

# ICT FOR TTCs

STUDENT-TEACHER'S BOOK

YEAR

2

OPTIONS:

ECLPE | SME | SSE | LE

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# FOREWORD

## *Dear Student,*

Rwanda Basic Education Board (REB) is honored to present Year Two ICT Student-Teacher's book which serves as a guide to competence-based teaching and learning to ensure consistency and coherence in the learning of the ICT subject. The Rwandan educational philosophy is to ensure that learners achieve full potential at every level of education which will prepare them to be well integrated in society and exploit employment opportunities.

In line with efforts to improve the quality of education, the government of Rwanda emphasizes the importance of aligning teaching and learning materials with the syllabus to facilitate your learning process. Many factors influence what you learn, how well you learn and the competences acquired. Those factors include the relevance of the specific content, the quality of tutor's pedagogical approaches, the assessment strategies and the instructional materials available. We paid special attention to the activities that facilitate the learning process in which learners can develop ideas and make new discoveries during concrete activities carried out individually or with peers. With the help of the tutor, you will gain appropriate skills and be able to apply what you have learnt in real life situations. Hence, you will be able to develop certain values and attitudes allowing you to make a difference not only to your own life but also to the nation.

This is in contrast to traditional learning theories which view learning mainly as a process of acquiring knowledge from the more knowledgeable who is mostly the teacher. In competence-based curriculum, learning is considered as a process of active building and developing of knowledge and understanding, skills and values and attitude by the learner where concepts are mainly introduced by an activity, situation or scenario that helps the learner to construct knowledge, develop skills and acquire positive attitudes and values.

In addition, such active learning engages you in doing and thinking about what you are doing and you are encouraged to bring your own real experiences and knowledge into the learning processes. In this view, your role is to:

- Develop knowledge and skills by working on given activities which lead to the content;
- Communicate and share relevant information with other learners through presentation, discussion, group work and other active learning techniques such as role play, case studies, investigation and research in the library, on internet or outside;
- Participate to and take responsibility for your own learning;
- Carry out research/investigation by consulting printed/online documents and resourceful people, and present your findings;

- Ensure the effective contribution of each group member in assigned tasks through clear explanations and arguments, critical thinking, responsibility and confidence in public speaking;
- Draw conclusions based on the findings from the learning activities.

I wish to sincerely extend my appreciation to the people who contributed towards the development of this book, particularly REB staff who organized the whole process from its inception. Special appreciation goes to the teachers who supported the exercise. Any comment or contribution would be welcome to the improvement of this textbook for the next versions.

**Dr. MBARUSHIMANA Nelson**

**Director General, REB**

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## TABLE OF CONTENT

<b>FOREWORD</b> .....	<b>iii</b>
<b>ACKNOWLEDGMENT</b> .....	<b>v</b>
<b>UNIT 1: ADVANCED SPREADSHEET II</b> .....	<b>1</b>
1.1. Advanced Spreadsheet functions .....	2
1.1.1. Logical functions .....	2
1.1.2. Advanced Math Spreadsheet functions .....	7
1.1.3. Advanced Statistical Spreadsheet functions .....	12
1.1.4. Text spreadsheet functions .....	17
1.2. Using formula & functions from different sheets .....	20
1.3. Protecting worksheet style, contents and elements .....	23
1.3.1. Protecting & unprotecting worksheet; .....	23
1.3.2. Lock & unlock cells, style, contents and other elements .....	24
1.4. Data validation .....	27
1.5. Using other Excel templates .....	33
<b>UNIT 2: ADVANCED POWER POINT PRESENTATION</b> .....	<b>40</b>
2.1. Create and manage presentations .....	41
2.1.1. Creating, copying and inserting slides .....	41
2.1.2. Managing slides .....	44
2.1.3. Apply Design themes and format background .....	46
2.1.4. Adding notes and comments, Inserting header and footer .....	49
2.2. Add sound and animation to slides .....	51
2.2.1. Animate text and picture in slides .....	51
2.2.2. Add audio and video content to slides .....	56
2.2.3. Slide transitions .....	59
2.3. Presenting Using PowerPoint .....	61

<b>UNIT 3: COMPUTER GRAPHICS TOOLS .....</b>	<b>65</b>
3.1. Introduction to computer graphics .....	66
3.1.1. Definitions of different terms.....	66
3.2. Image format .....	69
3.2.1. Definition .....	69
3.2.2. Image compression .....	70
3.2.3. Viewing an image's file size and dimensions .....	71
3.2.4. Calculating size of an uncompressed image file .....	71
3.3. Image capturing tools .....	72
3.3.1. Digital camera .....	73
3.3.2. Scanner .....	76
3.4. Screenshots capturing .....	78
3.4.1. Use of Print Screen Key .....	78
3.4.2. Use of Snipping tool .....	79
3.5. Graphic software-Paint.....	81
3.5.1. Starting and saving a Paint file.....	81
3.5.2. Paint tools .....	83
3.5.3. Insertion of shapes.....	85
3.5.4. Select, cut, copy, paste and crop.....	86
 <b>UNIT 4: E COMMERCE, SOCIAL MEDIA AND ONLINE SERVICES .....</b>	 <b>91</b>
4.1. E commerce .....	91
4.1.1. Understanding e commerce .....	92
4.1.2. E-commerce models .....	95
4.1.3. Online Payment methods.....	96
4.2. Social media .....	100
4.2.1. Facebook.....	100
4.2.2. Twitter .....	105

4.2.3. Instagram .....	110
4.2.4. WhatsApp .....	113
4.3. Online Services.....	116
4.3.1. E-Banking and E-Payment .....	116
4.3.2. Irembo local online services .....	118
<b>BIBLIOGRAPHY .....</b>	<b>122</b>

# UNIT 1

## ADVANCED SPREADSHEET II

**Key Unit competence:** Use the full potential of the spreadsheet to manipulate data.

### 1.0 INTRODUCTORY ACTIVITY

1. Using Ms Excel summarize the number of expectant mothers and children under 2 years in the cells of Muhororo Sector who must receive mosquito nets

SN	CELL	Expectant Mothers	ChildrenUnderAgeTwo
1	Muhororo	25	14
2	Kamusenyi	21	10
3	Mpanda	19	12
4	Nyakabuye	15	13
5	Ntenyo	20	11

- a. Which cell that has more expectant mothers to receive mosquito nets?
- b. Which cell that has more children under age Two?
- c. Calculate the average number of children to receive mosquito nets in Muhororo
- d. Which cell has less children under age Two?

## 1.1. Advanced Spreadsheet functions

### 1.1.1. Logical functions

#### ACTIVITY 1.1

REB is rewarding best performing students with marks between 80 and 100 in Science and ICT. The reward is a laptop for those who succeeded in both subjects and a dictionary for those who succeeded in one subject. Using MS Excel answer below questions:

Names	Marks in Science	Marks in ICT	Rewarded with a laptop	Rewarded with a dictionary	Not re-warded
Kamali	70	92			
Mutoni	84	88			
Mugabo	60	75			
Isimbi	90	93			
Uwase	55	70			
Uwineza	70	81			
Gihozo	98	95			
Gwiza	78	80			
Kamikazi	62	68			
Rukundo	80	82			
Total laptops/ dictionaries given					

- Write an Excel function to find students who are to be rewarded with laptops, dictionaries and those not rewarded
- Determine the number of students that have not been rewarded?
- How many laptops and dictionaries will be given?
- In which subject does Kamali have more marks?
- In which subject does Mutoni have minimum marks
- Use Excel logical functions to fill the table above

A condition is an expression that either evaluates to true or false. The expression could be a function that determines if the value entered in a cell is of numeric or text data type, if a value is greater than, equal to or less than a specified value, etc.

Logical Function is a feature in Excel that allows excel users to introduce automated decision-making when executing formulas and functions.

The role of functions in this is to check if a condition is true or false. It combines multiple conditions together and comes up with a result depending on the result of the evaluation of the condition.

### a. IF Function

The If function checks whether data in a cell meets a certain condition and returns one value which can be True or False

- **Syntax: = IF(Logical\_test, Value\_If\_True, Value\_If\_False )**

The If function takes as arguments the logical test, checks if it evaluates to true and if so returns as a result the content of the second argument and if false the content of third argument is returned

- **Example 1:**

	A	B	C	D	E
1	Name1	Name2	Matching names ?		
2	Esperence Uwimana	Esperence Uwimana	=IF(A2=B2, "MATCH", "DON'T MATCH")		
3	Kanyamibwa Benjamin	Kanyamibwa Edouard	IF(logical_test, [value_if_true], [value_if_false])		
4	Mussa Clenie	Clenie Mussa	DON'T MATCH		
5	Mugabo Idrissa	Mugabo Idrissa	MATCH		

**The used If function**

Figure 1. 1. The use of If function to compare names

In the above example the If function with its arguments is entered in the cell where the result is to appear.

To apply that function in other cells proceed like this:

1. Place the cursor in the bottom corner of the cell
2. Hold down the left key, scroll down to other cells and release the left button

The **If** function in the above examples checks if the two names are alike and if yes, the function writes MATCH in the cell, if not the function writes DON'T MATCH

- **Example 2:**

Considering the marks obtained by Irasubiza, Karenzi, Byukusenge and Shyaka in ICT, Maths and English. The If function checks if the marks are greater than 87 and gives to the candidate the **Very Good** note else the Good note is given.

G2							=IF(F2>87,"Very Good", "Good")	
	B	C	D	E	F	G	H	G
1	ICT/25	Maths/25	English/25	TOT/75	%	Testing		Testing
2	19	18	24	61	81.33333	Good		=IF(F2>87,"Very Good", "
3	23	20	23	66	88	Very Good		=IF(F3>87,"Very Good", "
4	22	20	23	65	86.66667	Good		=IF(F4>87,"Very Good", "
5	24	21	23	68	90.66667	Very Good		=IF(F5>87,"Very Good", "

Here are formula used

Figure 1. 2. Use of if function to award grades

### b. AND Function

The Excel **AND function** is a logical function used to test if two or many conditions are true. The result is **TRUE** if all the conditions are true else the result is **FALSE**

- **Syntax: =AND (Logical1, Logical2, logical3,...)**
- **Example:**

In the table below the **And function** checks if people in the table studied Education and that their age is greater than 18

	A	B	C	D	D
1	<b>Name</b>	<b>EDUCATION</b>	<b>AGE</b>	<b>APPROVED</b>	<b>APPROVED</b>
2	Kanani	IT	23	FALSE	=AND(B2="Education",C2>18)
3	Kalisa	Education	19	TRUE	=AND(B3="Education",C3>18)
4	Abizera	IT	19	FALSE	=AND(B4="Education",C4>18)
5	Abayo	Driver	30	FALSE	=AND(B5="Education",C5>18)
6	Uwase	Education	23	TRUE	=AND(B6="Education",C6>18)
7	Kamana	Education	17	FALSE	=AND(B7="Education",C7>18)

The used formula for this text

Figure 1. 3. Results of And function and on the left functions used

**Note:** the **And function** may have more than two arguments and for the results to be True all the arguments must evaluate to TRUE and if one of the arguments is false all the result is FALSE

### Interpretation of the results:

The second, fourth, fifth and seventh rows evaluate to True as the education for all those rows is Education and the age is greater than 18 while the remaining rows evaluate to FALSE as they don't meet the two criteria.

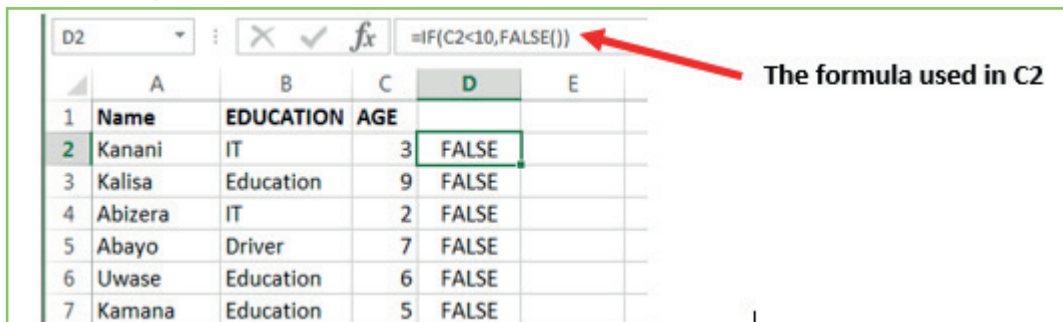
### c. FALSE Function

The FALSE function takes no arguments and generates the Boolean value FALSE. It is used to compare the results of a condition or function that either returns true or false

- **Syntax:** =False ( )

The false function takes no argument but just returns the logical value False

- **Example:** The False function used in the example below returns FALSE if the age entered in C2 is less than 10 (C2<10)



	A	B	C	D	E
1	Name	EDUCATION	AGE		
2	Kanani	IT	3	FALSE	
3	Kalisa	Education	9	FALSE	
4	Abizera	IT	2	FALSE	
5	Abayo	Driver	7	FALSE	
6	Uwase	Education	6	FALSE	
7	Kamana	Education	5	FALSE	

Figure 1. 4. The use of the False function in Excel

### Interpretation:

The used function “=IF(C2<10,FALSE( ))” will check if the C2 cell data is less than 10, if so it will return **False** as a result else it will return **True**. The same function will be applied to other cells by changing the cell position

### d. NOT Function

The Excel **NOT function** returns the opposite of a given logical or Boolean value. When given TRUE, NOT returns FALSE. When given FALSE, NOT returns TRUE. Use the NOT function to reverse a logical value.

- **Syntax:** =NOT(Logical)

The not function takes one logical expression as an argument. It returns an error if more than one argument is used.

- **Example**

The table below will have all its content returned to **True** by the use of the NOT function. If the results to reverse were got by using a formula the Not function can be put in front of the function/formula to make the latter an argument of the Not function.

	A	B	C	D	E
1	Name	EDUCATION	AGE		
2	Kanani	IT	3	FALSE	TRUE
3	Kalisa	Education	9	FALSE	TRUE
4	Abizera	IT	2	FALSE	TRUE
5	Abayo	Driver	7	FALSE	TRUE
6	Uwase	Education	6	FALSE	TRUE
7	Kamana	Education	5	FALSE	TRUE

Figure 1. 5. Not function and its results

**Note:** If the results in column D2 were got by using the function “=IF(C2<10,FALSE( ))” the result in column E2 can be got by using the function “=NOT(IF(C2<10,FALSE( )))”. As always the formula/function in one cell can be applied to other cells by pasting it in those cells

#### e. The OR function

The OR function is a logical function to test multiple conditions at the same time. OR returns either TRUE or FALSE.

- **Syntax:** = OR(logical1, Logical2, ...)
- **Example:**

The **OR function** in the screenshot below checks for students who got more than 70% as the Pass mark in anyone of the three tests.

	A	B	C	D	E
1	Names	Mathematics	Physics	Biology	PASSED ONE EXAM
2	Ruhumuriza	70	71	73	TRUE
3	Shyaka	69	48	65	FALSE
4	Isimbi	76	80	88	TRUE
5	Mugwaneza	69	69	51	FALSE
6	Mukamusoni	73	75	77	TRUE

Figure 1. 6. The OR function to test if any of the arguments is true

## APPLICATION ACTIVITY 1.1

1. Give the difference between IF and AND functions?
2. Which of these three functions in column B will give you TRUE as an answer?

	A	B
1	1	=AND(A1=1,A2=2)
2	1	=OR(A1=2,A2=1)
3		=IF(A1>1,"TRUE","FALSE")

### 1.1.2. Advanced Math Spreadsheet functions

## ACTIVITY 1.2

You are given the following data in Microsoft Excel data sheet.

Name	ICT/50	English/50	Roman	Average	Square Root	Modulo
Karegesa	35	28				
Irasubiza	28	29				
Bagwaneza	40	33				
Bamurange	35	28				
Kwizera	27	33				
Byukusenge	42	29				
Mutoni	35	15				

Answer below questions:

1. Convert ICT marks into Roman style?
2. Discuss on how to calculate the modulus of the students' marks?
3. Calculate the square root of student average marks?
4. Discuss the conversion from roman style to Arabic style number?

Mathematical functions are used to calculate values basing on what is in cells, perform operations on a cell content, fetch values after an operation based on the search criteria and much more. Some of the functions to be seen here are Abs ( ), Arabic ( ), Roman ( ), Base ( ), Mod ( ) and Sqrt ( )

### a. ABS

The Excel ABS function returns the absolute value of any provided number.

**The syntax** of the function is: **ABS (number)**

Where the numerical argument is the positive or negative numeric value for which the absolute value is to be calculated.

**Examples:**

	A	B	C	D
1	value	-100	Absolute Value	100
2	value	23	Absolute Value	23
3	value	-45	Absolute Value	45
4	value	12	Absolute Value	12
5	value	-12	Absolute Value	12
6	value	0	Absolute Value	0
7	value	67	Absolute Value	67

*Figure 1. 7. Example of the use of Abs Function*

### b. ARABIC

The Excel Arabic function converts a Roman numeral into an Arabic numeral.

**The syntax** of the function is: **ARABIC (text)**

Where the text argument is a text representation of a Roman numeral not exceeding 255 characters.

**Note that:**

- If supplied directly to the function, the text argument must be encased in quotation marks;
- If an empty text string is supplied, the Arabic function returns the value 0;
- The Arabic function was only introduced in Excel 2013 and so is not available in earlier versions of Excel.

Below are five examples of converting ARABIC to NUMBERS

Formulas:		Results:	
	A	B	
1		=ARABIC("IV")	4
2		=ARABIC("-IV")	-4
3		=ARABIC("MCXX")	1120
4	MMXV	=ARABIC(A4)	2015
5		=ARABIC("")	0

Figure 1. 8. Results of using an Arabic function

### c. ROMAN

The Excel ROMAN function converts an Arabic number to a Roman number. This means that if a function is supplied with an integer, the function returns a text string showing the Roman numeral form of the number.

**The syntax of the function is:** ROMAN (Number, [form])

- Where **Number** is any Arabic number and the form specifies the presentation format of the Roman number to be calculated. The formats to choose from are displayed after writing the number to convert and writing the comma but the default (classic) is used.

