Spreadsheets...

Are programmes used to *perform mathematical, statistical, financial and analytically related tasks*. They attempt to simulate real life models of either a statistical financial or mathematical models like Budgeting, Break-Even Analysis, Profit and Loss Statements, Balance Sheets and Forecasting etc.

Within the Spreadsheet industry Microsoft Excel stands out above other competitors like Lotus 123, Quattro Pro, Microsoft Works, Multi Plan etc.

Terms of Reference.

Workbook:
This is a term used to refer to a single file within the excel spreadsheet. Typically, all unsaved files in Microsoft Excel will be given a generic name, e.g. Book1, Book2, Book3 ... Book n where n is a number.

Worksheet:
This is the working area within a workbook. It consists of a grid of rows and columns; the rows are identified by numbers while the columns with alphabetical letters. Generally Microsoft Excel comes with a minimum of three Worksheets, however users have the ability to add and remove any existing ones.

Cell:
The point of intersection between a column and a row forms a cell; a cell is the actual data entry position within the work sheet. It is uniquely identified by the coordinates of its column and row headings e.g. the first cell is termed as A1 (column A, row 1) the contents of a cell can be either of the following:

1. Text, Narratives or Labels. e.g. EXPENSES, JAN, PROFITS/LOSS etc.
2. Values, Numbers e.g. 145, 45,000, $ 5,600 etc.
3. Formulas e.g. =A2+A3, =B3*C5, =SUM(A2:A9)

NB: All formulas are preceded by the Equal Sign (=)

Range:
This is a term that refers to a group of cells selected together. It is formed by the coordinates of the first cell (top, left) address within the selection, separated by a full colon (:), ending with the address of the last cell within the selection (bottom, right).
NB: Ranges are only used within a formula. e.g. =SUM(B3:B9), =MAX(B3:F9), =AVERAGE(B3:G14) etc.

Workbook/Worksheet Management

As earlier described, the worksheet provides the actual working area within the Workbook. It thus follows that the user will make use of them every time a workbook is accessed. The following properties can be performed to worksheet:-

Selection of Worksheets
To select a single worksheet, simply click on the tab name. However for more than one sheet, click the first one, for additional ones, hold down the CTRL key and click any more additional sheets at random. To deselect them, repeat the procedure with CTRL key held down. For a consecutive group use the SHIFT key instead.

Creation of Worksheets
To create a new worksheet, from the insert menu, choose worksheet

Deletion of Worksheets
Select the worksheet(s) of interest, and from the edit menu, choose the delete sheet command NOT delete. Confirm appropriately.
NB: the procedure is none reversible

Renaming Worksheets

Select the worksheet of interest and from the format menu, choose sheet, and click the rename command.
TIP: You can also rename by simply double clicking the tab name (sheet name), typing the new name and pressing enter key.

Saving Workbooks

From the file menu, choose save as command, type a name for the file, specify the location to save the file, then click save command button.
NB: to update changes to your workbook, from the same menu (file), click save command.

Moving Worksheet(s)

Select the sheet(s) of interest, from the edit menu, click the move/copy sheet command. Specify the location to place the moved sheet in terms of being within the same workbook, or to a different workbook, in which case both books must be opened concurrently. Once the location is specified, further specify the relative position in relation to other sheets on the new location and click OK.
TIP: you can also drag the selected sheet(s) to the new position (but only while moving within the same workbook)

Copying Worksheet(s)

Select the sheet(s) of interest, from the edit menu, click the move/copy sheet command. Specify the location to place the moved sheet in terms of being within the same workbook, or to a different workbook, in which case both books must be opened concurrently. Once the location is specified, further specify the relative position in relation to other sheets on the new location. Now click the create copy check box and click OK.
TIP: you can also drag the selected sheet(s) to the new position while holding down the CTRL key (but only while copying within the same workbook)

Formulas

1. **Addition in Cells/Range**
   =A1+A2   ***adds*** *the contents in cells A1 and A2*
   =SUM(A3:A10)   *this also* ***adds*** *the cell contents found on the range A1 to A10*

2. **Subtraction in Cells**
   =A1-A2   ***subtracts*** *the contents in cells A1 from those in A2*

