstly want to sort the adult and child indicator per column B so that all the children are reflected first. With that, we also want to sort the ages for each group (column C) from youngest to oldest.
- Select range A8:F18.
- Click on the **Data** tab
- In the **Sort & Filter** group, click on the **Sort** icon

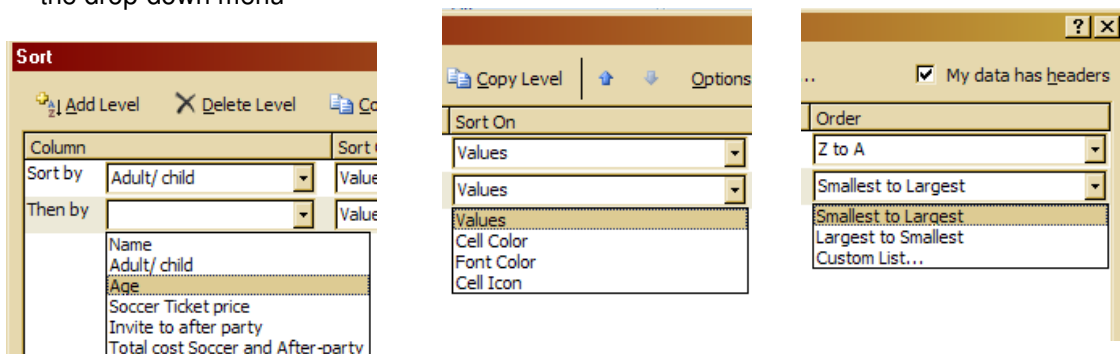
➤ This will open the following **Sort dialogue box**.



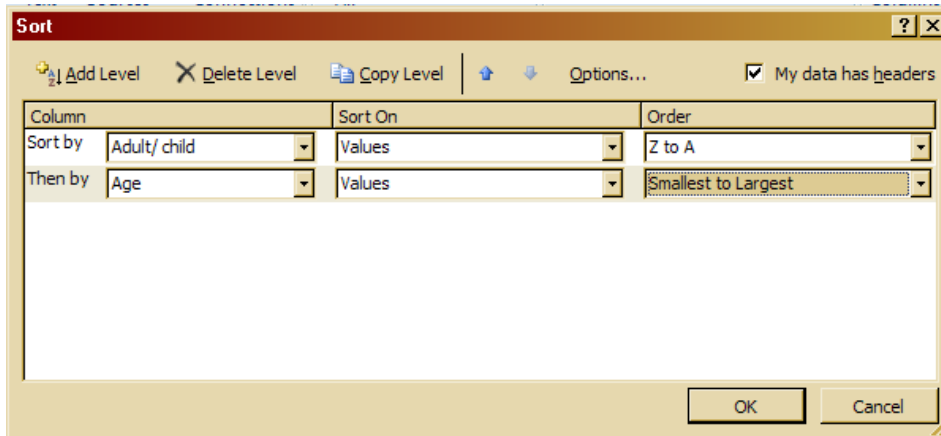
- Ensure the **My data has headers** box has been ticked
- Click on the arrow in the **Sort by** dialog box and select **Adult/child** from the drop-down menu
- Click on the arrow in the **Sort on** dialog box and select **Values** from the drop-down menu
- Click on the arrow in the **Order** dialog box and select **Z to A** from the drop-down menu



- Click on **Add Level**
- Click on the arrow in the **Then by** dialog box and select **Age** from the drop-down menu
- Click on the arrow in the **Sort on** dialog box (in the **Then by** row) and select **Values** from the drop-down menu
- Click on the arrow in the **Order** dialog box (in the **Then by** row) and select **Smallest to Largest** from the drop-down menu



- Your complete selection will appear as follows:



- Select **OK** to action the sort.
- The result of the sort will appear as follows:

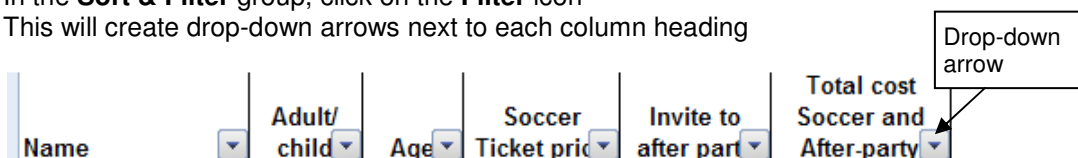
	A	B	C	D	E	F
1	<b>Soccer match and after party</b>					
2						
3	<b>Price per person</b>					
4	Soccer ticket - Adult	R 30.00				
5	Soccer ticket - Child	R 15.00				
6	After party	R 100.00				
7						
8	<b>Name</b>	<b>Adult/ child</b>	<b>Age</b>	<b>Soccer Ticket price</b>	<b>Invite to after party</b>	<b>Total cost Soccer and After-party</b>
9	Thomas	Child	5	15	Don't invite	15
10	Abel	Child	8	15	Don't invite	15
11	Rikki	Child	9	15	Don't invite	15
12	Sandy	Child	10	15	Don't invite	15
13	Thabo	Child	12	15	Don't invite	15
14	Razia	Adult	19	30	Don't invite	30
15	Martin	Adult	22	30	Invite	130
16	Viwe	Adult	32	30	Invite	130
17	Sarah	Adult	40	30	Invite	130
18	Peter	Adult	43	30	Invite	130
19				225		625