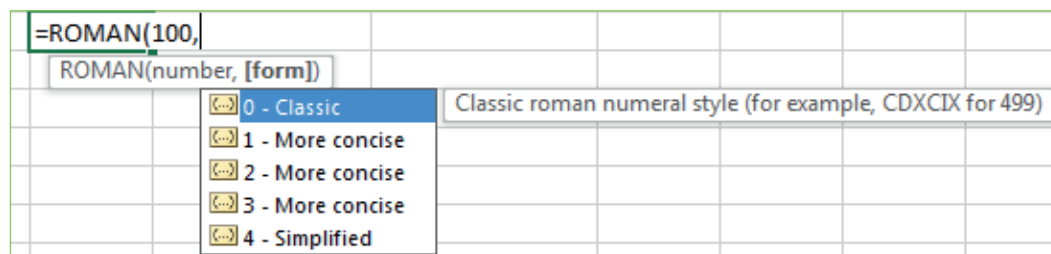


Figure 1.9. Different Roman numbers formats

- **Roman Function use examples**

In the following spreadsheet, the Excel Roman function is used to convert the number 1999 to different forms of Roman numerals.

	A	B
1	=ROMAN(1)	I
2	=ROMAN(5)	V
3	=ROMAN(23)	XXIII
4	=ROMAN(10)	X

Figure 1. 10. Results of a Roman function

#### d. BASE

The Excel Base function converts a number into a supplied base and returns a text representation of the calculated value. The Base function was introduced in Ms Excel 2013 and therefore, it is not available in earlier versions of Excel.

The spreadsheet below shows three examples of the Excel Base Function.

	A	B	C
1	FORMULA		RESULTS
2	=BASE (73, 2)		1001001
3	=BASE (100, 2)		1100100
4	=BASE (12, 2, 8)		00001100
5	=BASE (100000, 16)		186A0
6	=BASE (80, 8)		120
7	=BASE (25, 2, 7)		0011001

Figure 1.11. Results of a Base function

#### e. MOD

The Excel MOD function returns the remainder of a division between two supplied numbers.

The syntax of the function is: **=MOD (number, divisor)**

The spreadsheet below shows four simple examples of the Excel Mod function.

C	D	E	F
		=MOD(100,30)	10
		=MOD(10,6)	4
		=MOD(5,2)	1
35	4	=MOD(C8,D8)	3
34.5	34	=MOD(C5,D5)	0.5

Figure 1.12. MOD Function Results

#### f. SQRT

The Excel **SQRT Function** calculates the positive square root of a supplied number.

**The syntax of the function is: SQRT (number)**

- Where the number argument is the numeric value for which the square root is to be found.

If the supplied number is negative, the Sqrt function returns the **#NUM! Error**.

- **Excel Sqrt Function Examples**

The following spreadsheet shows three simple examples of the Excel Sqrt function.

C2	:	X	✓	f <sub>x</sub>	=SQRT(A2)
	A	B	C		
1	NUMBER	SQRT	RESULTS		
2	100	=SQRT(A2)	10		
3		=SQRT(100)	10		
4	25	=SQRT(A4)	5		
5	4	=SQRT(A5)	2		
6		=SQRT(60)	7.745966692		
7	225	=SQRT(A7)	15		

Figure 1. 13. Results of a Sqrt function

### APPLICATION ACTIVITY 1.2

1. What is the difference between MOD and SQRT Functions
2. Using Excel change the following Roman into Arabic style
  - a. MCCIII
  - b. XLIX
  - c. CMV
  - d. XXIII

### 1.1.3. Advanced Statistical Spreadsheet functions

#### ACTIVITY 1.3

The table below contains students' marks.

Name	ICT	Science	Mathematics	Total Marks	Average
Mugisha	98	78	95		
Murebwayire	99	86	60		
Muteteri	60	90	92		
Kamanzi	90	73	50		

Answer the questions that follow:

- a. Calculate the average marks of every student
- b. Give the name of the one who has more marks in:
  - i. ICT
  - ii. Science
  - iii. Mathematics

#### a. AVERAGE

The AVERAGE function in Excel returns the arithmetic mean of a list of supplied numbers, where the number arguments are a set of one or more numeric values, or arrays of numeric values, for which the average is to be calculated.

- **Syntax of AVERAGE Function in Excel**

= Average (Number1, Number2,...)

An example of how Average function is used is displayed in the screenshot below:

COND	A	B	C
NAME		SUBJECT	SCORE
Karenzi		Mathematics	89
Shyaka		Science	90
Irasubiza		Statistics	76
Uwera		Geography	72
Byukusenge		Biology	88
Kamanayo		History	59
AVERAGE			79

Figure 1.14 Average function Results

## b. AVERAGEIF

AVERAGEIF Function in Excel finds and returns the average of array that meets the specific condition. The AVERAGEIF function in Excel supports logical operators (>, <, <>, =)

- **Syntax of AVERAGEIF Function in Excel:**

=AVERAGEIF (range, criteria, [average\_range])

Where:

- **Range:** An Array of range to be tested against the supplied criteria.
- **Criteria:** The criteria or condition on which average has to be calculated.
- **[average\_range]:** An optional array of numeric values for which the average is to be calculated.

### Example of AVERAGEIF Function in Excel

In the Excel screenshot below the averages of cells meeting certain conditions have been calculated. Those conditions are: cells with scores greater than 70, average for Irasubiza and average for science courses.

3	Name	Course	Score
4	Karenzi	Mathematics	89
5	Shyaka	Science	90
6	Irasubiza	Statistics	76
7	Uwera	Geograph	72
8	Byukusenge	Biology	88
9	Kamanayo	History	59
10			
11	Average		79
12		<b>Formulas Used</b>	
13	Average of Score Greater that 70	AVERAGEIF(C4:C9,">70")	83
14	Average of Score Greater done by Irasubiza	AVERAGEIF(A4:A9,"Irasubiza",C4:C9)	76
15	Average of Score of Geography course	AVERAGEIF(A4:A9,"Geograph",C4:C9)	72

Figure 1.15. The use of Averageif function

## c. LARGE

The LARGE Function in Excel returns the largest value from an array of numeric values.

- **The syntax of LARGE Function is**

=LARGE (array, k)

Where:

- **Array** – An array of numeric values from which to find the K<sup>th</sup> largest value.
- **K**- The index. Value of K that is passed to find the K<sup>th</sup> largest value.

### Example of LARGE Function in Excel:

	A	B	C	D	E	F	G
1	NAME	SUBJECT	SCORE				
2	Karenzi	Mathematics	89				
3	Shyaka	Science	90			Formula	Results
4	Irasubiza	Statistics	76		2nd largest value	=LARGE(C2:C7,2)	89
5	Uwera	Geography	72		5th largest value	=LARGE(C2:C8,5)	72
6	Byukusenge	Geography	88		Last	=LARGE(C2:C8,7)	55
7	Murebwayire	ICT	55				
8	Kamanayo	History	59				
9	AVERAGE		75.57142857				

Figure 1.16. Use of LARGE function in Excel

### Interpretation:

- First Example finds the 2nd Largest Value as 89
- Second Example finds the 5<sup>th</sup> Largest Value as 72
- Third Example finds the 7th Largest Value as 55

### d. MAXIFS

MAXIFS function in Excel returns the Maximum value from the set of supplied numbers that meets some specific conditions. In other terms it returns the maximum if a condition is met. The MAXIFS function in Excel supports logical operators (>, <, <>, =) and wildcards characters (\*,?) for pattern matching.

### Syntax of MAXIFS Function in Excel:

- MAXIFS(max\_range, criteria\_range1, criteria1, [criteria\_range2, criteria2], ... )

Where:

- **max\_range:** is the range of numeric values from which to find the maximum value if the conditions are satisfied.
- **criteria\_range1:** is an array of values to be tested against the criteria "criteria1".
- **criteria1:** is the condition to be tested against the values in criteria\_range1

## Example of MAXIFS Function in Excel

Data and Maxifs functions used:							Results:		
	A	B	C	D	E	F	G	H	I
1	NAME	DEPARTMENT	Score						
2	Munezero	Science	78				MAX of conditions with logical operator		
3	Mugiraneza	Mathematics	89						
4	Izere	Mathematics	76				maximum Score of Irasubiza		
5	Irasubiza	ICT	90				=MAXIFS(C2:C12,A2:A12,"=Irasubiza")		90
6	Kabanda	Science	56						
7	Kamali	ICT	59						
8	Kwizera	ICT	45						
9	Muteteri	English	96				maximum of Science scores greater than 70		
10	Kabanda	Science	76						
11	Kamali	Biology	56				=MAXIFS(C2:C12,B2:B12,"=Science",C2:C12,">70")		78
12	Irasubiza	Mathematics	78						

Figure 1.17. Use of the Maxif function

- First two examples states the use of logical operation in MAXIFS function with conditions.
  - Last two examples states the use of wildcards in MAXIFS function with two conditions.
- e. MEDIAN

MEDIAN function in Excel returns the statistical median or middle value of a list of supplied numbers.

**Syntax of MEDIAN Function in Excel is:** = MEDIAN (number1, [number2], ...)

Where the number arguments are a set of one or more numeric values for which to calculate the median.

**An example of how the Median function is used in Excel is shown in the table below:**

The functions used to calculate the median							Results from the functions:		
	A	B	C	D	E	F			
1	3	6	9	32	4	=MEDIAN(A1:E1)			
2	4	6	3		5	=MEDIAN(A2:E2)			
3	BOOK	4	7	3	ICT	=MEDIAN(A3:E3)			
4	TRUE	FALSE	6	17	14				14

Figure 1.18. The use of the median function and the results

- When the total number of supplied values is odd, the median is calculated as the middle number in the group.

- When the total number of supplied values is even, the median is calculated as the average of the two numbers in the middle.
- Cells containing Text values, logical values, or no value are ignored.

#### f. MINIF Function

The Excel MINIFS function returns the smallest numeric value that meets one or more criteria in a range of values. MINIFS can be used with criteria based on dates, numbers, text and other conditions.

**Syntax:**

	A	B	C
1	<b>Name</b>	<b>EDUCATION</b>	<b>AGE</b>
2	Kanani	IT	23
3	Kalisa	Education	19
4	Abizera	IT	19
5	Abayo	Driver	30
6	Uwase	Education	23
7	Kamana	Education	17

Figure 1.19. Illustration of how Minif function is used

#### g. MODE Function

MODE function in Excel returns the mode which is the most frequently occurring number in a group of supplied arguments.

**The Syntax of MODE Function in Excel is =MODE (number1, [number2],...)**

Where the number of arguments are a set of one or more numeric values for which you want to calculate the mode.

	A	B	C	D	E	F	G	H	I
1	Names	VALUE1	VALUE2	VALUE2	VALUE3	VALUE4	VALUE4	VALUE5	MODE
2	Kamana	50	44	88	63	62	63	99	63
3	Kaneza	87	65	87	45	89	97	66	87
4	Rukundo	77	65	76	43	65	92	69	65

Figure 1.20. The use of the Mode function

Cells containing Text values, logical values, or no value are ignored.

- Mode (most frequently occurring value) is calculated row wise in above example.

### APPLICATION ACTIVITY 1.3

- Using the below students records. Answer the following questions:

	A	B	C	D	E	F	G	H
1	NAMES	ICT/40	ENGLISH/40	MATHS/40	AVERAGE	AVERAGEIF	LARGE	MEDIAN
2	MULISA	34	27	35				
3	MUTONI	25	30	32				
4	KABANDA	39	39	15				
5	KABERA	35	25	17				
6	KAGIRIMPUNDU	37	27	30				
7	MUTONI	25	39	38				
8	MUTETERI	26	36	36				
9	MUTONI	18	25	39				
10								

- Calculate the average for each student?
- Display the largest marks for KABERA?
- Calculate the greatest average marks for Mutoni?
- Calculate the median marks for ICT ?

#### 1.1.4. Text spreadsheet functions

### ACTIVITY 1.4

Mukamana, a human resource manager of a company in Rwanda received a file containing manpower names and phone numbers from one of their branches. Names in the file are not uniformly written and having many columns.

The file has more than 1000 rows (only 4 are shown) and looks like the in **Table 1** while she wants data to be arranged like in **Table 2**

	A	B	C	D	E	F	G
1	First Name	Last Name	MTN number	Tigo number		Names	Phone Number
2	claudine	uwimana	078327215	072327215		UWIMANA Claudine	078327215 or 072327215
3	fabien	Habingarwa	078497251	072327259		HABINGARWA Fabien	078497251 or 072327259
4	ERNEST	rukuNDO	078327179	072321793		RUKUNDO Ernest	078327179 or 072321793
5	GLORIOSE	ISIMBI	078168255	071320455		ISIMBI Gloriose	078168255 or 071320455
6	Table 1					Table 2	

- Discuss what Mukamana will do to arrange data in Table 1 and make it look like the data in Table 2
- Estimate the time required to do this if Table 1 has 1000 rows
- Using functions make the data in Table 1 look like those in Table 2
- For the 1000 rows to be reorganized discuss the amount of time needed compared to the manual method used in question 1

Excel has functions which facilitate an automatic manipulation of text which would take too much time if it was done manually.

For example in the case presented in the activity above if one has to combine data from two rows into one for a total of 1000 rows by copying data from one row and pasting it next to data in the other row and if one can do one row in 2 seconds, the whole exercise would take up to 33 minutes. Considering that some names which are in upper case must be in lower case and some in lower must be in upper which would require rewriting the names the whole exercise can take up to an hour.

That is where Excel ingenuity comes in by providing functions which can allow one to do this in less than one minute. The section below explore the functions that can be used to do such a task

#### a. CHAR

The CHAR function returns the character based on the ASCII value. The CHAR function is a built-in function in Excel that is categorized as a String/Text Function.

**The syntax for the CHAR function is:**

- **CHAR( ascii\_value )**

The ASCII value is used to retrieve the character.

**Example:** Explore how to use the CHAR function as a worksheet function in Microsoft Excel:

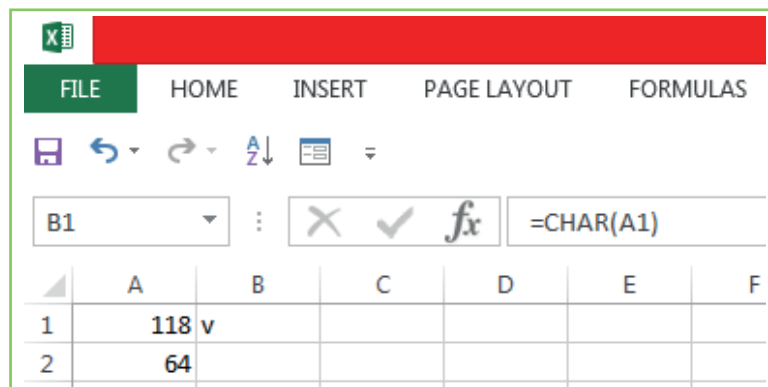


Figure 1.21. Illustration on the use of the CHAR function

Based on the Excel spreadsheet above, the following use of the CHAR function would return:

`=CHAR(A1)` : Gives Result: "v"

`=CHAR(A2)` : Gives Result: "@"

=CHAR(72) : Gives Result: "H"

=CHAR(109) : Gives Result: "m"

### b. CONCATENATE

The CONCATENATE function in Excel is designed to join different pieces of text together or combine values from several cells into one cell.

**The syntax of Excel CONCATENATE is as follows:**

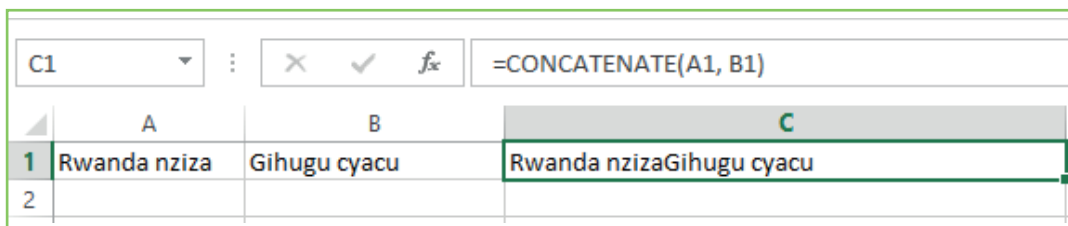
CONCATENATE (text1, [text2], ...)

Where text is a text string, cell reference or formula-driven value.

Below is an example of using the CONCATENATE function in Excel in which data from two cells has been combined.

The simplest CONCATENATE formula to combine the values of cells A1 and B1 is as follows:

=CONCATENATE(A1, B1)



	A	B	C
1	Rwanda nziza	Gihugu cyacu	Rwanda nzizaGihugu cyacu
2			

Figure 1.22. Use of the concatenate function

### c. UPPER

The UPPER function is a built-in function in Excel that is categorized as a *String/Text Function*. It converts a text (String) into uppercase

**Example:**

A1=" better technology for the best future"

=UPPER(A1)

Result: "BETTER TECHNOLOGY FOR THE BEST FUTURE"

### d. LOWER

The LOWER function is used to convert text (String) into small cap text

**Example:** B1="EXCEL SCIENCES THROUGH TECHNOLOGY"

=LOWER (B1)

Result: excel sciences through technology

### APPLICATION ACTIVITY 1.4

1. The text in A1 is KARENZI. The text in A2 is IRASUBIZA. What would be the result of the following formula? =CONCATENATE(A1,A2)
  - a. KARENZIIRASUBIZA
  - b. KARENZI IRASUBIZA
  - c. KARENZI,IRASUBIZA
  - d. KARENZI, IRASUBIZA
  - e. KARENZI ,IRASUBIZA
2. Suppose you want to combine the street address in A1, with the city in A2 and the state in A3. Each component should be separated by a comma. What formula would be best?

## 1.2. Using formula & functions from different sheets

### ACTIVITY 1.5

Suppose that you have a class of 15 students in Year 2 . You have also the marks for those students in three separate sheets where each sheet contains marks for each term

1. Discuss how you can combine the data from the three sheets to make the yearly total

When the workbook has many sheets there is a possibility to get data from one sheet into another by using formula or functions.