3. **Division in Cells**
   =A1/A2   ***divides*** *the contents in cells A1 with those in cell A2*

4. **Multiplication in Cells**
   =A1*A2   ***multiplies*** *the contents in cells A1 with those in cell A2*
   =PRODUCT(A1:A2)   ***multiplies*** *the contents found on the range A1to A2*

5. **Power in Cells**
   =A1^2   ***raises*** *the contents in cells A1 to the* ***power of two*** *i.e. squares it*
   =A1^3   ***raises*** *the contents in cells A1 to the* ***power of three***

More Formulas

6. **Average Function   -   (Mean score)**
   =AVERAGE(A1,A2, A4)   *Finds the* ***mean*** *within the cells A1, A2 and A4*
   =AVERAGE(A3:A10)   *Finds the* ***mean*** *of cells in the range A3 to A10*

7. **Max Function   -   (Returns the cell with the Highest value)**
   =MAX(A1,A2, A4)   *Finds the* ***highest value*** *within the cells A1, A2 and A4*
   =MAX(A3:A10)   *Finds the* ***highest value*** *on the cells found in the range A3 to A10*

8. *Min Function* - *(Returns the cell with the Lowest value)*
   =MIN(A1,A2, A4) *Finds the **lowest value** within the cells A1, A2 and A4*
   =MIN(A3:A10) *Finds the **lowest value** on the cells found in the range A3 to A10*

9. *Count Function* - *(Count of cells with values in them)*
   =COUNT(A1,A2, A4) *Finds the **count** of cells with values in the range A1, A2 and A4*
   =COUNT(A3:A10) *Finds the **count** of cells with values in the range A3 to A10*

10. *Median Function* - *(Most frequently occurring value)*
    =MEDIAN(A1,A2, A4) *Finds the **median** within the cells A1, A2 and A4*
    =MEDIAN(A3:A10) *Finds the **median** of cells in the range A3 to A10*

11. *Mode Function* - *(Middle number)*
    =MODE(A1,A2, A4) *Finds the **mode** within the cells A1, A2 and A4*
    =MODE(A3:A10) *Finds the **mode** of cells in the range A3 to A10*

12. *Standard Deviation Function* *(Standard Deviation)*
    =STDEV(A1,A2, A4) *Finds the **standard deviation** within the cells A1, A2 and A4*
    =STDEV(A3:A10) *Finds the **standard deviation** of cells in the range A3 to A10*

Other Formulas

13. *IF Statement…*
    This is an Excel formula used to evaluate the contents of a single cell, compares the contents of this cell against a given value or statement, to return a TRUE value, statement or formula if tested condition is positive; alternatively it returns a FALSE statement, value or formula if tested condition is negative.

Syntax

$$=IF (\text{CELL to be analyzed} \quad \underline{\text{Operator}} \quad \text{Value or Statement to compare against} \, , \, \text{TRUE Value, "Statement" or formula} \, , \, \text{FALSE Value, "Statement" or formula})$$

Operator
- o =   Equal
- o >   Greater Than
- o >=   Greater Than or Equal to
- o <   Less Than
- o <=   Less Than or Equal to
- o <>   Not Equal to

Example I: - *(With Solution)*

To determine the age status of students, create a column called AGE STATUS, and using the IF statement compare their ages against the value 18. If they are 18 and above, it should return ADULT else, failure should return MINOR

Solution Example I:

(Assuming cell under analysis is A3)

=IF(A3>=18, "Adult", "Minor")

Example II: - *(Self Attempt)*

Create a column called NEXT CLASS, and using the IF statement analyze the student's AVERAGE scores, compares them against the value 65, If they are equal to or above, it should return PROCEED else, failure should return REPEAT.

14. *Nested IF Statement*
    This unlike the standard IF statement, evaluates the contents of a single cell, compares the contents of this cell against several given values or statements, to return **several** TRUE values, statements or

formulas if tested condition is positive; alternatively it returns a single FALSE statement, value or formula if tested condition is negative.