## 9.6. Filter data

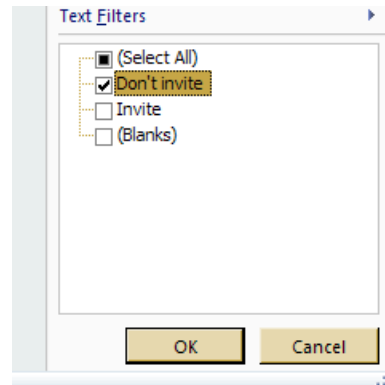
Filtering data allows you to display only the rows that meet your specified criteria and hide the rows you do not want displayed. You can also filter by more than one column but remember filters are additive, which means each additional filter is based on the current filter, and further reduces the subset of data. The filter will only apply to the selected data range. You can copy, find, edit, format, chart, and print the subset of filtered data without rearranging or moving it. You can only filter by a list values, a format, or by criteria. However each of these filters is mutually exclusive, you can for example, filter by font colour or by a list of numbers, but not by both.

### Activity 51:

- Use the completed spreadsheet of *Activity 41*
- Select range A8:F18
- Click on the **Data** tab
- In the **Sort & Filter** group, click on the **Filter** icon
- This will create drop-down arrows next to each column heading



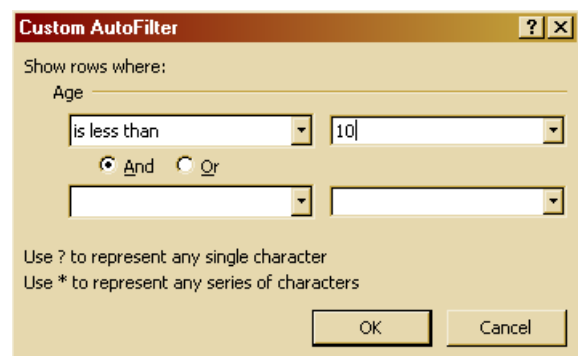
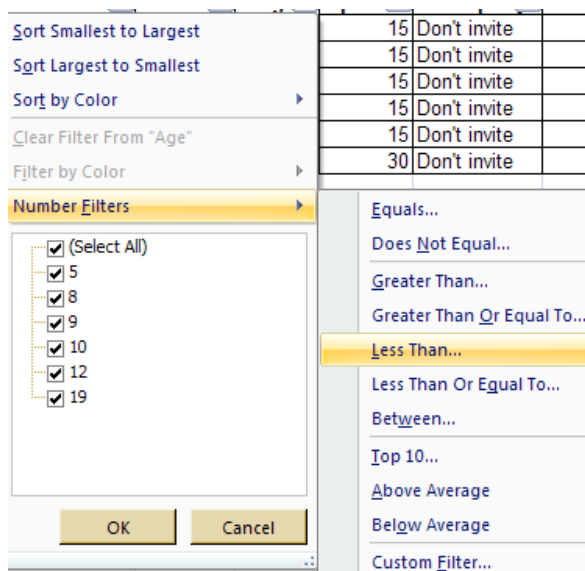
- Click on the drop-down arrow next to “Invite to after party”
- In the drop-down menu only select “Don’t invite”.
- Click on OK



- Only the rows with “Don’t invite” in that column is displayed and it will appear as follow:

	A	B	C	D	E	F
1	<b>Soccer match and after party</b>					
2						
3	<b>Price per person</b>					
4	Soccer ticket - Adult	R 30.00				
5	Soccer ticket - Child	R 15.00				
6	After party	R 100.00				
7						
8	<b>Name</b>	<b>Adult/child</b>	<b>Age</b>	<b>Soccer Ticket price</b>	<b>Invite to after party</b>	<b>Total cost Soccer and After-party</b>
11	Thabo	Child	12	15	Don't invite	15
12	Sandy	Child	10	15	Don't invite	15
13	Thomas	Child	5	15	Don't invite	15
15	Abel	Child	8	15	Don't invite	15
16	Rikki	Child	9	15	Don't invite	15
18	Razia	Adult	19	30	Don't invite	30

- Did you notice that:
  - The filter icon is displayed on the drop-down arrow next to “Invite to after party”. This indicates there is a filter applied on that column.
  - The row reference displayed seems to be missing rows i.e. only rows 1 to 8, 11 to 13 and 15 to 18 are displayed. The applied filter did not delete rows 9, 10 and 14 but only hid them.
- We now only want display all the persons that were not invited but are younger than 10. To do this we will apply a further filter. (remember filters are additive)
- Click on the drop-down arrow next to “Age” and select **Number Filters**.
- In the drop-down menu under select **Less Than...**
- This will open the **Custom AutoFilter** dialog box
- Click on the box right of **is less than** and either type 10 or select 10 from the drop-down menu
- Click **OK** to action the filter



- Only the rows with “Don’t invite” in column E and where the persons age (column C) is less than 10 are displayed and the rest of the rows are hidden. The spreadsheet will appear as follows:

	A	B	C	D	E	F
1	<b>Soccer match and after party</b>					
2						
3	<b>Price per person</b>					
4	Soccer ticket - Adult	R 30.00				
5	Soccer ticket - Child	R 15.00				
6	After party	R 100.00				
7						
8	<b>Name</b>	<b>Adult/child</b>	<b>Age</b>	<b>Soccer Ticket price</b>	<b>Invite to after party</b>	<b>Total cost Soccer and After-party</b>
13	Thomas	Child	5	15	Don't invite	15
15	Abel	Child	8	15	Don't invite	15
16	Rikki	Child	9	15	Don't invite	15
20						

- Did you notice that:
  - The filter icon is displayed on the drop-down arrow next to “Invite to after party” and “Age”. The filter icon indicates there is a filter applied on that column.
  - The row reference displayed seems to be missing rows i.e. rows 1-8, 13, 15, 16 are displayed but not the other rows. The applied filters did not delete the other rows but only hid them.
- To remove a filter from a column click on the applicable column’s drop-down arrow and select **(Select All)**. You can also change the filter by clicking on the applicable column’s drop-down arrow and selecting the new filter you want to apply.

8	Name	Adult/child	Age	Soccer Ticket price	Invite to after party
13	Th			15	Don't invite
15	Ab			15	Don't invite
16	Ri			15	Don't invite
20					
21					
22					
23					
24					
25					
26					
27					
28					
29					
30					
31					
32					

- To remove filtering in total from the data range follow the following steps:
  - Select the data range which was filtered
  - Click on the **Data** tab
  - In the **Sort & Filter** group, click on the **Filter** icon to deselect the filter option

## 10. WORKING WITH CHARTS

Charts are a visual/graphical presentation of data and are very useful to help with the understanding and interpretation of the data presented. Charts sometimes make it is easier to identify trends in data. Remember persons looking at a chart do not have the underlying data in front of them so it is very important to make sure the following is always included in a chart:

- **A chart title.** This is the title of your chart and indicates what your chart is all about.
- **Category-axis title.** This is a short description of the categories on the category-axis e.g. months, item codes, etc. Charts mostly display categories on the horizontal axis, but Bar charts display categories on the vertical axis.
- **Value-axis title.** This is a short description of the values on the Value-axis e.g. rand, number, percentage, etc. Charts mostly display values on the vertical axis, but Bar charts display values on the horizontal axis.
- **Category-axis scale label.** This describes each Category-axis scale label e.g. if your Category-axis title is for example “Months” the scale label will probably be “January”, “February”, “March”, etc.
- **Legend.** This indicates what colour represent which particular data series.

Refer to paragraph 7.4.8 in ISBE for how to work with charts.

### 10.1. Creating a Chart

To create a chart, follow the steps below:

#### Activity 52:

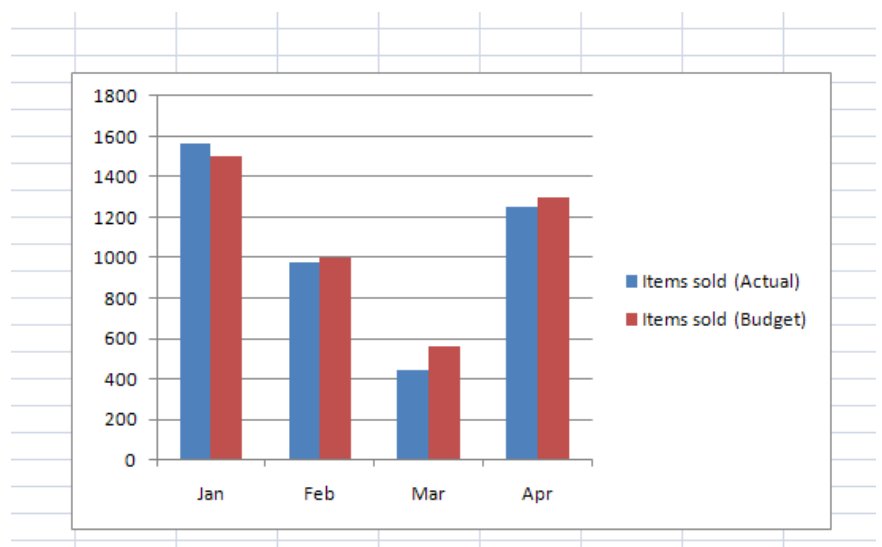
- Create the following data in a **new Workbook file on Sheet1.**
  - “Total sales R (Actual)” is calculated as the applicable number of “Items sold (Actual)” \* R150
  - “Total sales R (Budget)” is calculated as the applicable number of “Items sold (Budget)” \* R100
- Save the Workbook file as “**GRAPH**”

	A	B	C	D	E
1	<b>SA Textbooks Pty Ltd</b>				
2					
3		<b>Items sold (Actual)</b>	<b>Items sold (Budget)</b>	<b>Total sales R (Actual)</b>	<b>Total sales R (Budget)</b>
4	Jan	1567	1500	235,050	150,000
5	Feb	975	1000	146,250	100,000
6	Mar	445	560	66,750	56,000
7	Apr	1249	1300	187,350	130,000
8	May	368	300	55,200	30,000
9	Jun	1345	1100	201,750	110,000

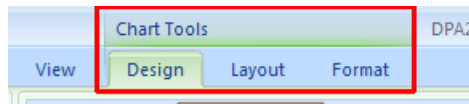
- Select range A3:C7

**Excel is very particular when a data range is selected. The range SHOULD be selected correctly the first time. For example in this activity do not move your mouse pointer over column D and then back to column C**