#### Example 1:

Consider the example below which are data from two different sheets named Sheet1 and Sheet2. These sheets contain marks for ICT and for Biology. The teacher wants to make totals for each student for the two subjects and keep those totals in a separate sheet "Sheet3"

	A	B	C
1	<b>ICT MARKS</b>		
2	SN	NAMES	ICT/20
3	1	MUCYO	12
4	2	NSHUTI	16
5	3	UWASE	10
6	4	MUTONI	17
7	5	AKIMANA	16
8	6	AKAYEZU	19

Sheet1

	A	B	C
1	<b>BIOLOGY MARKS</b>		
2	SN	NAMES	BIO/20
3	1	MUCYO	8
4	2	NSHUTI	19
5	3	UWASE	18
6	4	MUTONI	11
7	5	AKIMANA	15
8	6	AKAYEZU	13

Sheet2

	A	B	C
1	<b>TOTAL ICT AND BIOLOGY MARKS</b>		
2	SN	NAMES	TOT
3	1	MUCYO	20
4	2	NSHUTI	35
5	3	UWASE	28
6	4	MUTONI	28
7	5	AKIMANA	31
8	6	AKAYEZU	32

Sheet3 containing totals for the two subjects for each student

Figure 1.23. Different Excel sheets where data from two sheets has been added

To achieve this go to the table in Sheet3 where totals of data from the two sheets has to be done then in the TOT column cell C3 write the formula to use which is **=Sheet1!C3+Sheet2!C3**

Meaning that data from cell C3 of Sheet1 is added to data from cell C3 of sheet2

You can do this by writing formula from scratch or by:

- Writing the equal sign in the cell where total is to be written
- Going to the cell containing the first data to be added and selecting it
- Writing the + sign
- Selecting second data to be added by going to the sheet containing that data and selecting the right cell and lastly hitting enter

The formulas used to calculate the totals for the example above are in the image below:

	A	B	C
1	<b>TOTAL ICT AND BIOLOGY MARKS</b>		
2	SN	NAMES	TOT
3	1	MUCYO	=Sheet1!C3+Sheet2!C3
4	2	NSHUTI	=Sheet1!C4+Sheet2!C4
5	3	UWASE	=Sheet1!C5+Sheet2!C5
6	4	MUTONI	=Sheet1!C6+Sheet2!C6
7	5	AKIMANA	=Sheet1!C7+Sheet2!C7
8	6	AKAYEZU	=Sheet1!C8+Sheet2!C8

Figure 1.24. Formula used to calculate totals in sheet3

### Example 2:

Consider another example in which two sheets Sheet1 and Sheet2 contains data (score) on different subjects. The average of marks contained in the two sheets is going to be calculated and kept in Sheet1. The formula used is **=AVERAGE(C2:C10,Sheet2!C2:C10)**

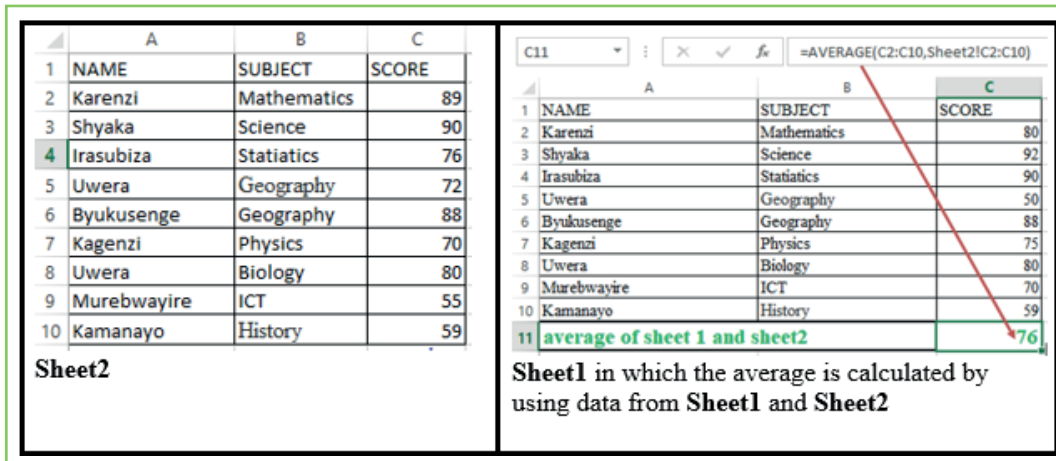


Figure 1.25. Calculating the average by using data from two sheets

## APPLICATION ACTIVITY 1.5

Consider the screenshots of excel tables containing data from the three sheets Sheet1, Sheet2 and Sheet3

Sheet1					
Names	English/25	Kinyarwanda/25	Mathematics/25	total	average
Mbabazi	12	23	25		
Karenzi	20	12	19		
Uwizeyimana	21	22	23		
irasubiza	25	12	18		
Mukashyaka	17	17	18		
Dusabimana	19	19	19		
Kagenzi	20	12	12		

Sheet2						Sheet3					
Names	English/25	Kinyarwanda	Mathematics	total	average	Names	English/25	Kinyarwanda	Mathematics	total3	average3
Mbabazi	13	23	17			Mbabazi	11	11	17		
Karenzi	19	18	19			Karenzi	20	20	19		
Uwizeyimana	24	12	19			Uwizeyimana	24	12	12		
irasubiza	22	12	21			irasubiza	12	11	11		
Mukashyaka	20	20	18			Mukashyaka	15	15	15		
Dusabimana	16	17	18			Dusabimana	15	15	15		
Kagenzi	21	10	10			Kagenzi	21	10	10		

- Calculate the total and average of every student per sheet
- Calculate the total1, total 2 and total 3 into total 3 of the third sheet
- Calculate the average1, average 2 and average 3 into average 3 of the third sheet

## 1.3. Protecting worksheet style, contents and elements

### ACTIVITY 1.6

At the end of the school year, GS Kamucyo teachers receive student reports so that they may fill in marks for the third term, do totals and average for the whole year. However the head teacher fears that teachers may mistakenly change even marks for Term I and Term II

- a. Which advice would you give to the head teacher on what to do in order to avoid this?
- b. If this advice is adopted, teachers won't be able to edit term I and II. What can be done to allow them to do it if it is found necessary?

#### 1.3.1. Protecting & unprotecting worksheet;

Worksheet protection is to prevent other users from accidentally or deliberately changing, moving, or deleting data in a worksheet, you can lock the cells on your Excel worksheet and then protect the sheet with a password.

With worksheet protection, you can make only certain parts of the sheet editable and users will not be able to modify data in any other region in the sheet.

#### Rules to follow for protecting worksheets with strong protection

- a. Protect your sheets with strong passwords that include different types of alpha numeric characters and special symbols. At that, try to make passwords as random as possible
- b. Protect the workbook structure to prevent other people from adding, moving, renaming or deleting the sheets.
- c. For workbook-level security, encrypt the workbook with different passwords from opening and modifying.
- d. If possible, store your Excel files with sensitive information in a secure location, e.g. on an encrypted hard drive.

**To protect a sheet in Excel 2016, 2013 and 2010, perform the following steps.**

- a. Under the **Review tab** click on **Protect Sheet**.
- b. Type the password and click on **Ok**
- c. Reenter password and click on **Ok**

When a sheet is protected, anyone will be able to read data but will not be able to modify it and once data in that sheet is modified this message below will be displayed

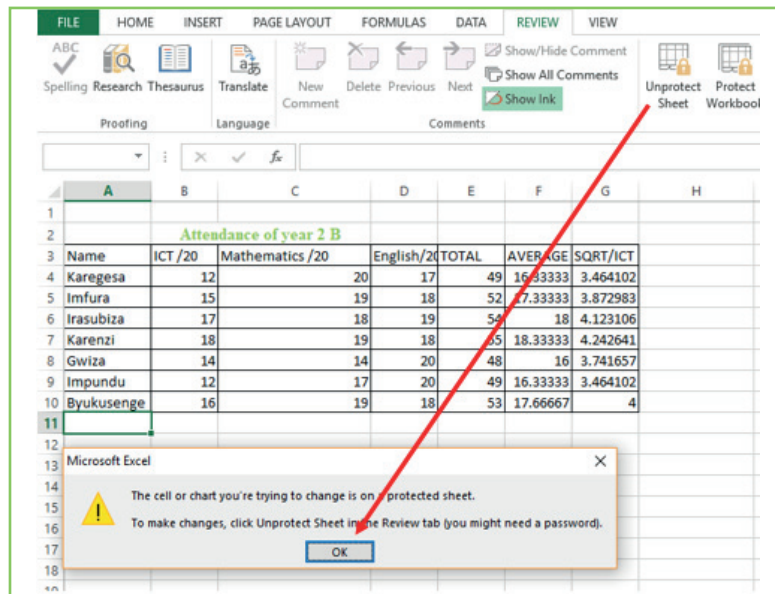


Figure 1.26 Unprotect a sheet

### 1.3.2. Lock & unlock cells, style, contents and other elements

#### a. How to Lock Cells for Editing and Protect Formulas

When a sheet is shared while some sheet cells must not be modified some rules have to be set so that data can be modified by anyone who wants it but not modified by someone who does not have the right to do so. In the table below a list of products will be sent to the customers. Customers will be able to modify some product records.

	A	B	C	D	E
1					
2					
3			HOLLY CITY TECHNOLOGY		
4			Muhanga district		
5			Nyamabuye Sector		
7		Product name	Price	transport	date
8		Laptop	320000	3000	12th/5/2018
9		Flash Dist	4000	100	12th/6/2017
10		Modem	35000	50	5th/10/2019
11		switch	70000	200	13th/6/2016
12		Network Cable	50000	50000	30th/3/2018
13		Adaptors	13000	50	3th/8/2019
14					
15					

Figure 1.27 Table illustrates locked and unlocked cells

The great news is that you can lock cell, or a whole range of cells, to keep your work protected. Here's how to prevent users from changing some cells.

Type a password in the corresponding field.

Be sure to remember the password or store it in a safe location because you will need it later to unprotect the sheet.

### Select locked cells .

If only these two options are selected, the users of your sheet, including yourself, will be able only to select cells (both locked and unlocked).

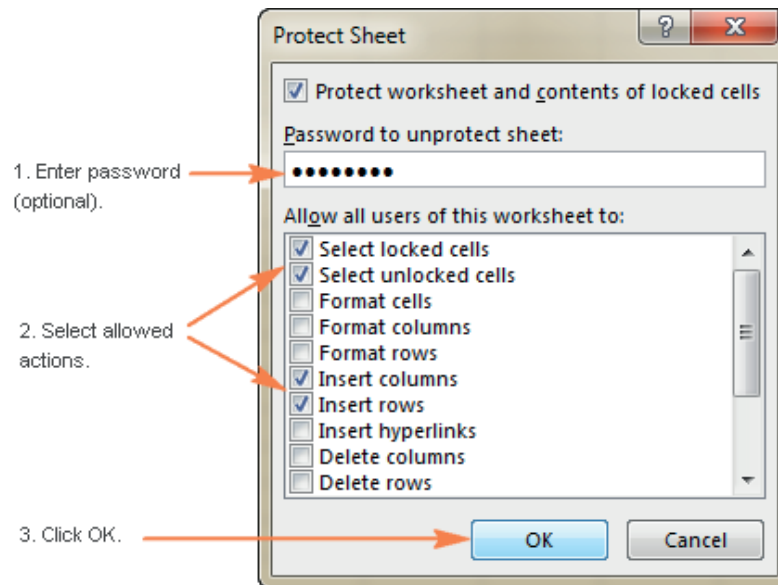


Figure 1.28 Options to choose for protecting a sheet

If the worksheet protection is nothing more than a precaution against accidental modification of the sheet contents by yourself or by the members of your local team, you may not want to bother about memorizing the password and **leave the password field empty**

**Select the actions** you allow the users to perform.

#### b. How to unprotect Excel sheet with password

To lock only specific cells and ranges in a protected worksheet

Follow these steps:

1. Select the cells you want to lock.
2. On the **Home** tab, in the **Alignment** group, click the small arrow to open the **Format Cells** popup window.
3. On the **Protection** tab, select the **Locked** check box, and then click **OK** to close the popup.
4. Right-click the sheet tab, and select **Unprotect Sheet** from the context menu.

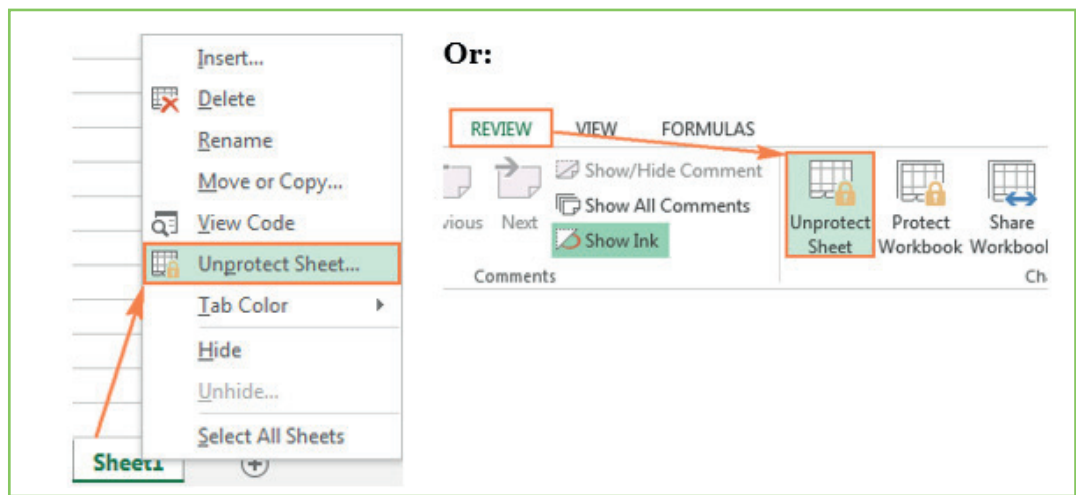


Figure 1.29 Unprotect sheet

On the *Review* tab, in the *Changes* group, click **Unprotect Sheet**.

- On the *Home* tab, in the *Cells* group, click *Format*, and select **Unprotect Sheet** from the drop-down menu.

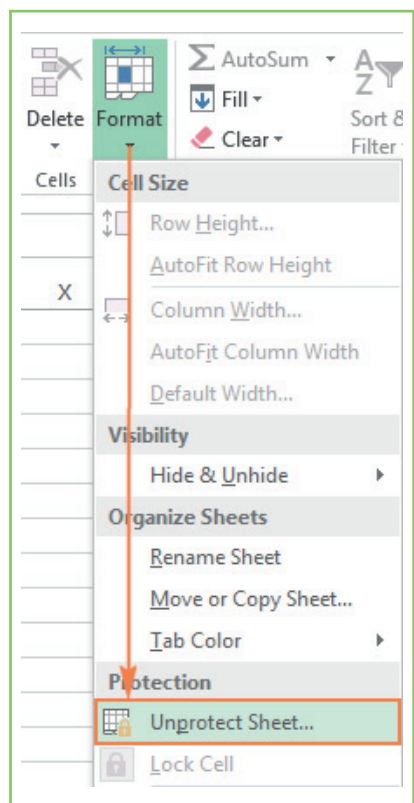


Figure 1.30. Unprotect sheet second method

## APPLICATION ACTIVITY 1.6

Name	Age	School	Marks
Kalisa	12	G.S Mushubati	70
Gatete	15	G.s MWENDO	73
Kamana	20	ESC.RUHANGO	70
Tumushime	17	TTC MUHANGA	73

By considering the table above

1. Explain how the table can be protected?
2. Using MS Excel, protect marks and names columns?
3. What is the role of protecting a document?

## 1.4. Data validation

### ACTIVITY 1.7

Trinity High school committee needs to record the parents' ID of their students and every ID has 16 digits.

Discuss about how committee will fix the numbers of digits

- a) Discuss the message that will be appeared in case the entered records is not valid

**Excel Data Validation** is a feature that restricts (validates) user input to a worksheet. Technically, you create a validation rule that controls what kind of data can be entered into a certain cell.

Here are just a few examples of what Excel's data validation can do:

- Allow only numeric or text values in a cell.
- Allow only numbers within a specified range.
- Allow data entries of a specific length.
- Restrict dates and times outside a given time frame.
- Restrict entries to a selection from a drop-down list.
- Validate an entry based on another cell.
- Show an input message when the user selects a cell.
- Show a warning message when incorrect data has been entered.
- Find incorrect entries in validated cells.

For instance, you can set up a rule that limits data entry to 4-digit numbers between 1000 and 9999. If the user types something different, Excel will show an error alert explaining what they have done wrong. The window below shows a warning message that appears when data outside of the range (1000-9999) is entered.