Example III   -   (With Solution)

To determine the age group status of students, create a column called AGE GROUP, and using the Nested IF statement compare their ages against the values alongside:-

Solution Example III:

(Assuming cell under analysis is A3)

=IF(A3>=60, "Old Man", IF(A3>=35, "Middle Aged", IF(A3>=20, "Youth", IF(A3>=13, "Teenager", IF(A3>=7, "Toddler", "Infant")))))

NOTE:

- ❑   *The TRUE and FALSE statements are the only ones enclosed in quotes; where a value or formula is used, no quotes*
- ❑   *The last item within the IF statement is NEVER analyzed as it come by default on the failure of all the tested conditions*
- ❑   *The Nested IF statement can only analyze with up to a Maximum of 7 (seven) IF Statements.*

Example IV: -   (Self Attempt)

Create a column called GRADE, and using the Nested IF statement analyze the student's AVERAGE scores, compares them against the pre-rated grades which could either be DISTINCTION, CREDIT, PASS or FAIL.
NB: You have to sit down and work out your ranges for the appropriate grades

15. Logical IF Statements
These make use of Logical Operators like OR, AND & NOT to evaluate cell contents.

Logical Operators

1. **AND** ………… **ALL** tested conditions **MUST** be met for the True Value, Statement or Formula to come

2. **OR** …………… the True Value, Statement or Formula comes if **ANY** of the tested conditions returns positive.

IF(AND) Statement

This Logical IF statement, evaluates the contents of several cells Maximum of 30, compares the contents of these cells against several given values or statements, to return a single TRUE value, statement or formula if tested conditions are ALL positive; alternatively it returns a single FALSE statement, value or formula if ANY of the tested conditions returns negative.

Example V: -   (With Solution)

To determine the students who qualify to get a prize, the school's management has stipulated that the following conditions must be met: *(this should be done on a new column titled PRIZE)*

Conditions

Mathematics …………………………… > 65
English ……………………………… > 70
Age………………………………… >=18
Average ………………………>= 68

If **ALL** conditions stipulated are met, it should return the prize as the student's **average multiplied by 100**; however, failure on any should return **No Prize**.

Solution Example V:

> *(Assuming Mathematics is in Cell C3, English is in Cell B3, Age is in Cell A3 and Average is in Cell G3)*
>
> =IF(AND(C3>65,B3>70,A3>=18,G3>=68), G3*100, "No Prize")

Example VI: -   (Self Attempt)

Kenya College of Accountancy is offering **Scholarship** to sponsor students to pursue Graduates Diploma IMIS Programme, however to qualify for the scholarship, students must meet the following conditions stipulated by the donors: *(this should be done on a new column titled SCHOLARSHIP)*

Conditions
Mathematics................................ > 80
English ....> 85
Physics .... >= 70
Biology .... > 65
Age .... >=25
Average .... >= 75

> If **ALL** conditions stipulated are met, it should return the Scholarship as the student's **average multiplied by 3000**; however, failure on any should return **No Scholarship**.

IF(OR) Statement

This Logical IF statement, evaluates the contents of several cells Maximum of 30, compares the contents of these cells against several given values or statements, to return a single TRUE value, statement or formula if ANY of the tested conditions is positive; alternatively it returns a single FALSE statement, value or formula ONLY if ALL of the tested conditions return negative.

Example VII -   (With Solution)

To determine the students who qualify to go for a tour, the school's management has decided that any of the following conditions should be met: *(this should be done on a new column titled TOUR)*

Conditions
Mathematics .... > 85
Age.. >=18
Average ....>= 60

> If **ANY** of the conditions is met, it should return the **Granted**; however, failure on **ALL** should return **Denied**.

Solution Example VII:

> *(Assuming Mathematics is in Cell C3, Age is in Cell A3 and Average is in Cell G3)*
>
> =IF(OR(C3>85,A3>=18,G3>=60), "Granted", "Denied")

Example VIII: -   (Self Attempt)

Kenya College of Accountancy has a student body known as STUKCA. This body is entirely run by students, representing their rights and grievances to the management. The Student leader is elected to this post through Student Election, and should at least meet any of the following college regulations:- *(this should be done on a new column titled STUKCA)*

Conditions
Mathematics................................> 80
Age .... >=25
Average .... >= 83

> If **ANY** condition stipulated is met, it should return the **Possible Candidate**; however, failure on **ALL** should return **Did Not Qualify**.

...End of Topic...

Cell Referencing...