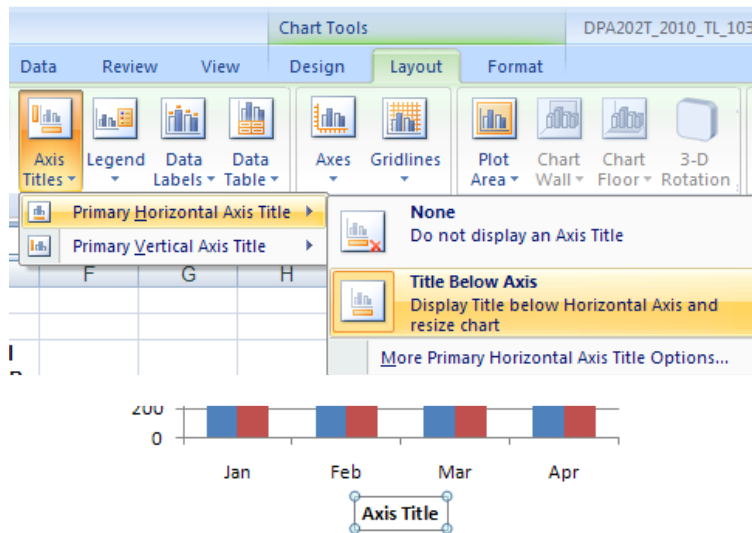
- While the above-mentioned range is selected
- Click on the **Insert** tab
- In the **Chart** group, click on the arrow next to the **Column** icon
- In the drop-down menu select **2D Clustered Column** (Tip: **Hovering with your mouse pointer over the different chart icons will make the description of the icon appear**)



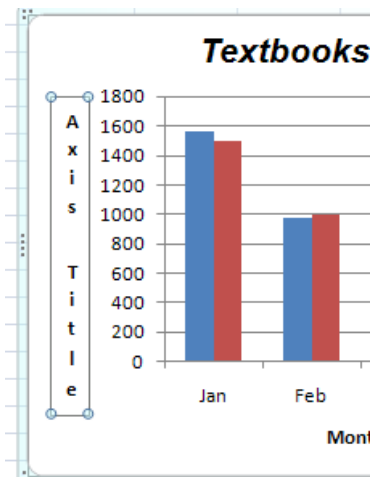
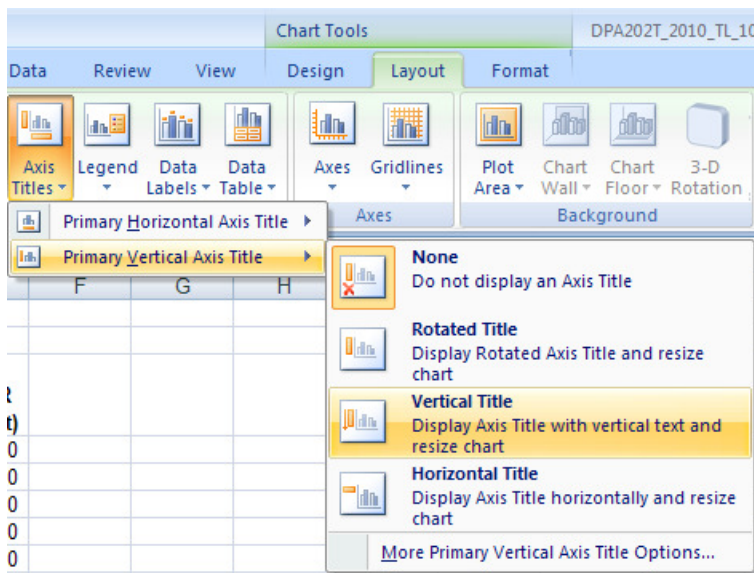
- You will note that the graph inserted into your worksheet is basic without any graph and axis titles, etc. You are going to update the graph to be more user-friendly.
- Click on the graph to have the **Chart Tools** commands displayed. The **Chart Tools** will add 3 more tabs: **Design**, **Layout** and **Format**



- Click on the **Layout** tab
- In the **Labels** group, click on the arrow next to the **Chart title** icon
- In the drop-down menu select **Above Chart**
- This will open a Text box in the chart area above the chart with the text “**Chart title**”.
- Click in the text box and delete “**Chart Title**”. Type in “*Textbooks sold per month*”
- In the textbox highlight “*Textbooks sold per month*”
  - Click on the Home tab and change the Font of the Chart title to: Arial, font size 16, Bold and Italic
- Click on the **Layout** tab
- In the **Labels** group, click on the arrow next to the **Axis Titles** icon
- In the drop-down menu click on the arrow next to **Primary Horizontal Axis Title**
- In the drop-down menu select **Title Below Axis**
- This will open a text box in the chart area, below the chart, with the text “**Axis title**”
- Click in the box and delete “**Axis title**”. Type in “*Months*”