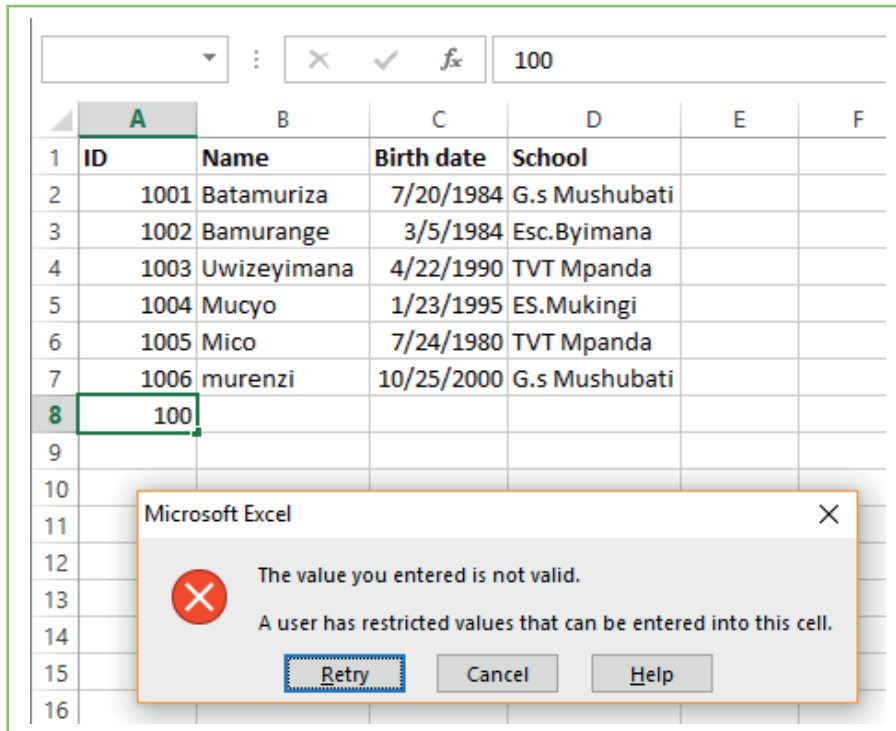


Figure 1.31 Data validation

### How to do data validation in Excel

1. Select the cell(s) you want to create a rule for.
2. Select **Data >Data Validation**.

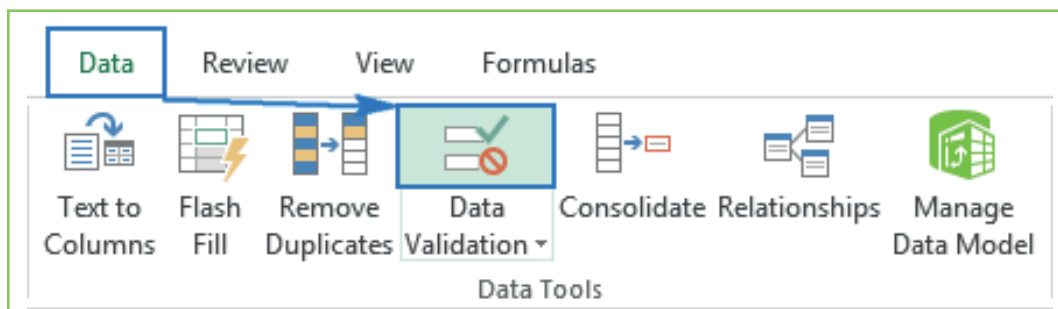


Figure 1.32 Data validation

3. On the **Settings** tab, under **Allow**, select an option.

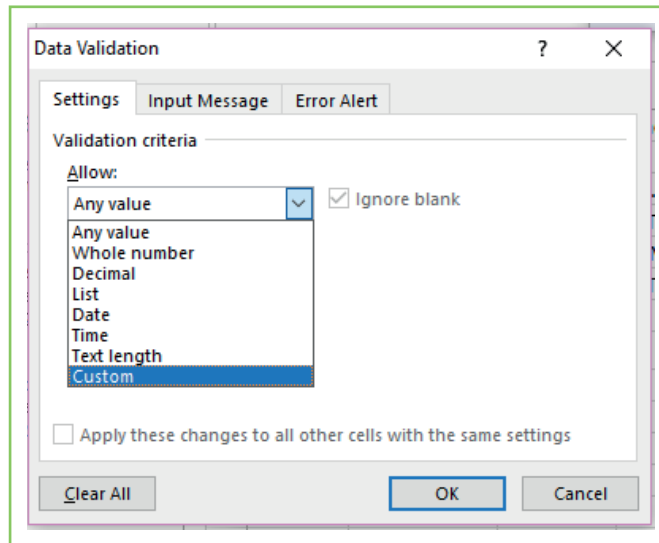


Figure 1. 33 Customize data

4. Under **Data**, select a condition:

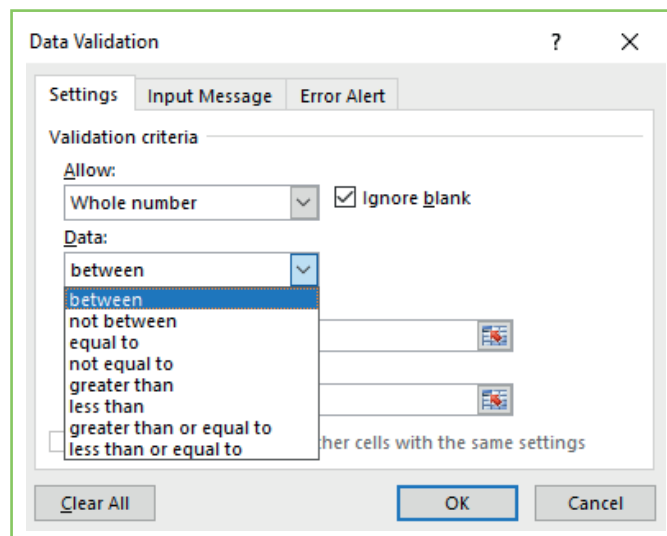


Figure 1. 34 condition of selecting range of numbers

5. On the **Settings** tab, under **Allow**, select an option:
6. Set the other required values, based on what you chose for **Allow** and **Data**. For example, if you select **between**, then select the **Minimum:** and **maximum:** values for the cell(s).
7. Select the **Ignore blank** checkbox if you want to ignore blank spaces.
8. If you want to add a **Title** and message for your rule, select the **Input Message** tab, and then type a title and input message.

9. Select the **Show input message when cell is selected** checkbox to display the message when the user selects or hovers over the selected cell(s).
10. Select OK.

As an example, let's make a rule that restricts users to entering a whole number between 1000 and 9999:

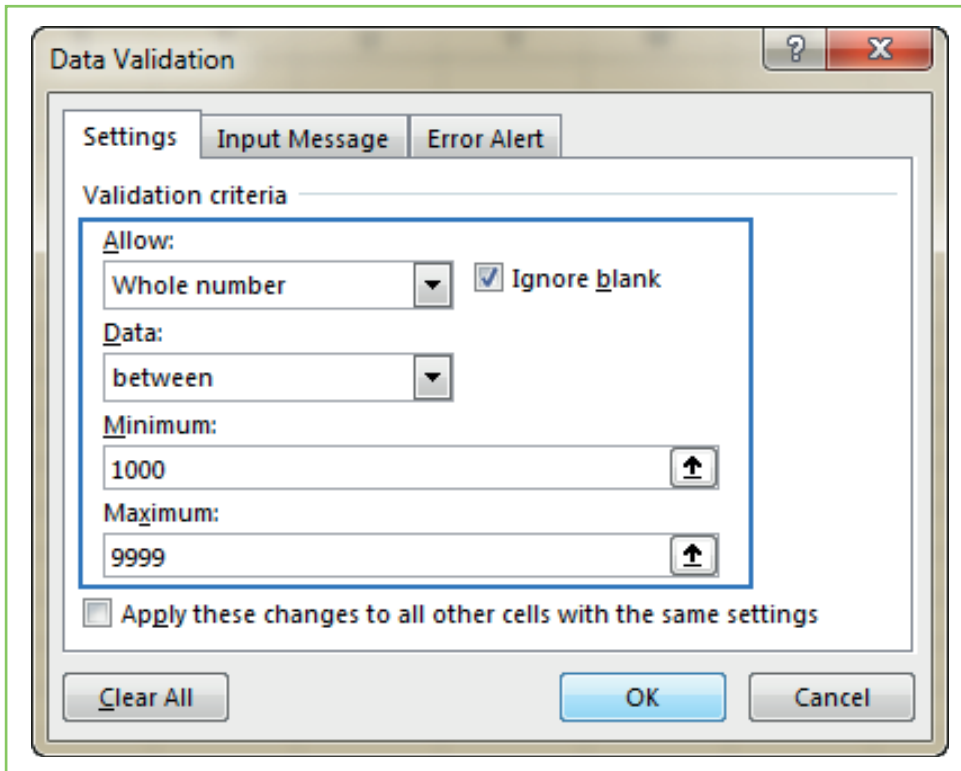


Figure 1.35 range number between 1000 to 9999

With the validation rule configured, either click *OK* to close the *Data Validation* window or switch to another tab to add an input message or/and error alert.

### 3. Add an input message (optional)

If you want to display a message that explains to the user what data is allowed in a given cell, open the *Input Message* tab and do the following:

- Make sure the Show input message when cell is selected box is checked.
- Enter the title and text of your message into the corresponding fields.
- Click OK to close the dialog window.

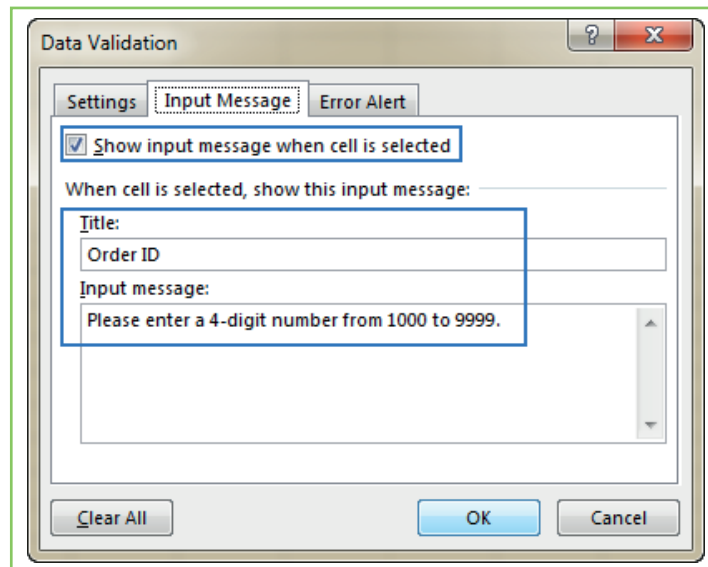


Figure 1.36 Input Message

As soon as the user selects the validated cell, the following message will show up:

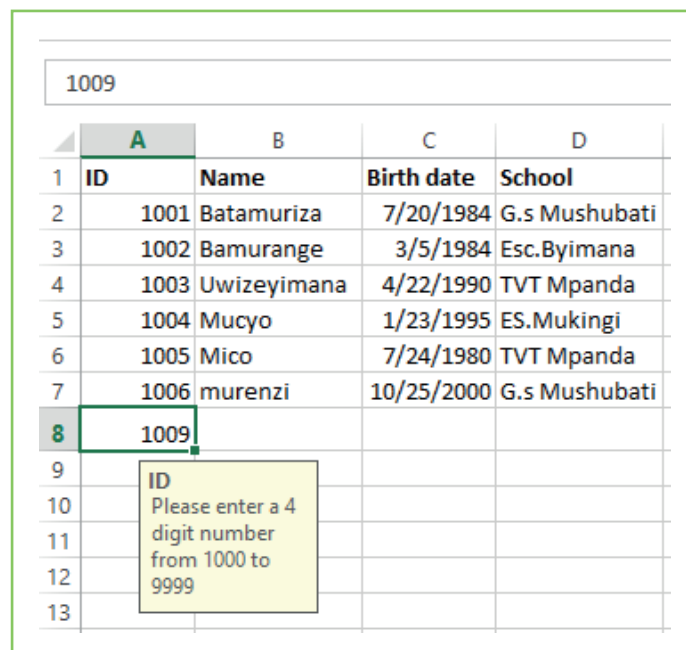


Figure 1.37. Message Box displayed

#### 4. Display an error alert (optional)

To configure a custom error message, go to the *Error Alert* tab and define the following parameters:

- Check the Show error alert after invalid data is entered box (usually selected by default).
- In the Style box, select the desired alert type.
- Enter the title and text of the error message into the corresponding boxes.
- Click OK.

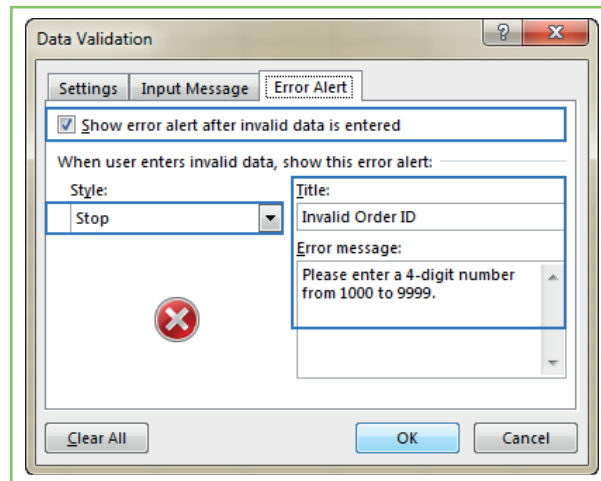


Figure 1.38. Error Alert

## APPLICATION ACTIVITY 1.7

1. Define the following Terms:
  - a. Data validation
  - b. Input message
  - c. error Alert
2. What is the benefit of validating a document?
3. Analyze the table below and Apply **an input message to IdNumber**

IdNumber	District		
1001	Names	District	Salary
1002	Mutesi	Ruhango	80000
1003	Abayo	Muhanga	120000
1004	Murenzi	Nyagatare	105000
1005	Mutabazi	Rutsiro	300000
1006	Umubyeyi	Huye	82000

4. Validate column IdNumber so that the entered number must be between 1000 and 7777

## 1.5. Using other Excel templates

### ACTIVITY 1.8

In the scenario below discuss the excel template to be used:

1. ICT Club members are trying to make a school calendar
2. Mbabazi, a Math teacher at Lycee de Nyanza wants to request for a loan of five million (5,000,000) from Umwalimu Sacco. The loan will be paid at the 11% interest rate in five years (5). The starting period of payment is 25/05/2019. Do the followings :
  - a. By using loan amortization template, find out the last date of payment, number of months and years of payment.
  - b. What is the total interest to pay for this loan?

Microsoft Excel templates are a powerful part of Excel experience and a great way to save time. Excel templates can also help you create consistent and attractive documents that will impress your colleagues or supervisors.

Templates are especially valuable for frequently used document types such as Excel calendars, budget planners, invoices, inventories and dashboards.

#### **a. Creating a workbook from an existing Excel template**

Instead of starting with a blank sheet, you can quickly create a new workbook based on an Excel template. The right template can really simplify your life since it makes the most of tricky formulas, sophisticated styles and other features of Microsoft Excel that you might not be even familiar with.

To make a new workbook based on an existing Excel template, perform the following steps.

- Switch to the *File* tab
- Click *New*

Templates provided by Microsoft displayed.

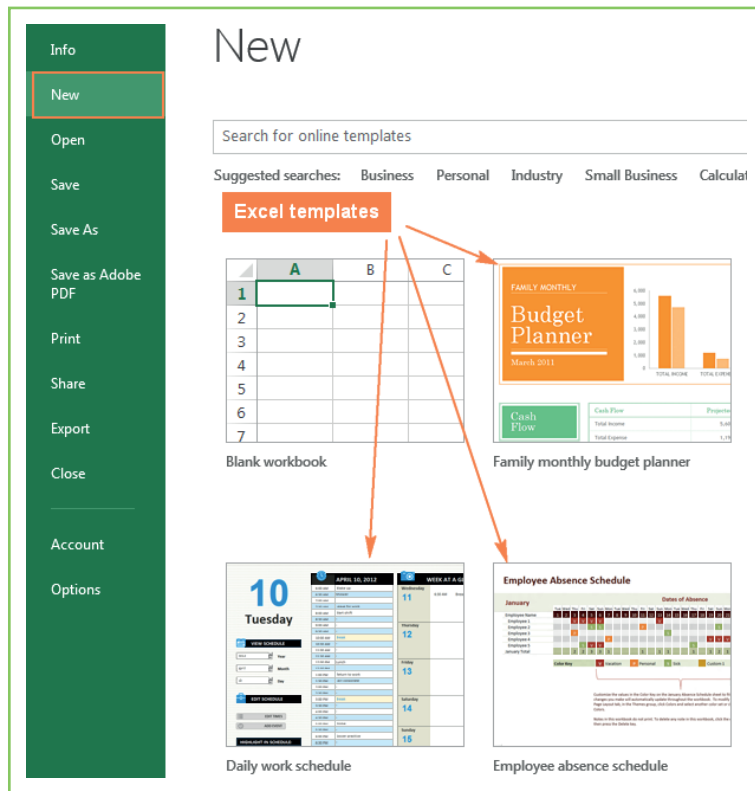


Figure 1.39. Different Excel template

1. To preview a certain template, simply click on it. A preview of the selected template will show up along with the publisher's name and additional details on how to use the template.
2. If you like the template's preview, click the **Create** button to download it. For example, I've chosen a nice mini calendar template for Excel:

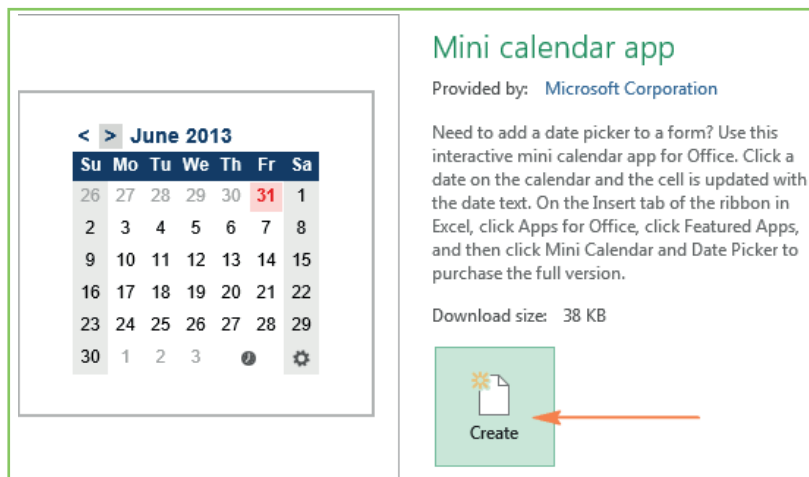


Figure 1.40. Creating a calendar by using the Mini calendar template app

That's it - the selected template is downloaded and a new workbook is created based on this template right away.