Sometimes you may wish to copy a formula and have the formulas references change in relation to the new location *(relative cell referencing.)*, while on other occasions you may copy a formula and have the cell references remain fixed to the original location *(Absolute cell referencing)*. Both of these are possible through Excel's cell referencing feature. Excel offers three different types of cell referencing:-

(a) Relative cell referencing *(b) Absolute cell referencing* *(c) Mixed cell referencing*

Relative Cell Referencing

This is **default** cell referencing for formulars copied within the same worksheet or workbook. Ideally, such formulars will **adjust** its cell references in relation to the new location eg if cell C3 had the following formula

= A3 + B3

When copying such a formula down a column would result in the following:-

```
C3 ............................... = A3 + B3
C4 ............................... = A4 + B4
C5 ............................... = A5 + B5
C6 ............................... = A6 + B6
```
Where *n* is the row number
```
Cn ............................... = An + Bn
```

However the picture would be as follows if the formula were copied across the rows.

```
C3 ............................... = A3 + B3
D3 ............................... = B3 + C3
E3 ............................... = C3 + D3
F3 ............................... = D3 + E3
```

Exercise I   -   *(Relative Cell Referencing)*

ABC COOKING FAT DISTRIBUTORS				
PRODUCTS	JAN	FEB	MAR	FIRST QTR
Kimbo	210 (a)	219 (b)	194 (c)	= a + b + c ≈ d
Kasuku	312	296	280	
Elianto	114	200	160	
Chipo	125	138	120	
TOTAL				

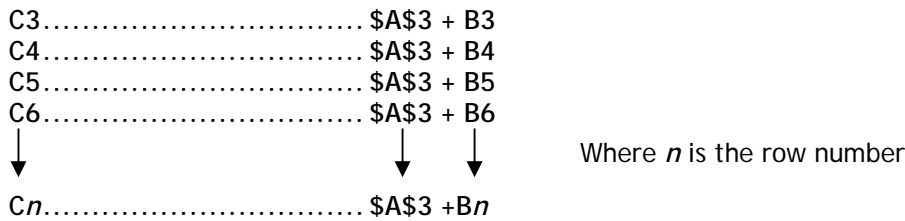| ANNUAL SALES	
	= d × 4
TOTALS	

Absolute Cell Referencing.

In this type of cell referencing the formula's cell referencing remain fixed or rather constant, pointing the cells originally copied from. Distinctively, these formulars are preceded by a dollar sign before both the column and row headings, for example, using the same formula, if the cell A3 were to be made absolute, it would look as follows:

=A3 + B3

Absolute Cell Referencing   Relative Cell Referencing
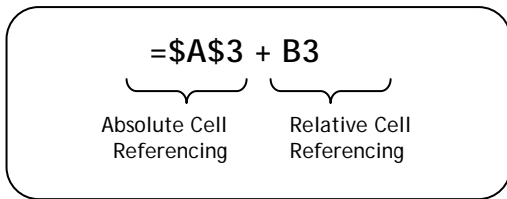
The absoluteness if created while developing the formula, by pressing **F4** function key, which cycles between the different cell references.

When copying such a formula down a column, the result would be as follows:-

C3…………………………… A3 + B3
C4…………………………… A3 + B4
C5…………………………… A3 + B5
C6…………………………… A3 + B6

Where *n* is the row number

C*n*…………………………… A3 +B*n*

i.e. the formula's cell referencing is **fixed** and thus acts as a **constant**, pointing to the same original location. However, when copied across the rows, the following would be observed.

C3…………………………… A3 + B3
D3…………………………… A3 + C3
E3…………………………… A3 + D3
F3…………………………… A3 + E3
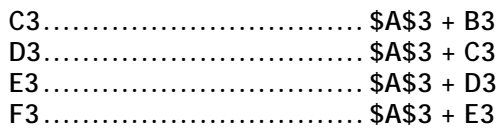
This kind of cell referencing is used where the cell's contents is to be used as a constant.