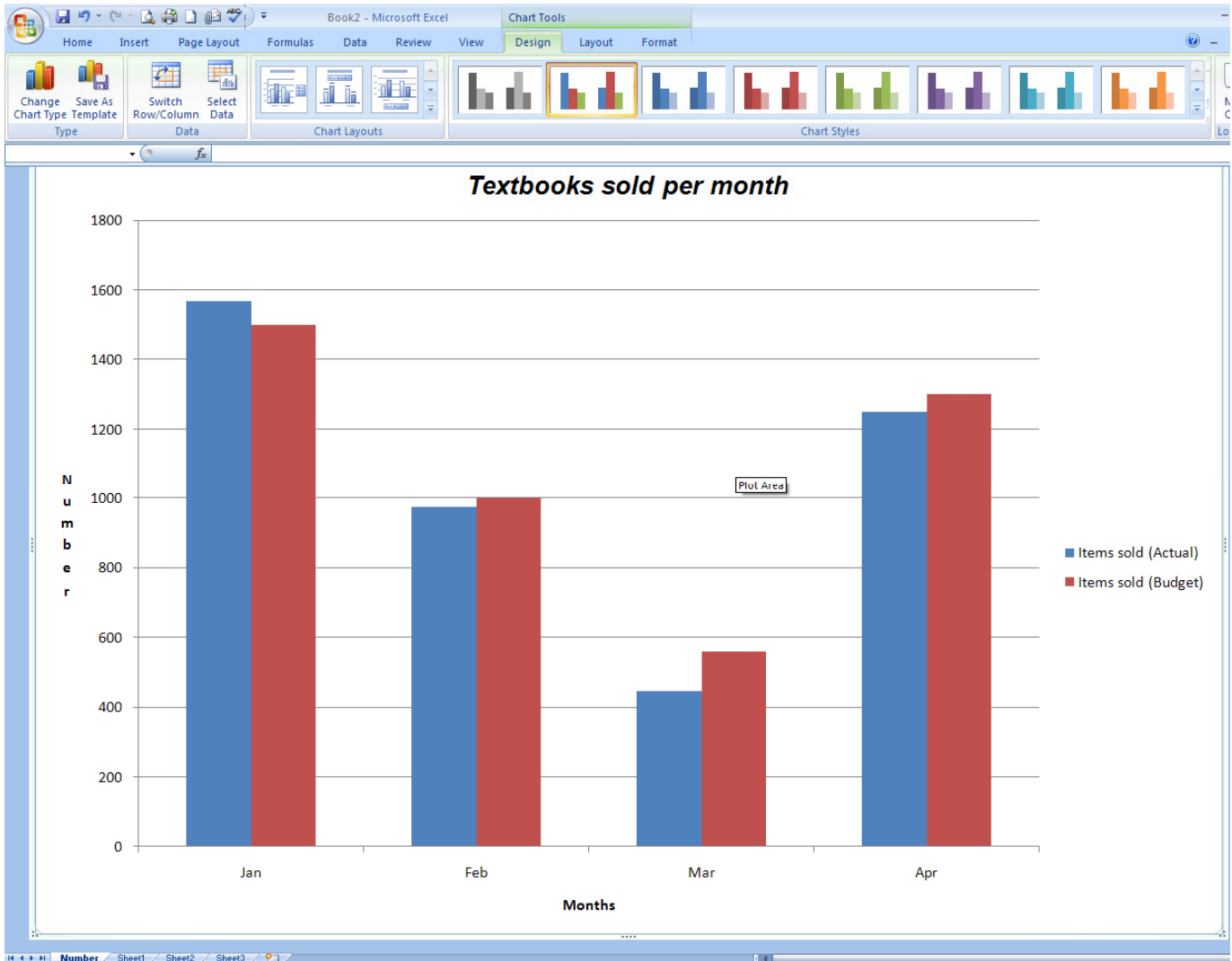
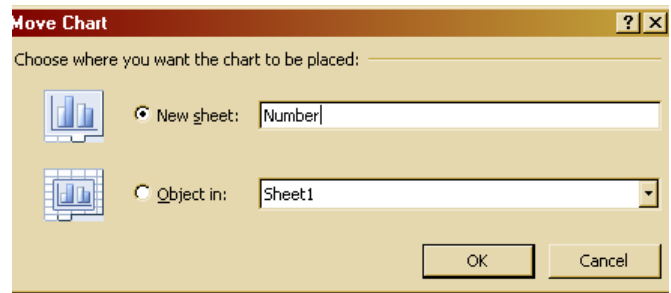


- Click on the **Layout** tab
- In the **Labels** group, click on the arrow next to the **Axis Titles** icon
- In the drop-down menu click on the arrow next to **Primary Vertical Axis Title**
- In the drop-down menu select **Vertical Title**
- This will open a text box in the chart area, left of the chart, with the text “**Axis title**”.
- Click in the box and delete “**Axis title**”. Type in “*Number*”