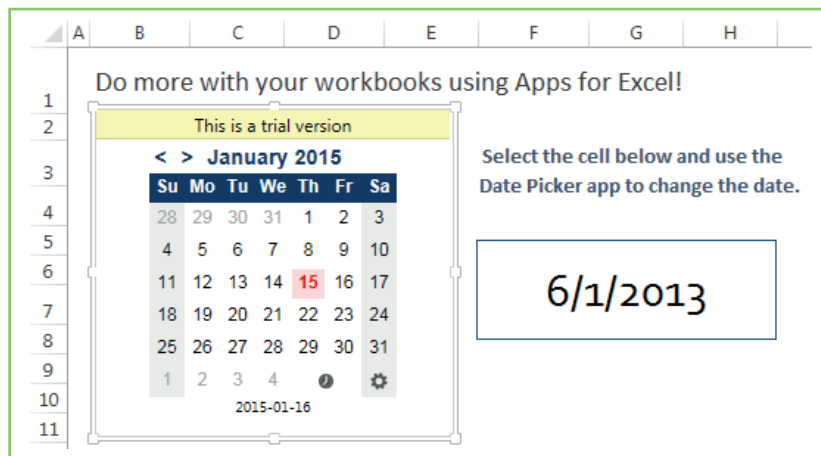


Figure 1.41. Calendar creation using excel templates

### b. Finding more templates

To get a bigger selection of templates for your Excel, type a corresponding keyword in the search bar:

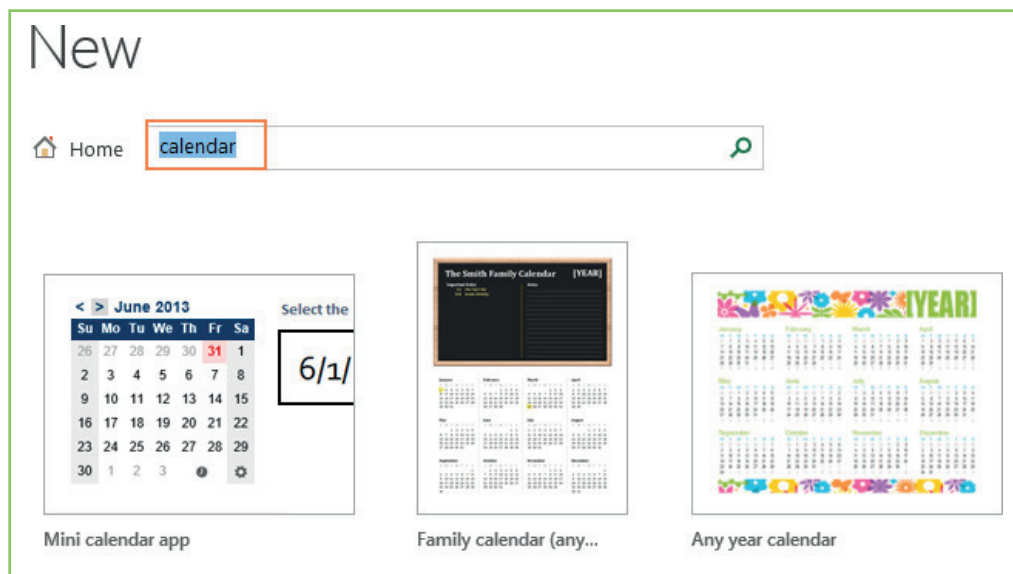


Figure 1.42. Different format of calendar

If you are looking for something specific, you can browse available Microsoft Excel templates by category. For example, see how many different calendar templates you can choose from:

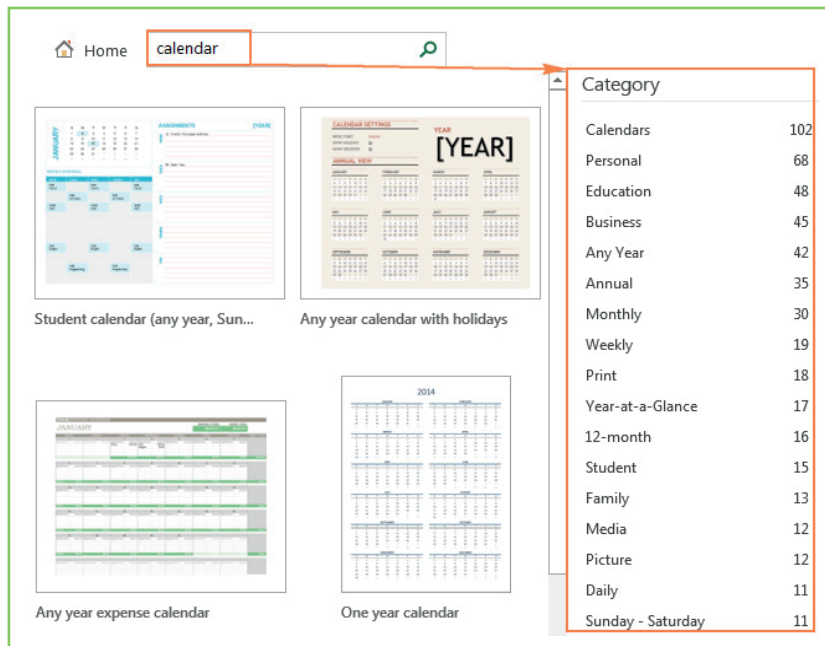


Figure 1.43. Format of Year calendar

**Note.** When you are searching for a certain template, Microsoft Excel displays all relevant templates that are available on the Office Store.

### c. Making a custom Excel template

Making your own templates in Excel is easy. You start by creating a workbook in the usual way, and the most challenging part is to make it look exactly the way you want. It is definitely worth investing some time and effort both in the design and contents, because all formatting, styles, text and graphics you use in the workbook will appear on all new workbooks based on this template.

In an Excel template, you can use save the following settings:

- The number and type of sheets
- Cell styles and formats
- Page layout and print areas for each sheet
- Hidden areas to make certain sheets, rows, columns or cells invisible
- Protected areas to prevent changes in certain cells
- Text that you want to appear in all workbooks created based on a given template, such as column labels or page headers
- Formulas, hyperlinks, charts, images and other graphics
- Excel Data validation options such as drop-down lists, validation messages or alerts, etc.
- Calculation options and window view options.

- Macros and ActiveX controls on custom forms

**Note:** Once you've created the workbook, you just need to save it as a .xlt or .xltx file (depending on which Excel version you use) instead of usual .xls or .xlsx.

If you need the detailed steps, here you go:

- In Excel 2013, click *File*
- In the *Save As* dialogue, in the File name box, type a template name.
- Under *Save as type*, select **Excel Template (\*.xltx)** if you are using Excel 2013, 2010 or 2007. In earlier Excel versions, select **Excel 97-2003 Template (\*.xlt)**.

If your workbook contains a macro, then choose Excel **Macro-Enabled Template (\*.xlsm)**.

When you select one of the above template types, the file extension in the *File Name* field changes to the corresponding extension.

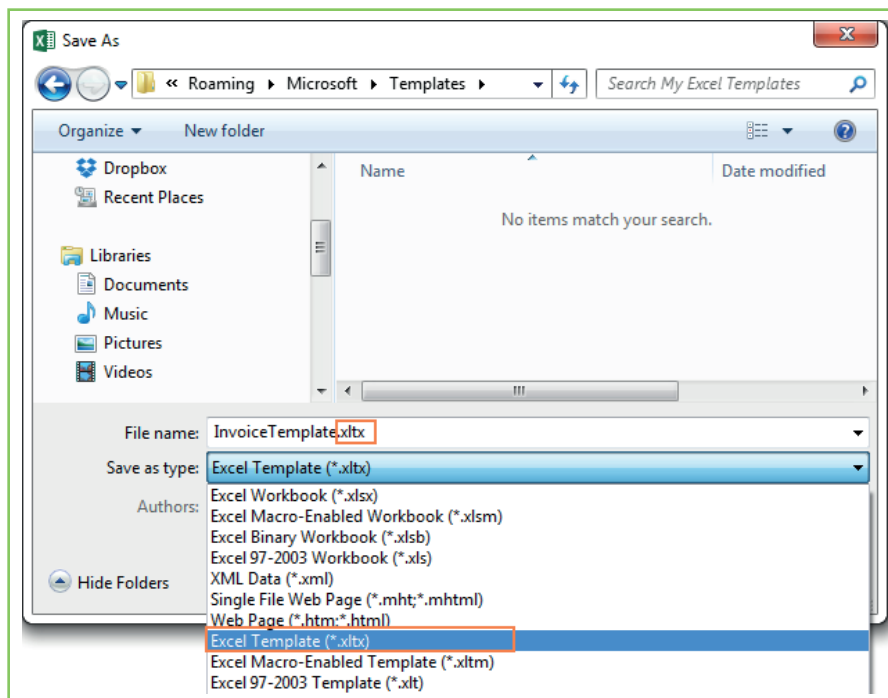


Figure 1.44. Dialogue box for saving a template

1. Click the *Save* button to save your newly created Excel template.

#### Where to download Excel templates

As you probably know, the best place to look for Excel templates is Office.com. Here you can find a great lot of free Excel templates grouped by different categories such as calendar templates, budget templates, invoices, timelines, inventory templates, project management templates and much more.

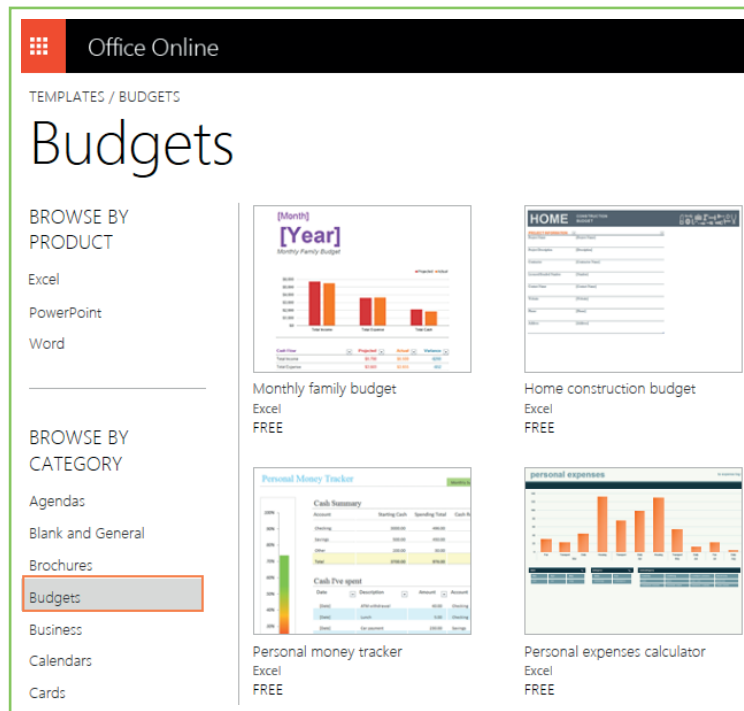


Figure 1.45. Download a template

To download a particular Excel template, simply click on it. This will display a brief description of the template as well as the *Open in Excel Online* button.

### APPLICATION ACTIVITY 1.8

1. Define the following Terms:
  - a. Microsoft Excel template
  - b. Business
  - c. Calendars
2. Design your personal Card using Microsoft Excel template (be specific)
3. You want to request a loan in BK
  - a. Using Loan Amortization template calculate the monthly payment
  - b. In which year will you finish paying?
  - c. Calculate the total interest to pay
  - d. If you get more means and you want to pay one year before the end of your contractual payment how much money will you save on unpaid interest

## END UNIT ASSESSMENT

i. Complete the table below

Names	Set	Maths	Averageif	Sqrt /set	Base/Maths
Kalisa	12	18			
KAMANA	18	17			
MUTONI	16	13			
MURENZI	10	20			

1. Calculate the averageif, Sqrt/set, Base/Math
  2. Convert KAMANA, MUTONI and MERENZI into lower case
  3. Concatenate Kalisa and MURENZI in a cell D:10
  4. Before saving a sheet in a folder created on desktop protect a sheet with a password.
- ii. Discuss Microsoft excel template
- iii. Create a school calendar using Microsoft template

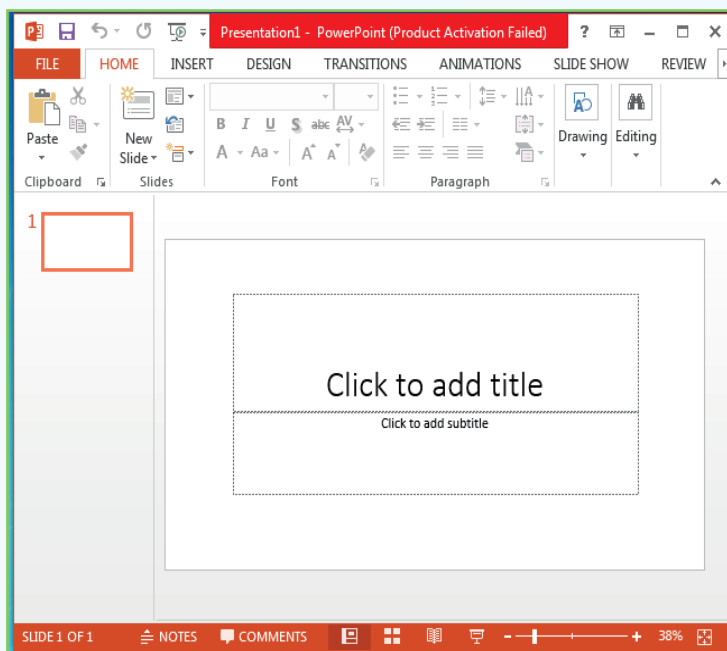
# UNIT 2

## ADVANCED POWER POINT PRESENTATION

**Key Unit competence:** Create a power point presentation to address a bigger audience

### 2.0 INTRODUCTORY ACTIVITY

Observe the image below: and answer related questions



**Answer the two question below and do what is requested in question 3**

1. What is the application program that is opened in the projection
2. What is the use of the opened program mentioned above
3. Connect a projector to your computer and present your work

## 2.1. Create and manage presentations

### 2.1.1. Creating, copying and inserting slides

#### ACTIVITY 2.1

1. Discuss elements that make a Good Presentation?
2. Create a PowerPoint presentation on “Good Money Habits” having two slides. Save the presentation on the desktop of your computer as “Good Money Habits”

**A presentation** is an organized report or message prepared as a talk before an audience, with the help of a computer program.

A presentation software is a program used to create slide shows for presentation on screen to an audience. Example of programs/software which can be used to create presentations are the following:

- Harvard Graphics,
- Corel Presentations,
- Lotus Freelance Graphics
- Microsoft PowerPoint

The role of Presentation applications is to help the presenter convey the message easily.

Microsoft PowerPoint is presentation software commonly used when planning to give a talk as a presentation. The purpose of the talk may be to inform, create awareness, present strategies or to sell a product or service.

A PowerPoint presentation is made by slides and it can be done on computer screen if the audience is very small and if the audience is large the computer can be connected to a projector that projects the image onto a large screen or a wall.

#### 2.1.1.a. Starting PowerPoint Presentation

To start Microsoft PowerPoint 2013 go through these steps:

- Click to the start icon
- Select and click on PowerPoint 2013 located on the startup menu
- Click on one of the PowerPoint templates. Here click on **Blank Presentation**. The PowerPoint screen appears as in the image below:

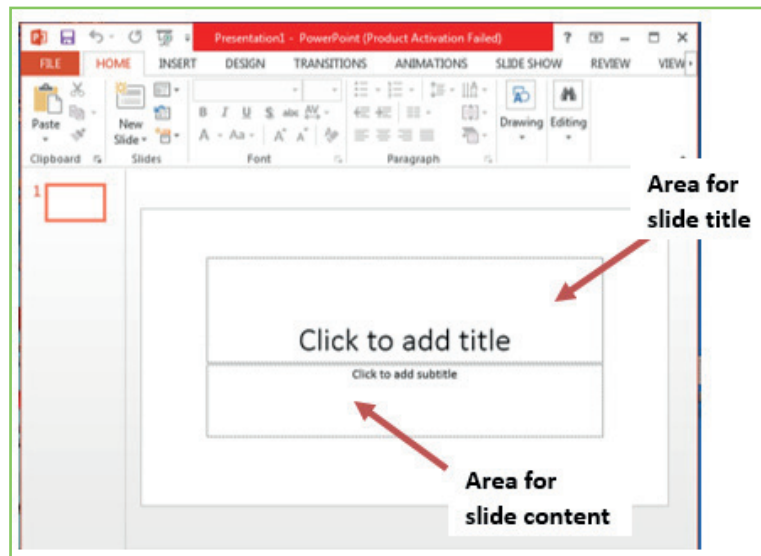


Figure 2. 1. First slide of a PowerPoint presentation

In the new slide write the slide title and write the content in the appropriate zone. Resize the writing zones accordingly to make the title area small and the content area bigger.

### 2.1.1.b Creating and inserting a slide in a presentation

The opened PowerPoint presentation has now one slide and each slide has to have its title set and have the content. Once this is finished a need to have more slides may arise. To create a slide in an existing presentation click on the **Insert** tab then click on **New Slide** then choose the slide theme to apply.

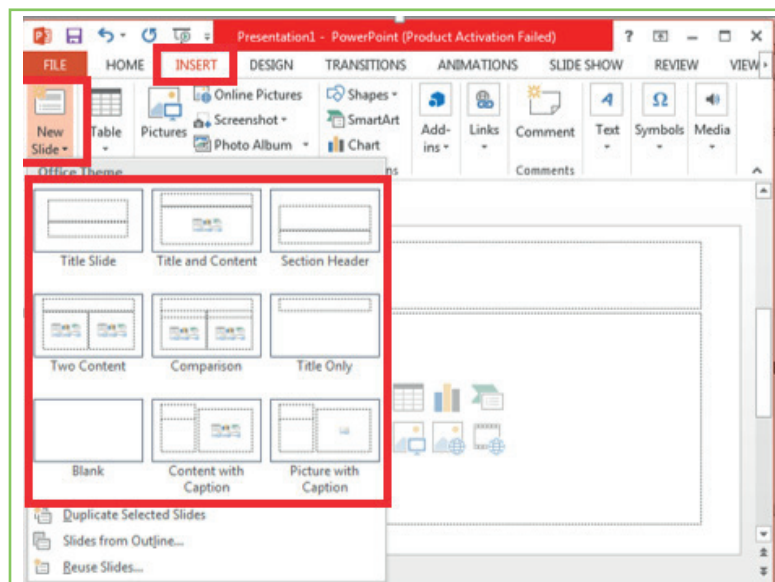



Figure 2. 2. Window illustrating the steps for inserting a new slide

A new slide can also be inserted by selecting the slide behind which a new one is to be inserted and hitting the **Enter key**.