Exercise II - *(Absolute cell referencing)*

ABC COOKING FAT DISTRIBUTORS				
VAT	18% (a)			
DISCOUNT	5% (b)			
PRODUCTS	BUYING PRICE (c)	VAT (d)	SELLING PRICE (e)	DISCOUNTED PRICE (f)
Kimbo	210	= c × a	= c + d	= e – (e × b)
Kasuku	198			
Elianto	199			
Chipo	200			
Totals				

Exercise III - *(Absolute cell referencing)*

Pie	3.14 (a)	
PLOT'S RADIUS (b)	AREA (c)	PERIMETER (d)
200	= a × b ^2	= 2 × a × b
643		
1,750		
2,160		

Exercise IV - *(Absolute cell referencing)*

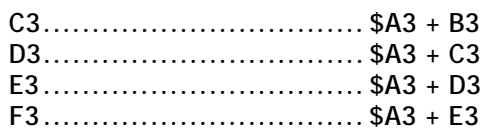| CURRENCY EXCHANGE RATE	DOLLAR	POUND	DM	RUPEES
	78.69 (b)	124.17 (c)	44.62 (d)	1.86 (e)
100,500 (a)	=a/b	=a/c	=a/d	=a/e
1,200,700				
2,653,300				
3,500,214				
9,400,611				

Mixed Cell Referencing.

In this kind of cell reference either the column or the row identifier remains fixed, but not both. Thus while still referring to the previous formula with the cell A3 being mixed referenced, then it would appear as follows:-

= $A3 + B3

Mixed Cell Referencing   Relative Cell Referencing

OR

= A$3 + B3

Mixed Cell Referencing   Relative Cell Referencing
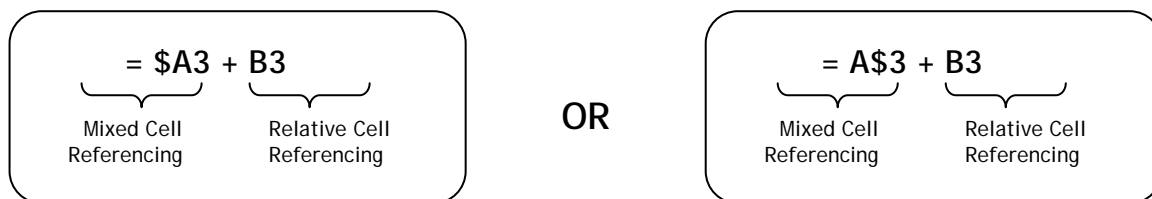
As indicated, in the first formula **(= $A3+B3)**, the column A is fixed, while the row 3 is free. Thus when such a formula is copied down a column, it would change as follows:-
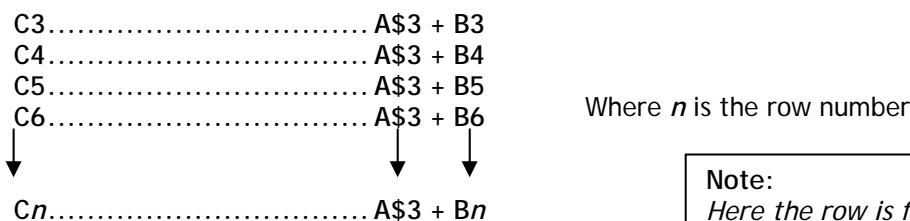
```
C3................................ $A3 + B3
C4................................ $A4 + B4
C5................................ $A5 + B5
C6................................ $A6 + B6
         ↓                 ↓         ↓
Cn................................ $An + Bn
```

Where *n* is the row number
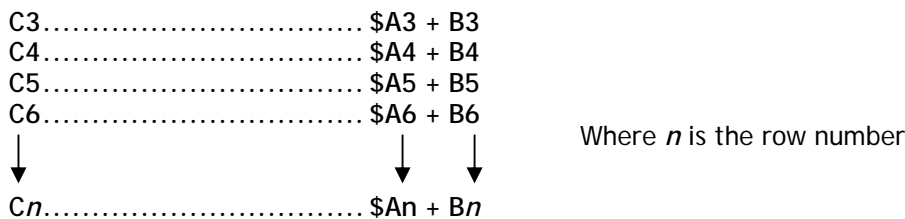
However, the formula would adjust as follows when copied across rows:-

```
C3................................ $A3 + B3
D3................................ $A3 + C3
E3................................ $A3 + D3
F3................................ $A3 + E3
```
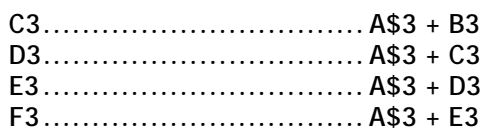
Note:
The column A is fixed, thus it cannot change, when copied to other columns, however, it will change if copied to other rows