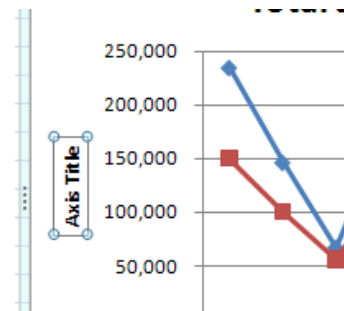
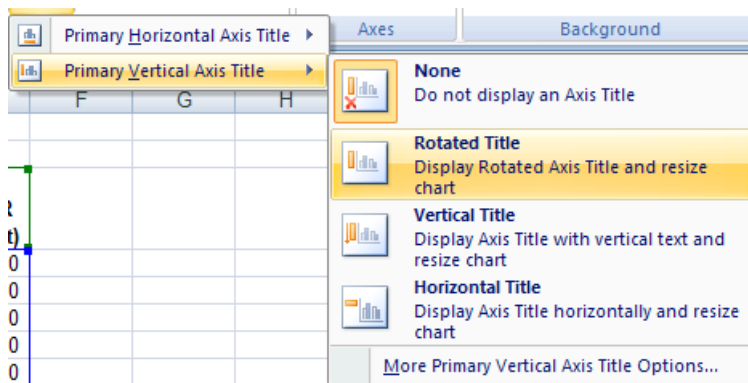
- Click on the **Design** tab
- In the **Location** group, click on the **Move Chart** icon
- Select **New sheet:** and change the name from **Chart1** to **Number**
- Click on **OK**
- Did you notice that the graph was moved to a new worksheet called “Number”
- Save the workbook file “**GRAPH**”
- The graph you created should appear as follows:



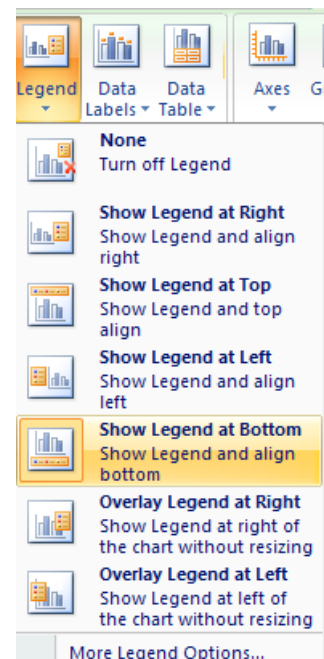
### Activity 53:

- Use the worksheet created in Activity 52 i.e. the file called “GRAPH”
- Select ranges A3:A9 AND D3:E9 simultaneously by using the control key.
  - This is done by selecting range A3:A9
  - While the above mentioned range is selected press the “CTRL” (control) key on the keyboard
  - While the “CTRL” (control) key is pressed select range D3:E9 with the mouse
- While the above-mentioned range is selected click on the **Insert** tab
- In the **Chart** group, click on the arrow next to the **Line with Markers** icon
- In the drop-down menu select **2D Line** (Tip: [Hovering with your mouse pointer over the different chart icons will make the description of the icon appear](#))
- You will note that the graph inserted into your worksheet is basic without any graph and axis titles, etc.
- Click on the graph to have the **Chart Tools** commands displayed.
- Click on the **Layout** tab
- In the **Labels** group, click on the arrow next to the **Chart title** icon

- In the drop-down menu select **Above Chart**
- This will open a Text box in the chart area above the chart with the text “**Chart title**”
- Click in the text box and delete “**Chart Title**”. Type in “*Total sales per month*”
  
- Click on the **Layout** tab
- In the **Labels** group, click on the arrow next to the **Axis Titles** icon
- In the drop-down menu click on the arrow next to **Primary Horizontal Axis Title**
- In the drop-down menu select **Title Below Axis**
- This will open a text box in the chart area, below the chart, with the text “**Axis title**”
- Click in the box and delete “**Axis title**”. Type in “*Month*”
  
- Click on the **Layout** tab
- In the **Labels** group, click on the arrow next to the **Axis Titles** icon
- In the drop-down menu click on the arrow next to **Primary Vertical Axis Title**
- In the drop-down menu select **Rotate Title**
- This will open a text box in the chart area, left of the chart, with the text “**Axis title**”
- Click in the box and delete “**Axis title**”. Type in “*Rand*”

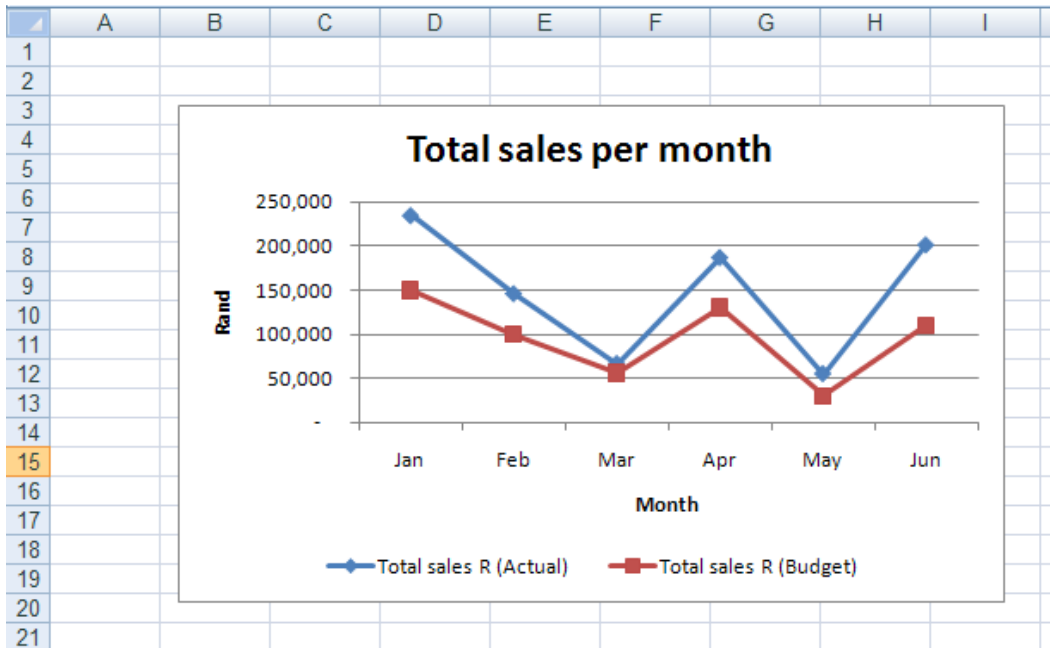


- Click on the **Layout** tab
- In the **Labels** group, click on the arrow next to the **Legend** icon
- In the drop-down menu select **Show Legend at Bottom**