The created presentation will be saved by clicking on the Save icon  then choose the location where to save and specifying the name of the presentation.

### 2.1.1.c. Copying a slide

A slide can be copied in the same presentation or copied to a new presentation in order to avoid rewriting that presentation from scratch. To copy a slide do the following:

- Open the presentation containing the slide to copy
- In the left pane outlining the slides select the slide to copy
- Do a Right click and click on copy
- In the left pan click in the location where to put the copied slide so as to have a red line and do a right click and click **Paste**

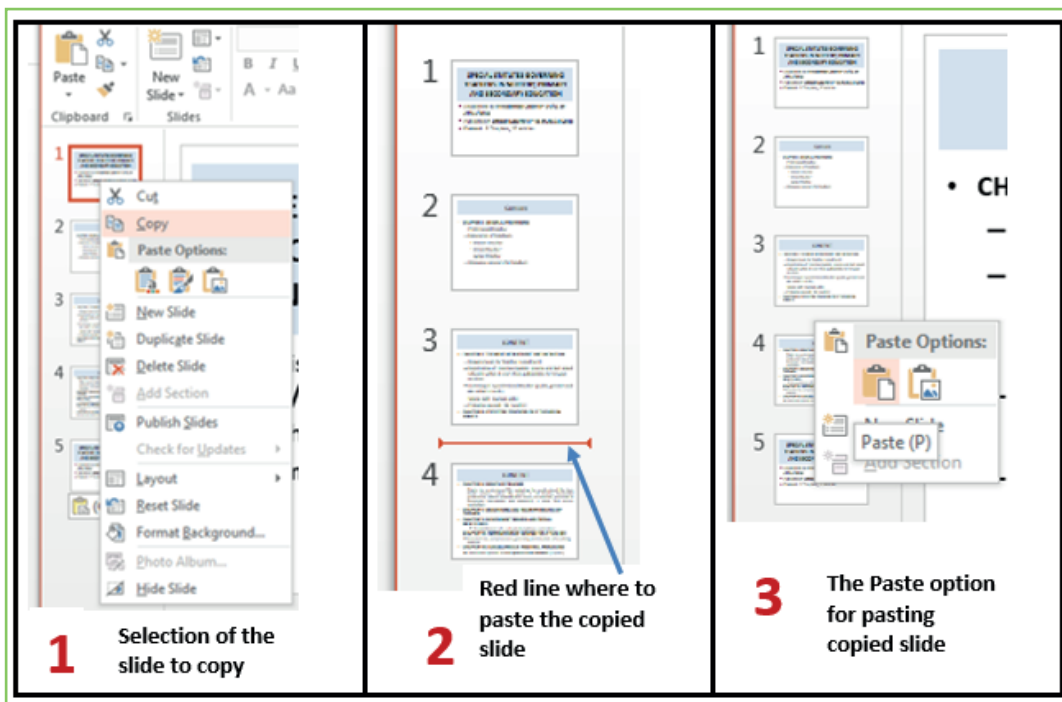


Figure 2. 3. Images illustrating selection of a slide to copy, location and paste options

## APPLICATION ACTIVITY 2.1

1. Create a PowerPoint presentation on any topic of your choice in Psychology
2. Using a computer connected to the projector present the created presentation to the class
3. Discuss the difference between presentation using ICT tools to normal presentation using paper notes

### 2.1.2. Managing slides

## ACTIVITY 2.2

Create a PowerPoint presentation of not less than 10 slides. The title of the presentation is "the importance of ICT in Education"

### Instruction:

Hide two last slides of the above presentation

Once the slides are created, one needs to know how to manipulate them by hiding some slides, moving in slides, rearrange slides, delete some slides, dividing slides into sections, etc.

#### a. Hiding a slide

When a slide is not currently needed it can be hidden by selecting it then doing a Right click and clicking on **Hide Slide**. The hidden slide will continue to appear in the slide pane and can be opened by double clicking it but it won't appear if the presentation is opened in the Slide Show mode. To unhide the hidden slide go through the same process.

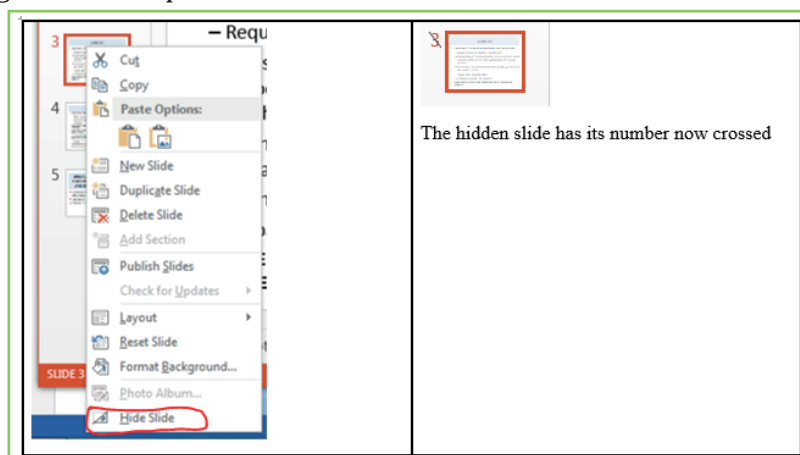


Figure 2. 4. Options gone through in hiding a slide

### **b. Moving in slides**

A slide that will be displayed on the computer screen or on the projector is the one which is selected.

In the Normal view to move from one slide to another use the **Arrow keys** found on the keyboard. The **Up key** will move to the previous slide while the **Down key** will move to the next slide. One can go to any slide without needing to serially go through all slides by just clicking the slide to go to.

In the Slide Show view also use the same keys but not that the Escape Key can be used to end the presentation in the Slide Show View mode and switch to the **Normal view**. Once the last slide is reached hitting the **Down key** will switch to the Normal View.

### **c. Rearranging slides**

Slides are not stationary, they can be moved and rearranged making for example the first slide be the third. To rearrange slides select the slide, hold down the left button and move the slide by moving the mouse up or down.

### **d. Deleting slides**

A slide that is no longer needed can be completely deleted by selecting it and hitting the **Delete key** or selecting that slide, doing a Right click and clicking on **Delete Slide**.

### **e. Dividing slides into sections**

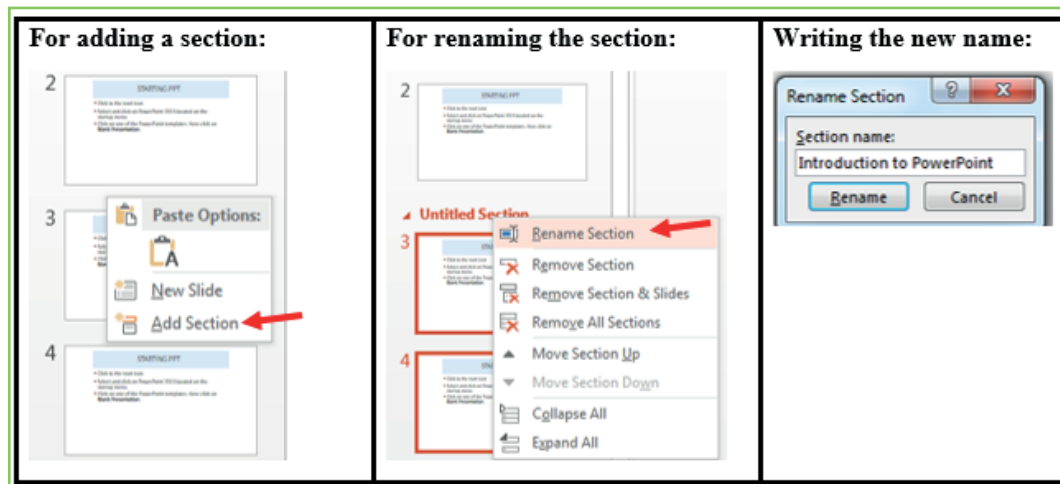
Sections are subdivisions in a PowerPoint presentation slides used preferably for bigger presentations that can be logically grouped. Slides in the same group should be logically related so as to facilitate their understanding during presentation or while reading them.

Putting slides into sections can also be done when slides are to be presented by different people thus each person presents his/her section.

- **Creating a section**

To create a section in a PowerPoint presentation do the following:

1. Select in between the slides where to insert the section or the slide behind which to insert the section
2. Do a right click and click on **Add Section** in the provided options
3. Rename the section by selecting it and clicking on **Rename**. The default name of a section is **Untitled Section**.
4. Write the new name and click **Rename**



A created section can be removed by selecting it, doing a right click and choosing **Remove Section**. It can be moved by choosing the **Move Section Up** or **Move Section Down** option.

## APPLICATION ACTIVITY 2.2

1. Create a PowerPoint presentation on ICT in Education with 3 distinct sections in the presentation where each section is about the following:
  - a. Benefits of ICT in Education
  - b. Learning environment
  - c. Role of ICT in bringing about changes in learning

### 2.1.3. Apply Design themes and format background

#### ACTIVITY 2.3

Discuss tips you can use make effective and more attractive for the PowerPoint presentations

##### a. Design theme

PowerPoint provides a variety of design themes which are predefined colors, fonts and visuals that can be applied to slides to make them have a beautiful look without doing a lot of formatting work.

The Themes gallery can be reached by clicking the **DESIGN** tab and themes will immediately be viewed.

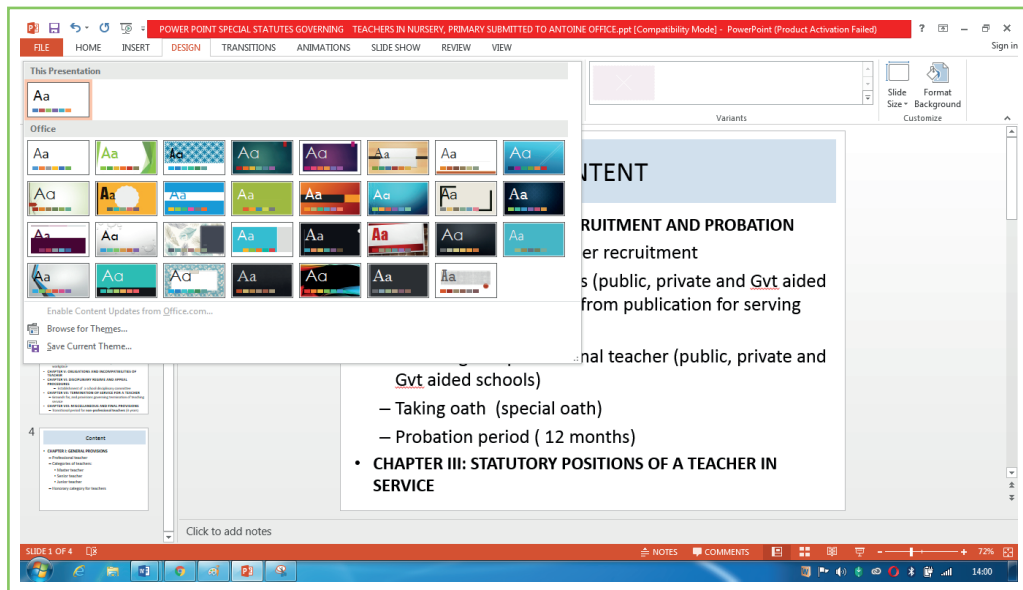


Figure 2. 5. Some of PowerPoint 2013 Design Themes

To apply a given theme to a presentation just open that presentation and select the desired Theme. In the image below the Theme “Facet” has been applied.

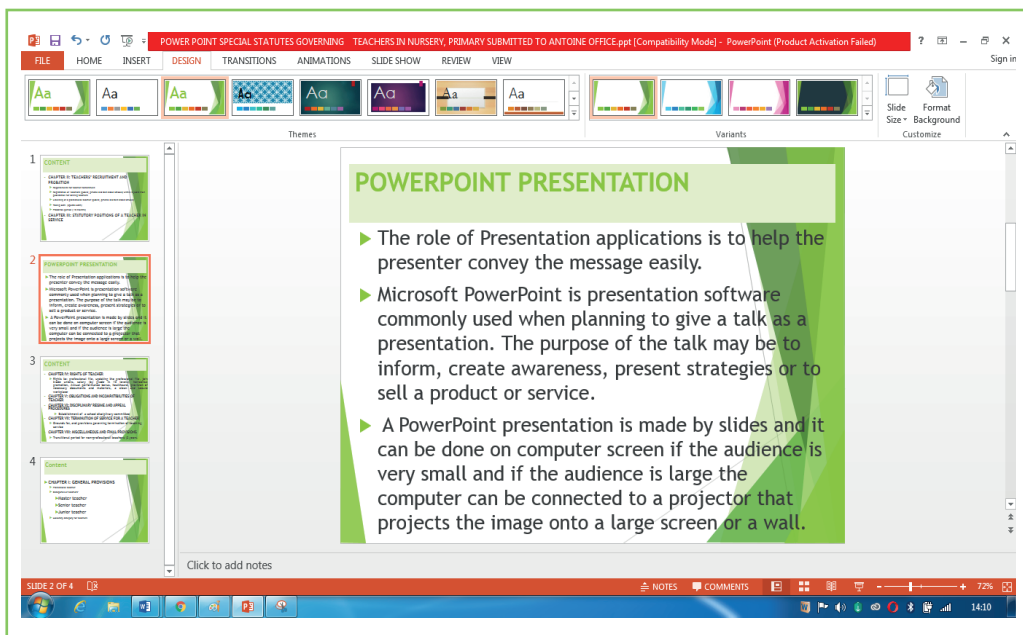


Figure 2. 6. A PowerPoint presentation in which “Facet” theme has been applied

### b. Format background

A background is an object which can be just a color, an image behind whatever text, charts, images in a PowerPoint presentation.

To set a presentation's background follow these steps:

- Open the presentation for which the background is to be set
- Under the **DESIGN** tab Click on **Format Background**
- Choose one of the provided options and customize those options accordingly

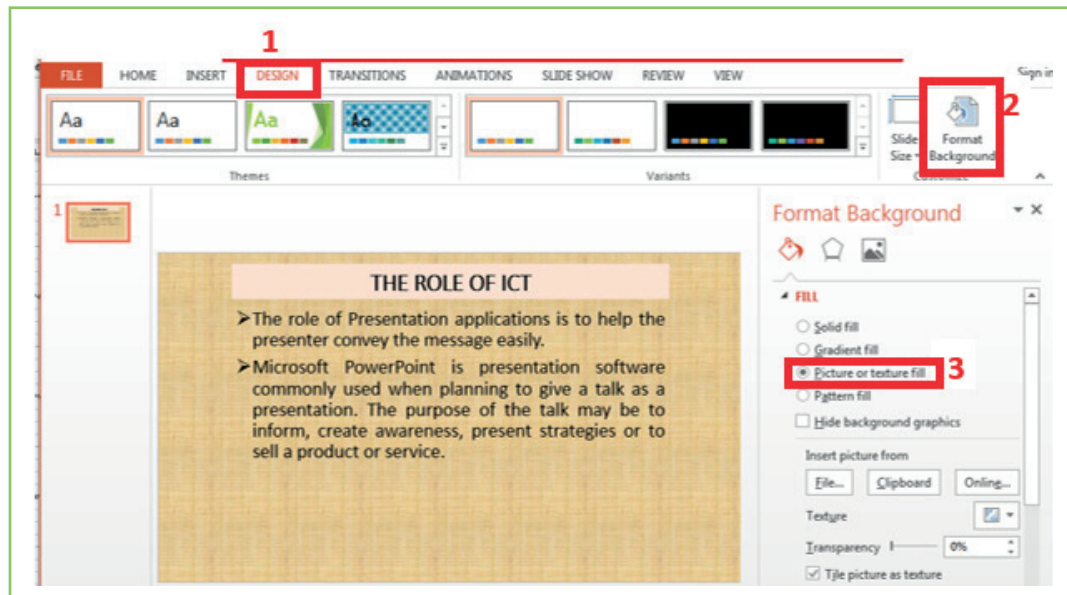


Figure 2. 7. Slide in which the Picture or Texture Fill has been applied

### APPLICATION ACTIVITY 2.3

Create a PowerPoint presentation “Understanding Gender Equality” containing at least 10 slides and do the following:

1. Change the theme of the presentation to “**Organic**”.
2. Give this presentation a picture background
3. Change the background of the presentation to “*Pattern Fill*”
4. Create a new section “Gender equality in the development of Rwanda” with 5 slides Give the section should have “Main event” as the theme of a presentation.
5. Apply new theme with colour and font to the working presentation

## 2.1.4. Adding notes and comments, Inserting header and footer

### ACTIVITY 2.4

Using Ms Power Point create a presentation containing 15 slides which has the title “inborn reflexes”

Apply the followings to the presentation:

- Add notes and comments to created slides that will help you while presenting
- Add header as “inborn reflexes” on every slide

#### a. Adding comment

In PowerPoint presentation, a comment is an explanation that is attached to a text or an object on a slide, or to an entire slide.

To add a comment in a slide go through the following steps:

**Step 1.** On the **Review tab**, click **New comment**

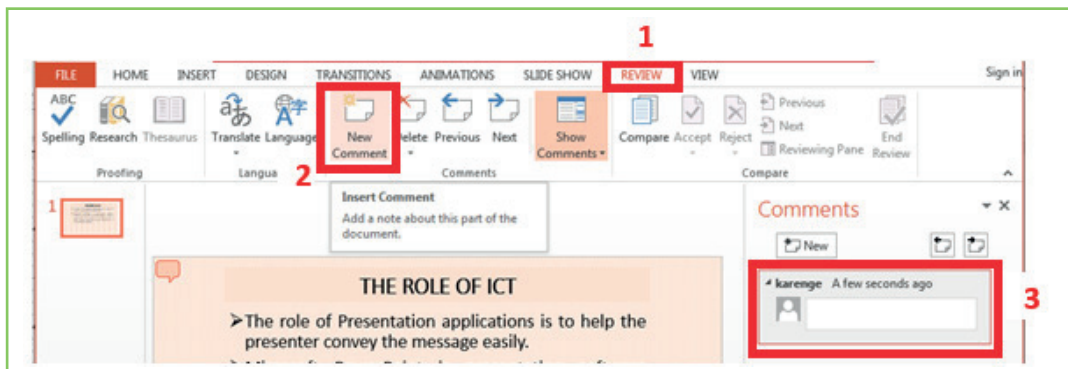


Figure 2. 8. Insert comment options

**Step 2.** Write the comments in the provided space as visible in the zone No 3 of the above image

**Note:** Comments can be added to a PowerPoint presentation by using a simpler method of clicking at the **Comment** option located at the bottom middle of an opened PowerPoint window.