On the second formula **(=A$3 + B3)**, the row 3 is fixed, while the column A is free. Thus when such a formula is copied down a column, it would adjust as follows:-

```
C3................................ A$3 + B3
C4................................ A$3 + B4
C5................................ A$3 + B5
C6................................ A$3 + B6
         ↓                 ↓         ↓
Cn................................ A$3 + Bn
```

Where *n* is the row number

Note:
Here the row is fixed, thus the formula will not change when copied to any other rows. However, in other columns it will adjust appropriately.

The same formula, when copied across rows, will adjust as follows:-

```
C3................................ A$3 + B3
D3................................ A$3 + C3
E3................................ A$3 + D3
F3................................ A$3 + E3
```

Exercise V   -   *(Mixed Cell Referencing)*

Loan/Rates	*5%*	*8%*	*10%*	*12%*	*18%*	*21%*
50,000						
79,000						
125,000						
210,000						
340,000						
550,000						

You can also retry **Exercise IV,** though applying *Mixed cell referencing.*

<p align="center">*...End Of Topic...*</p>

Create a Charts

1. **Select** the **range of cells** that contain the data you want to use for your chart.
2. The range must include the **column headings**, and **row headings.**

   NB: If the area to be charted has some cells to be exclude, **use** the **CTRL key** for **non-continuous selection**.

3. Now click **Chart Wizard icon** . Or from **Insert Menu**, choose **Chart**
4. Follow the instructions in the Chart Wizard.

   - Choose the **type of char**t of interest, and within your chosen chart, select the relevant **subset**
     NB: Choice of chart may be selected from the Standard Side or Custom Side
   - You may **preview** the chart by pressing **hold to view sample button** otherwise

   ### Click Next
   - On the next screen, you may **redefine the chart area** to include or exclude certain data sections.
   - You can also analyze you data in **Columns** or **Rows** otherwise

   ### Click Next
   - Provide the following attributes:-
     1. **Chart Title**
     2. **X and Y axis** (Where applicable 2nd X and 2nd Y or even the Z axis)
     3. You may Remove or Add **Gridlines** i.e. Major and Minor one for both X and Y Axis
     4. Decide the Position of the **Legend**
   5. For Pie Charts Provide the **Data labels**

   ### Click Next
   - Specify a **location** for the Chart i.e. as a **New Sheet** or as an **Objec**t within one of your Worksheets

   ### Click Finish

Exercise I - *(Column Chart)*

Highlight the column heading ***Student***, to the name of the last student (***Jane***), hold **CTRL** key and Click the headings Mat, Eng and Swa, drag to select the entry for the last student's Swa score (***43***). From this create a **Column Chart**, with the relevant Titles and Axis provided.
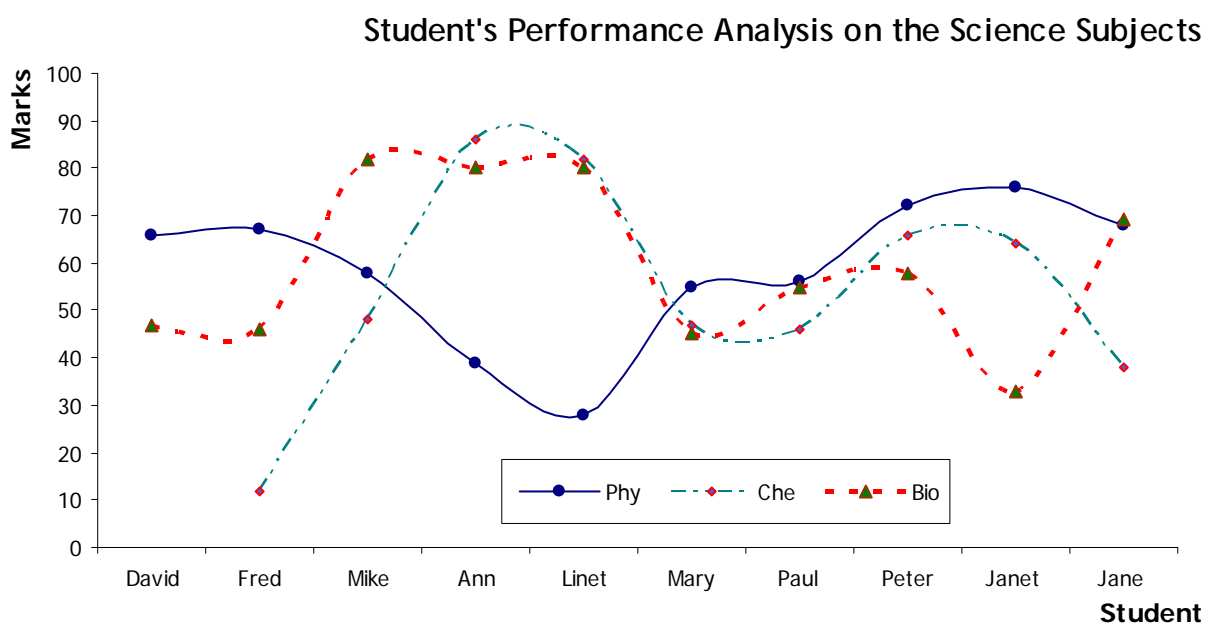
Solution Exercise I - *(Solution Chart)*