- Click on the **Design** tab
- In the **Location** group, click on the **Move Chart** icon
- Select **Object in:** and select **Sheet2** from the drop-down menu (click on the arrow to activate the menu)
- Click on **OK**
- Did you notice that the graph was moved to Sheet2
- Save the workbook file “**GRAPH**”

- The graph you created should appear as follows:



Note the difference in the look and feel between moving the chart to a **New sheet** or to an **Object in**.

## 10.2. Updating data in a chart

### 10.2.1. Updating source data

You can update the range of data the chart is reading after it was created. You will for example use this to add additional month's information as it become available.

#### Activity 54:

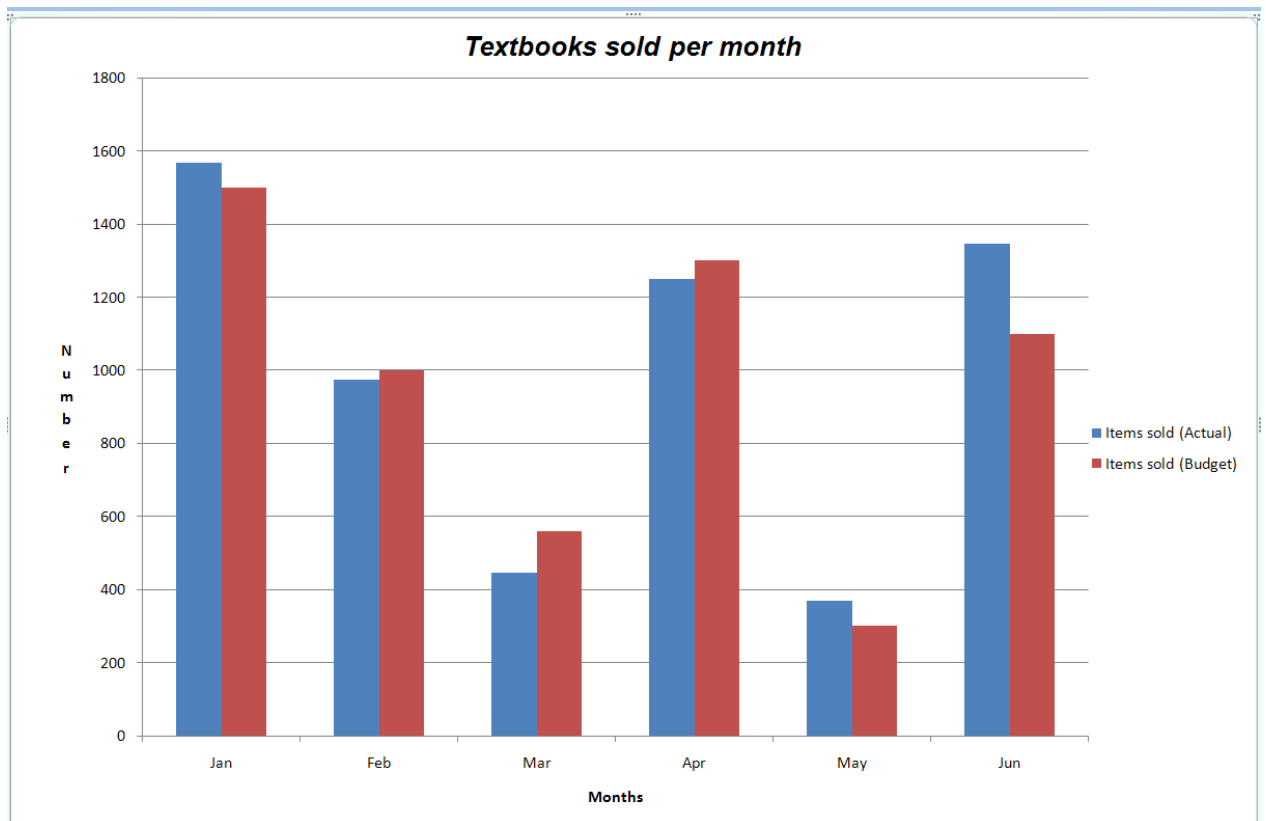
- Click on the chart created in *Activity 52*
- Click on the **Design** tab
- In the **Data** group, click on the **Select data** icon
- This will open the **Select Data Source Data** dialog box

Month	Items sold (Actual)	Items sold (Budget)	Total sale (Actual)
Jan	1567	1500	235
Feb	975	1000	46
Mar	445	560	66
Apr	1249	1300	87
May	368	300	55
Jun	1345	1100	201

- Note your current data selection has dotted lines around it.
- Also note the current **Chart data range: ='Sheet1!\$A\$3:\$C\$7**
- Update the data range to include May and June's data by:
  - Click on the table with the data and Re-selecting the data range(i.e. A2:C9) by including the new data range (Note that your new data selection has dotted lines around it) or
  - By changing the information in the **Chart data range: box** from **=Sheet1!\$A\$3:\$C\$7** to **=Sheet1!\$A\$3:\$C\$9**

- Click on **OK** to action the change

- The updated graph will appear as follows:



### 10.2.2. Changing the chart type

Microsoft Office Excel provides many different type of charts, including 3D charts. You can change the type of a created chart after you have created it.