#### b. Adding notes

In a PowerPoint presentation **Notes** are words/text added to a presentation as reference and only visible to the one presenting the slides. They serve as additional information for the presenter that can be read for guidance as the presentation goes on.

To add notes to a presentation do the following:

1. On the **View** menu, Click **Normal**
2. Select the thumbnail of the slide to add notes to
3. The notes pane will appear under the slide. Click where it says Click to add notes and type whatever notes depending on your choice

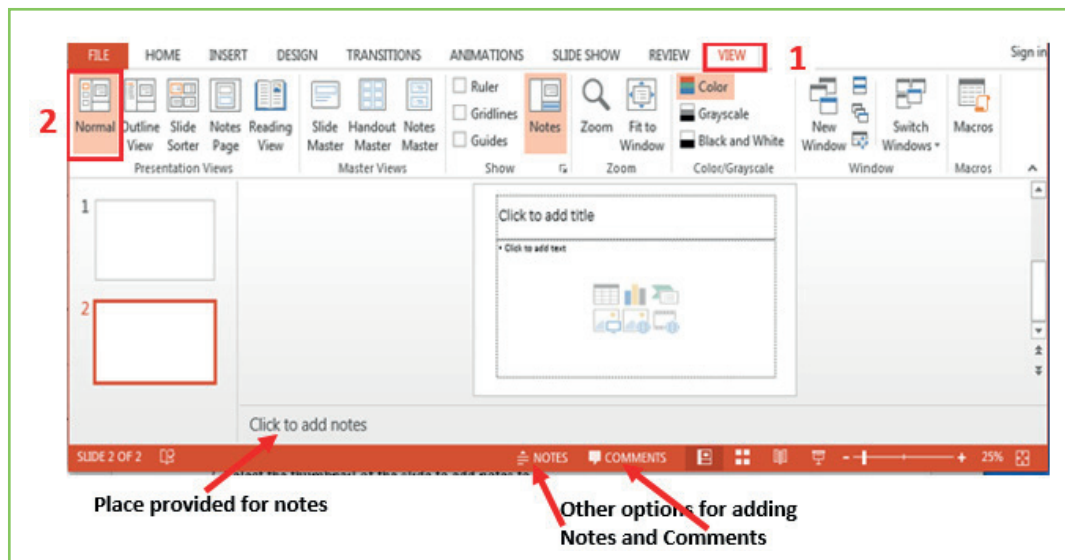


Figure 2. 9. Adding Notes and Comment Window

**Note:** A simple way to add notes is to use the Notes option located at the bottom middle of an opened PowerPoint window

### c. Insert header and footer

Header and footer in a presentation is the top and bottom parts of the slides. These include the slide number, text footer and date.

To add a header or footer follow these steps:

1. Click **Insert** then go to **Header & Footer**
2. In the box below **Footer**, type the text to use as footer such as the **presentation** title
3. Check Date and time to add that to the **slides**
4. Check **Slide number** to add to the created **slides**
5. Click on **Apply** or **Apply to all** if all slides are to have the same header or footer

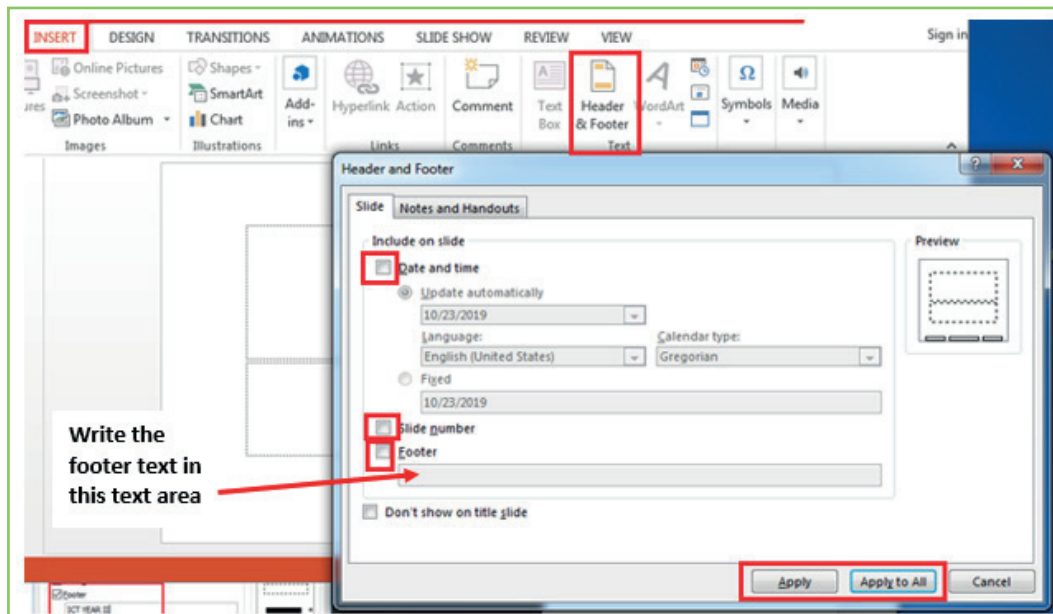


Figure 2. 10. PowerPoint Insert header and footer window

## APPLICATION ACTIVITY 2.4

1. What is the difference between header and footer?
2. Discuss the importance of notes and comments in a PowerPoint presentation
3. Create a PowerPoint presentation on “Quality and Accessibility of Education in Rwanda” that you will present to the class. Add notes and comments to slides that will help you while presenting

## 2.2. Add sound and animation to slides

### ACTIVITY 2.5

1. Give the benefits of adding multimedia into a presentation
2. Improve the PowerPoint presentation created on “Quality and Accessibility of Education in Rwanda” by adding in images

#### 2.2.1. Animate text and picture in slides

In PowerPoint, it is possible to **animate** text and **objects** such as clip art, shapes and pictures on the slide. Animation or movement on the slide can be used to **draw the audience’s attention** to specific content or to make the slide easier to read.

### a. Inserting pictures

To insert pictures in a slide select the **Insert** tab, and then click the **Pictures** command. Browse where the image are located and select one image and click **Insert**.

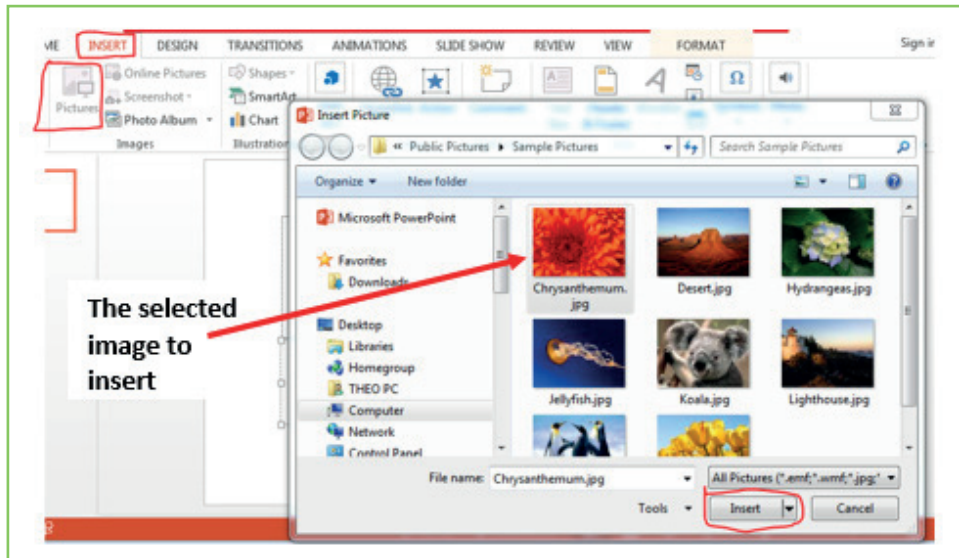


Figure 2. 11. PowerPoint Insert picture options

### b. Animating a text or a picture.

When a text is written in a slide or an image inserted they can be animated using the options available in PowerPoint. There are many types of animations available and each is used for different reasons like making the message come to the screen in a certain way (entrance animation) or bringing an emphasis to that message (emphasis animations). The image below shows some of the animations available in PowerPoint 2013.



Figure 2. 12. Different animations available in PowerPoint

For animating a text or an image do this:

- a. Select the text or picture to animate
- b. In the **Animation** tab choose one of the available options like Float In, Split, etc. The selected animation is immediately applied

In the next images below the title has been animated with “Fly In” animation, the text is animated with “Split” and the image is animated with “Zoom”. When the whole slide is opened in **Slide Show** mode each element has its own animation which helps attract more the attention of the audience.

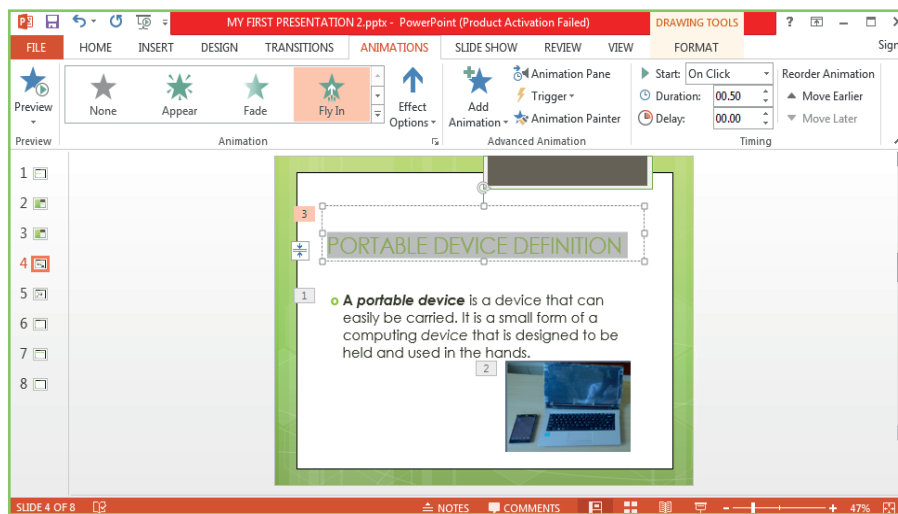


Figure 2. 13. The Title's animation is set to “Fly in”

Now that the title's animation is **Fly In**, the text's animation is going to be set to “Split” by selecting the text and choosing **Split** which is under the **Animations** tab

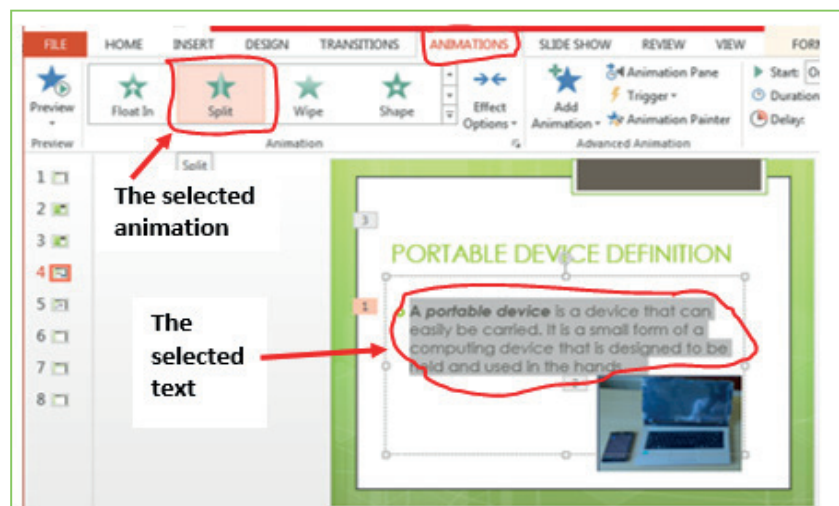


Figure 2. 14. The slide content animation set to Split

Now is the time to animate the image by also selecting it and choosing the desired animation

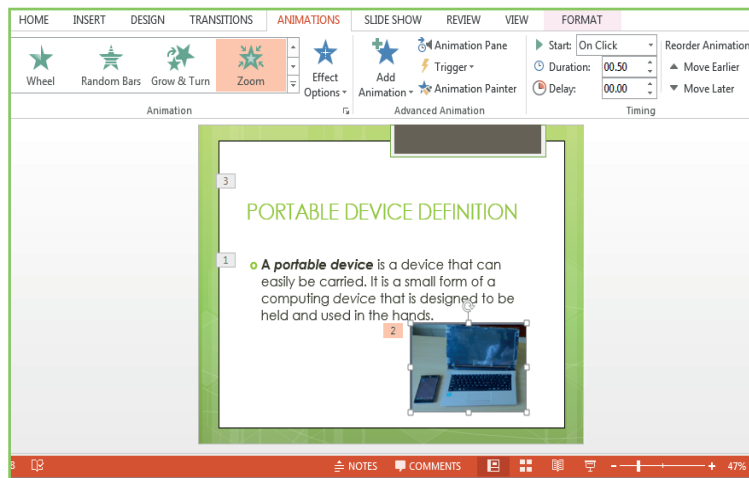


Figure 2. 15. The image animation is set to Zoom

Opening the above animated slide in Slide show mode will look like in the sequenced images below:

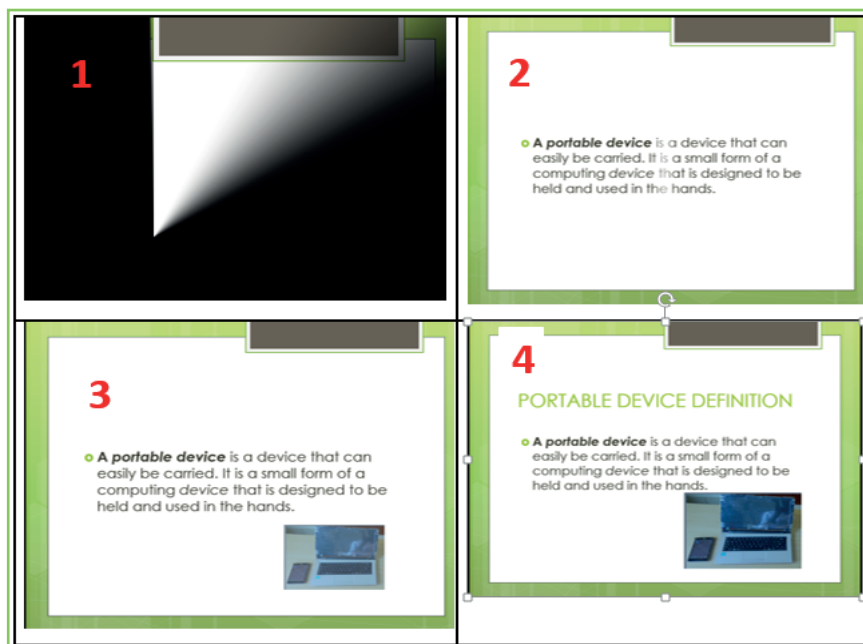


Figure 2. 16. Screen sequence of an animated slide containing text and image

**Interpretation:** the above animated slide when opened in Slide view mode will show in this way:

- a. A blank black screen will open and rapidly the black color will cede place to the white background of a normal document

- b. The text in the slide will come from left and right to meet in the middle
- c. The image will appear as a small image that will grow from the center
- d. The title of the slide will appear from the bottom of the slide, sliding upward

### B.1. Setting the delay of an animation

The default duration of a text or image animation can be changed to make the animation slower or quicker. The delay cannot be greater than 59 seconds. To set a delay click on **Animations** tab and in the Timing group specify the duration and the delay.

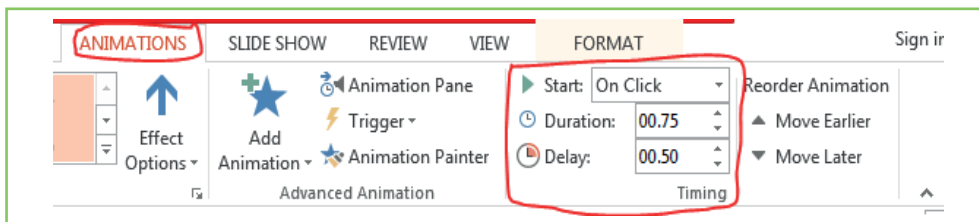


Figure 2. 17. Options to set the delay of an animation

### c. Customize animation effects

It is possible to apply multiple animation effects to a text, an image or a picture.

When working with multiple animation effects, it helps to work in the Animation Pane, where a list of all the animation effects for the current slide is displayed.

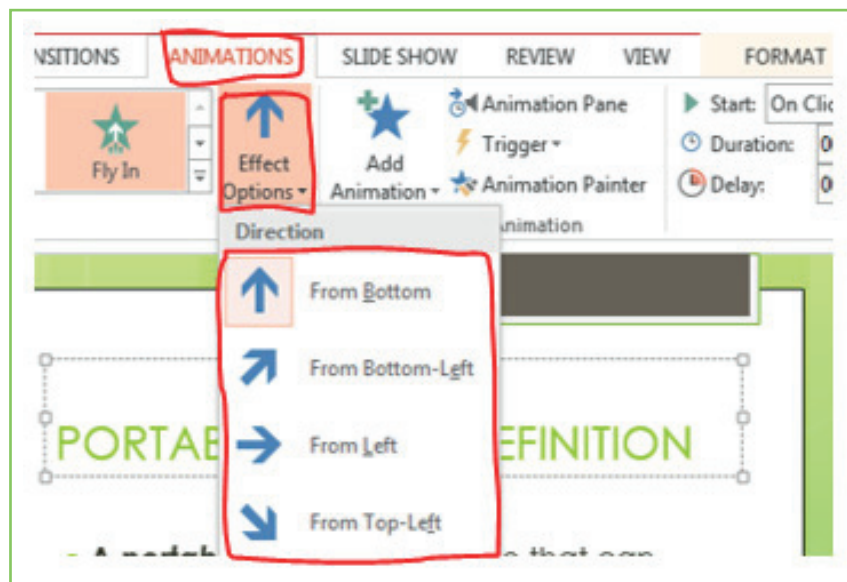


Figure 2. 18. Some of the animation effects available in PowerPoint

## APPLICATION ACTIVITY 2.5

Create a PowerPoint presentation having at least 20 slides on “Pedagogical principles”.