Student's Performance Analysis on the Core Subjects
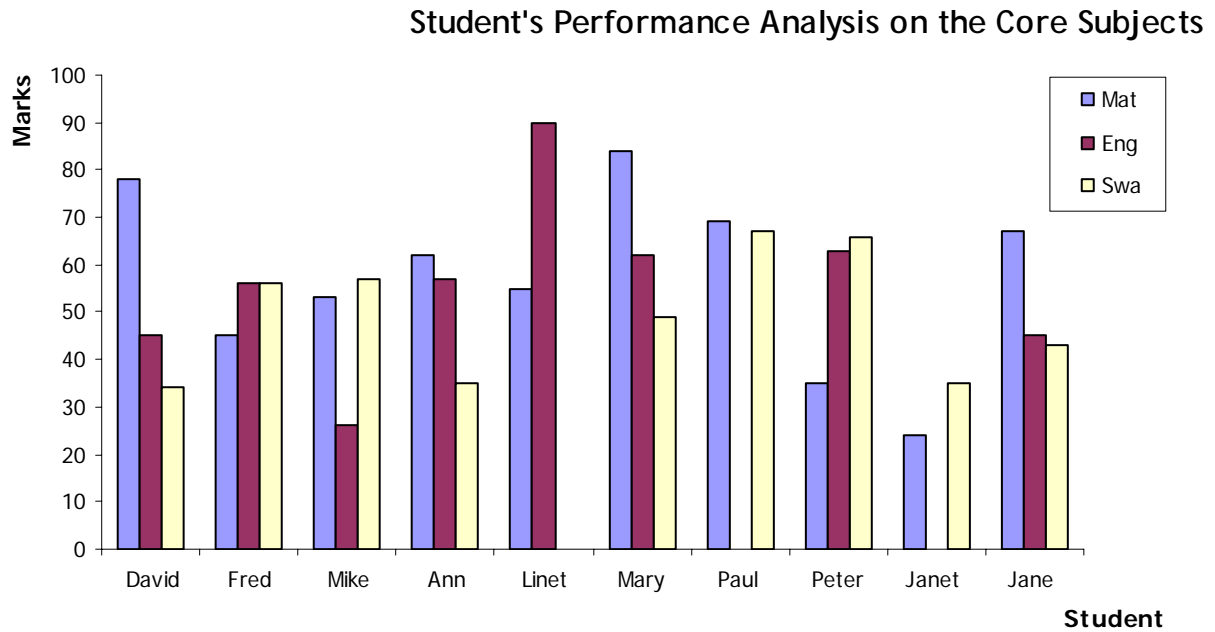
Exercise II - *(Line Chart)*

Now highlight the column heading ***Student***, to the name of the last student (***Jane***), hold **CTRL** key and Click the headings Phy, Che and Bio, drag to select the entry for the last student's Bio score (***69***). From this create a **Line Chart,** with the relevant Titles and Axis provided.