#### Activity 55:

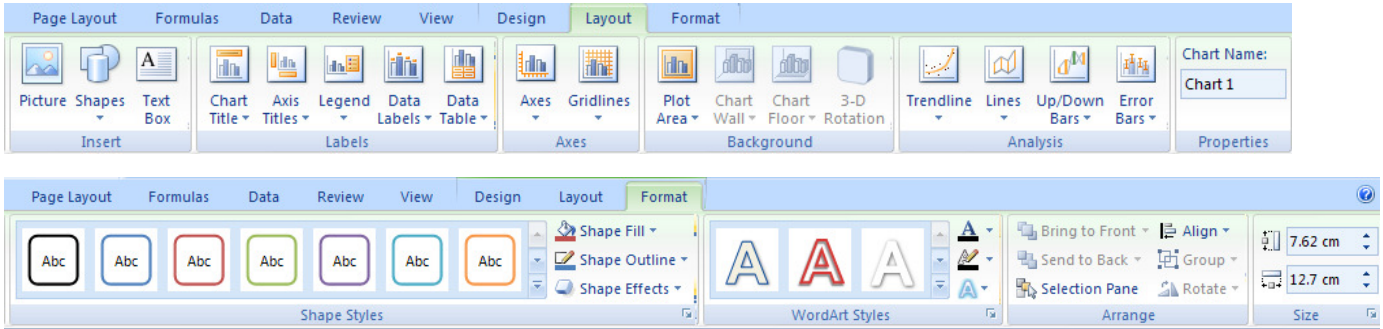
- Click on the chart created in *Activity 53 or Activity 54*
- Click on the **Design** tab
- In the **Type** group, click on the **Change Chart Type** icon
- This will open the **Change Chart Type dialog box**
- Experiment by choosing different types of charts
- Click on **OK** to action the change

### 10.2.3. Changing the chart layout and format

You can customise your chart to give it your own individual look. You can for example apply specific shape styles; format the shapes and text of chart elements.

#### Activity 56:

- Click on the chart created in *Activity 53, Activity 54 or Activity 55*
- Click on the **Layout** and **Format** Tab
- Experiment by selecting different icons on both these tabs
- Click on **OK** to action the changes



## 11. FREQUENT MISTAKES IN MICROSOFT OFFICE EXCEL QUESTIONS

When marking a Microsoft Office Excel question **1 mark** per error will be deducted for the following. Please note we will only deduct marks until you have zero for a formula, you can therefore not get a negative mark for that specific formula.

- Not starting the formula with =

Correct	Loose 1 mark
=sum(B5:B19)	sum(B5:B19)
=if(C3>B4,500,1000)	if(C3>B4,500,1000)

- Using [ ] instead of ( )

Correct	Loose 1 mark
=sum(B5:B19)	=sum[B5:B19]
=if(C3>B4,500,1000)	=if[C3>B4,500,1000]

- Incorrect use of parentheses ( )

Correct	Loose 1 mark
=sum(B5:B19)	=sum(B5:B19
=if(C3>B4,500,1000)	=(if(C3>B4,500,1000)
=sum(B5:B19)	=sumB5:B19)

- Using ; instead of : or , (please refer to paragraph 9.2 of TL103)

Correct	Loose 1 mark per incorrect syntax	
=sum(B5:B19)	=sum(B5;B19)	1 mark lost
=if(C3>B4,500,1000)	=if(C3>B4;500;1000)	2 marks lost

- Using SUM in a formula where it is not applicable

Correct	Loose 1 mark
=B5+B10	=sum(B5+B10)
=B10*B4	=sum(B10*B4)
=B5/B10	=sum(B5/B10)

- Not using “ ” when using text in a formula

Correct	Loose 1 mark per incorrect syntax	
=if(C3="yes","open","close")	=if(c3=yes,"open","close")	1 mark lost
=if(C3="yes","open","close")	=if(c3="yes",open,close)	2 marks lost
=if(C3="yes","open","close")	=if(c3=yes,open,close)	3 marks lost

- Using mathematical signs instead of Microsoft Office Excel signs

Correct	Loose 1 mark
*	x
/	÷

- Using a formula when a function is available

Correct	Loose 1 mark
=sum(B5:B10)	= B5+B6+B7+B8+B9+B10
=average(B5:B10)	=(B5+B6+B7+B8+B9+B10)/6

- Incorrect writing of values/amounts in a formula or function

Correct	Loose 1 mark
0.1	0,1
100000	100 000 or R100000 or 100,000

**Congratulations – you have finished working through your Microsoft Office Excel tutorial letter! I hope you have enjoyed learning about Microsoft Office Excel and will be able to apply what you have learned in the workplace!**

**Note: Microsoft product screen shots reprinted with permission from Microsoft Corporation**