Solution Exercise II - *(Solution Chart)*

Student's Performance Analysis on the Science Subjects

Exercise III   -   (3D Pie Chart)
Now highlight the column heading **_Mat_**, to the name of the last subject (**_Bio_**), hold **CTRL** key and Highlight the Averages for these subjects on the relevant row. From this create a **3D Pie Chart,** with the relevant Title and **Data Labels.**

Solution Exercise III - *(Solution Chart)*

Subject Performance Analysis by Average
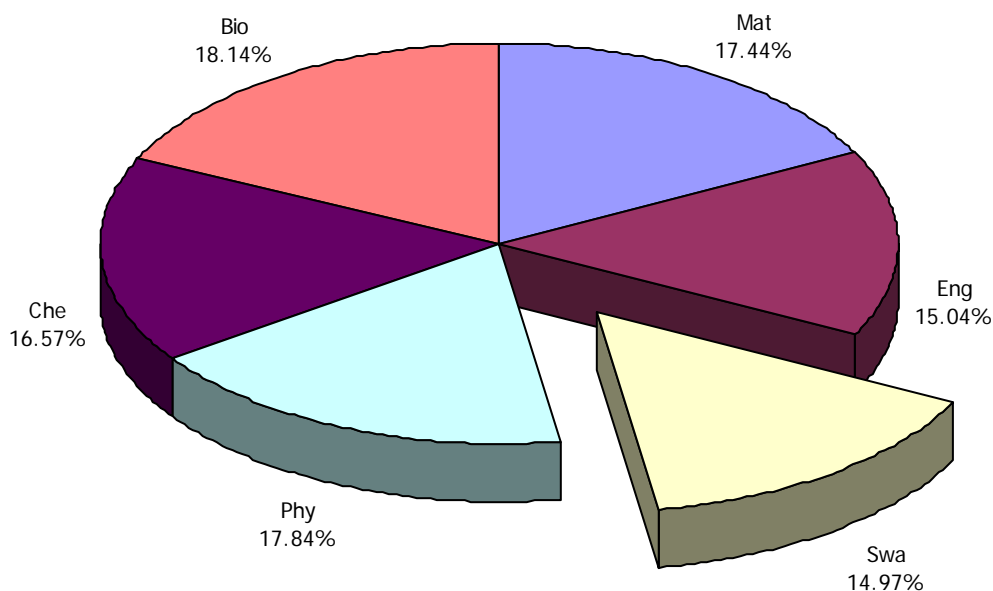
Exercise IV   -   (Self Attempt)
You have been provide with the following data, from this create a **Chart**, the chart must include **both** dataset within one chart. No particular chart has been stipulated, hence your choice of chart has to be justified later at the end of the exercise. Provide ALL the relevant Titles and Axis, Legend.
TIP: Custom type

City	Temp	Rainfall
Nairobi	21	2100
Cairo	28	1500
Dakar	32	750
Beijing	14	1200
Kampala	20	2600
Monrovia	- 6	1650
London	8	1800

Practical Exercise

Student	Age	Mat	Eng	Swa	Phy	Che	Bio	Total Marks	Average Mark	Highest	Lowest	Mode	Median	Subjects	Standard Deviation
David	18	78	45	34	66		47								
Fred	15	45	56	56	67	12	46								
Mike	12	53	26	57	58	48	82								
Ann	16	62	57	35	39	86	80								
Linet	25	55	90		28	82	80								
Mary	20	84	62	49	55	47	45								
Paul	17	69		67	56	46	55								
Peter	32	35	63	66	72	66	58								
Janet	15	24	0	35	76	64	33								
Jane	17	67	45	43	68	38	69								
Average															
Highest															
Lowest															
Mode															
Median															
Attendance															
Standard Deviation															

For

- **TOTAL** use **SUM** Function
- **AVERAGE** use **AVERAGE** Function
- **STANDARD DEVIATION** use **STDEV** Function

- **HIGHEST** use **MAX** Function
- **LOWEST** use **MIN** Function
- **SUBJECTS** use **COUNT** Function

- **MODE** use **MODE** Function
- **MEDIAN** use **MEDIAN** Function
- **ATTENDANCE** use **COUNT** Function