1. Insert a picture in each slide.
2. Animate the presentation as follow :
  - a. The title to “**Fade**”,
  - b. The text to “**Appear**”
  - c. The image to “**Pulse**”

### 2.2.2. Add audio and video content to slides

#### ACTIVITY 2.6

Create a presentation with a slide “Video in PowerPoint”. Insert a video as the only content on the slide. Play the presentation in the slideshow

PowerPoint allows to use images, **audio and video** to have a greater visual impact. These visual and **audio** cues may also help a presenter be more improvisational and interactive with the audience.

Animation applied to text or objects in a presentation gives them **sound** or **visual effects**, including movement. It is possible to use animation to focus on important points, to control the flow of information, and to increase viewer interest in a presentation.

#### a. Inserting an audio or a video

To insert an audio or a video do the following:

1. On the **Insert** tab click on **Media**
2. Choose the media to use which can be a video, an audio or a recording which is taken using a computer



Figure 2. 19. PowerPoint tabs used to insert media in a presentation

3. Browse the location where the audio or video to insert is located.
4. Select the media to use and click on **Insert**

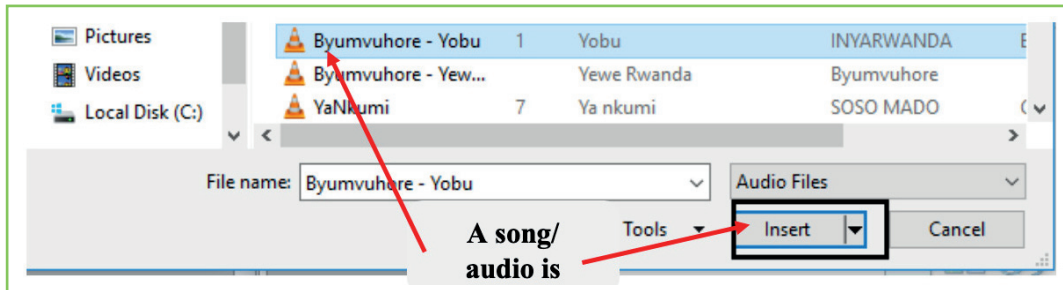


Figure 2. 20. Insertion of an audio in a presentation

The slide where audio has been inserted will have a graphic as shown in below. Play using the media buttons displayed.

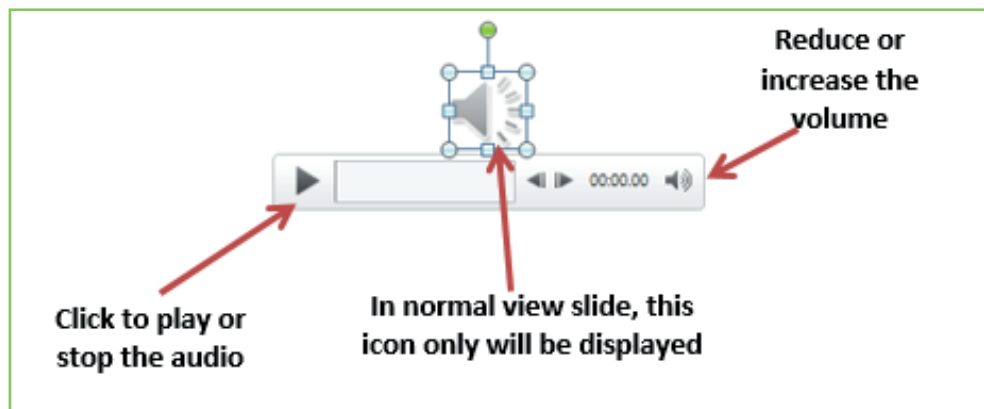


Figure 2. 21. Icons for playing a media inserted in a PowerPoint presentation

A media inserted in a PowerPoint presentation can have the role of providing more clarification for efficient understanding, it can be the only content in the slide, it can be a recording of the screen activity when for example one wants to show the steps to do a certain think using a computer. It can also be a readout of the slide's text.

### b. Inserting a recording

A recording is taken using the computer microphone and is inserted much the same way as other audio except that instead of browsing the audio to insert, the audio has to be recorded. To insert a recording go through the following steps:

1. Under the **Insert** tab click on **Media**
2. Click on **Audio** then on **Record Audio**

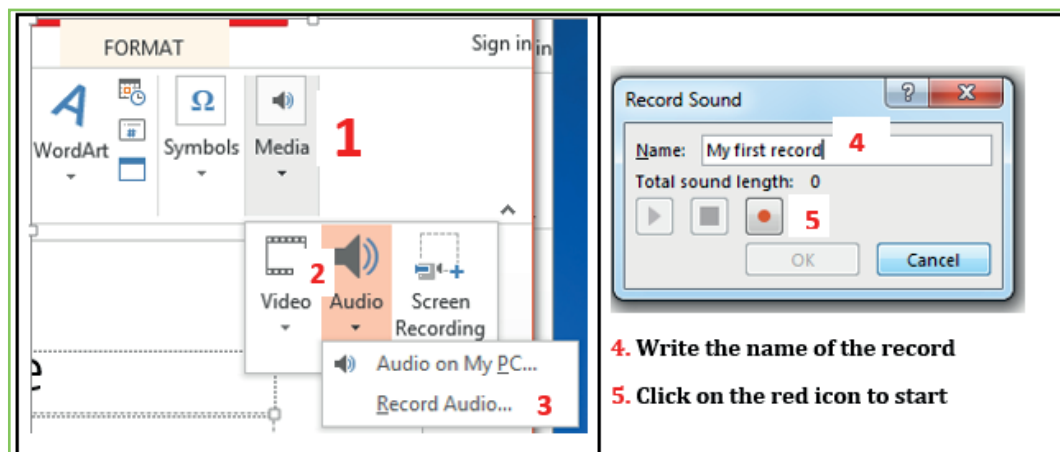
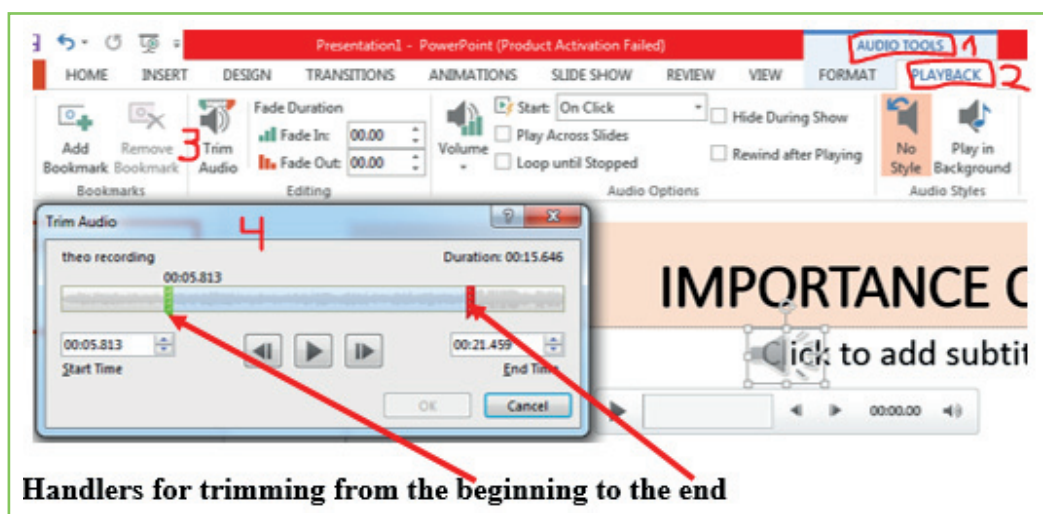


Figure 2.22. Steps to record an audio to insert in a PowerPoint presentation

The recorded audio can be set to play as the slide is opened or to play when clicked on. It can also be trimmed to fit in the desired time frame.

To trim the recording:

1. Click on the micro  icon then under the Audio tools go to **Playback**
2. Click on **Trim audio** then on **OK**



**Handlers for trimming from the beginning to the end**

Figure 2.23. Trimming a PowerPoint recorded audio

### c. Inserting a screen capture

Capturing a screen can be very important for many reasons but the main is when you want to make an instructional video that shows the steps that are being done on the screen. This can be combined with capturing an audio describing what is being done.

*Note:* Thus, for future student teachers this functionality can prove very useful.

### Steps to capture the screen:

1. Click on Insert then under the Media group go to Screen Recording

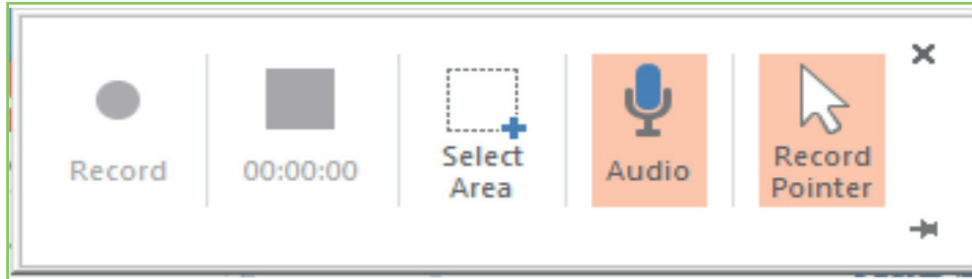


Figure 2. 24. Dialog box for capturing the screen

2. Choose among the available options in the dialog box that will appear, click on **Select Area** to choose which portion of the screen to be recorded and click on **Record**
3. To end the recording use the combination keys **Window key with shift key and Q**

### APPLICATION ACTIVITY 2.6

Create a PowerPoint presentation explaining how to insert audio and video into a presentation. Your presentation should contain a text stating the steps to follow and the audio of these steps should be heard on the display of the presentation. A screenshot of the steps to follow must be visible.

### 2.2.3. Slide transitions

#### ACTIVITY 2.7

Create a PowerPoint presentation “Saving Culture” of 5 slides.

1. Apply different slide transitions: Slide 1=“ Blind”, Slide 2=“ Clock”, Slide 3=“ Ripple” Slide 4=“ Honeycomb”, Slide 5=“ Reveal”,
2. Add sound to the slide3
3. Add time transitions to make them last for 2 seconds

A **slide transition** is the visual effect that occurs when moving from one **Slide** to the next during a presentation. Hereby one can control the speed, add sound, and customize the look of **transition** effects.

### a. Types of transitions:

In PowerPoint 2013 there are two main slide transitions namely subtle, exciting and dynamic content

In **Subtle** transition simple transitions are used to move from one slide to another, for **Exciting** additional visual effects are used to catch the eye of the audience while for **Dynamic** content will move only the placeholders, not the slides themselves.

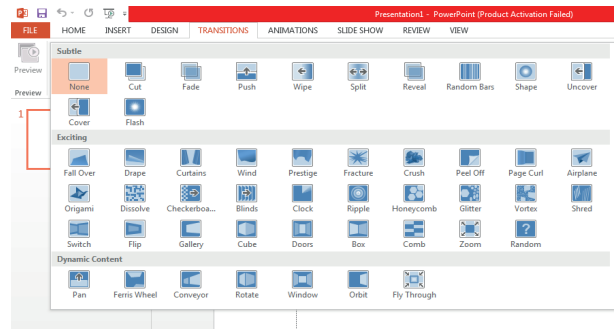


Figure 2. 25. Types of transitions available in PowerPoint 2013

### b. Using a transition

To use the different transitions do the following:

- To select the text or image on which to apply the transition
- Click on the **TRANSITION** tab then choose one of the transitions. In the image below the chosen transition is “Dissolve”

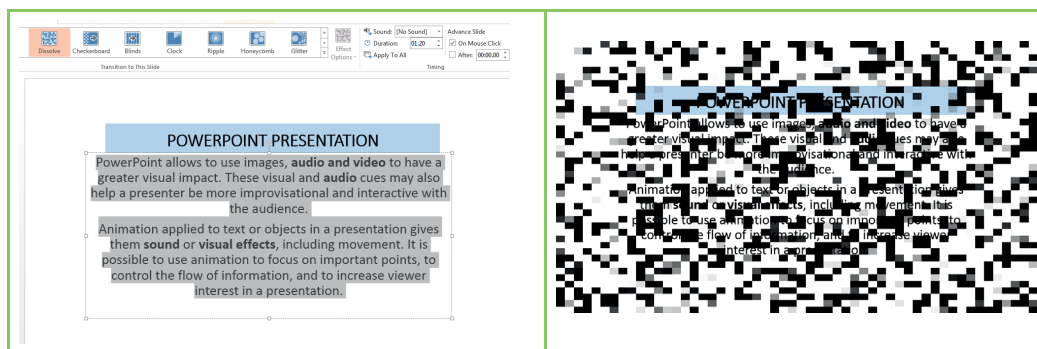


Figure 2. 26. Setting a transition (left) and slide appearance once played before it is properly arranged and visible

Once the transition has been set it can be modified by selecting the text having a particular transition and choosing the new transition to apply. It can also be removed by choosing the **None** transition.

## APPLICATION ACTIVITY 2.7

Create a presentation on "Education for all" which contain 10 slides and do the followings:

1. Make the Font type = " Candara" ; Font Size ="24" and Paragraph groups available in PowerPoint
2. Make the slide titles and each bullet in every slide have the Fly in animation.
3. If the title of the slide changes, change the sound accompanying the projection of the title (not the whole slide)
4. End the presentation with a visible and audible clap of the hands
5. Change the transition **Duration** to 2.00.
6. Use the **Apply to All** command to apply your changes to every slide.
7. Save your work

## 2.3. Presenting Using PowerPoint

### ACTIVITY 2.8

You are tasked to present to an audience of 300 people in the school hall on how to improve primary schools discipline.

1. Discuss the plan of your presentation by focusing on the organization of the presentation that of the session, plan to gather feedback and plan to make the group more participative and attentive.
2. Discuss the effectiveness of this presentation if you use papers and not a projector in your presentation

Microsoft PowerPoint can add a visual dynamic to a business meetings and presentations. The best way to share a PowerPoint presentation with a large group is to project slides on screen using a digital projector connected to the computer's video output.

### a. Presenting using a projector

A projector is an output device that can take images generated by a computer and produce them by projection onto a screen, wall or another surface.

A projector is connected to the computer through the VGA port but new projectors and computers can be connected using the HDMI ports



Figure 2. 27. Diagram of a computer connected to a projector

Steps for connecting a laptop to a projector

1. Make sure the laptop is turned off
2. Connect the video cable(VGA) from the laptop's external video port to the projector
3. Plug the projector into an electrical outlet and press the "power" button to turn it ON.
4. Turn on the laptop

There are different presentation modes while using a computer connected to a projector. One can use the **Projector only**, **duplicate** (both the projector and computer), **Extend** and **Disconnect the projector**.

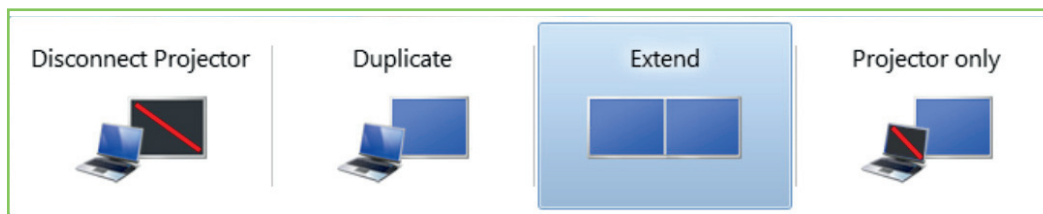


Figure 2. 28. Different options to use a projector connected to a computer

### **b. Printing and distributing handouts**

A handout is a piece of printed information provided to the audience so as to give a summarized information on a given topic.

Handouts are distributed to an audience so as to help them follow the presentation and take some notes on what is being presented.

It is a good practice to give the presentations to the audience at the end of the session so as to review what was presented to them.

### **c. Conducting the presentation**

When everything is in order; the projector is properly connected and working, the handouts have been distributed and everyone is properly seated it is then time to start the presentation.

For a presentation to be effective, the PowerPoint document have to have these qualities:

- Make the PowerPoint presentation short. Slides will contain short and concise sentences which are bulleted,
- Highlight important points by using animations and transitions wisely not randomly as these are used with a purpose like attracting attention on certain section, notifying of the change in the topic, etc
- For long slides provide short partial synthesis to make the audience keep track of what is so far presented
- Rehearse the presentation and use scripts and notes to help you not forget the important points to mention
- Be polite and use appropriate language.

### **APPLICATION ACTIVITY 2.8**

1. List the qualities a presentation should have?
2. List available options to use when a projector is connected to a computer ?

## END UNIT ASSESSMENT

1. Create a presentation of 12 slides on the topic “Nature-Protect”. Do the following:
  - a. In first slide describe the environmental protection in the World
  - b. In the second two slides describe the environmental protection in Rwanda
  - c. To give a good appearance and make slides more understandable insert images related to environment where applicable. Change theme, font and color to your presentation appropriately
  - d. In third three slides, describe the advantages of forest in environment and use a related audio/song that will play in the background.
  - e. In the fourth two slides discuss special cases where nature destruction by human exploitation had severe consequences
  - f. In the last two slides state what should be done for a better human future provided by livable environment. End with one conclusion slide and a Thank you slide.

# UNIT 3

## COMPUTER GRAPHICS TOOLS

### 3.0 INTRODUCTORY ACTIVITY

Observe the picture below and answer the following questions:

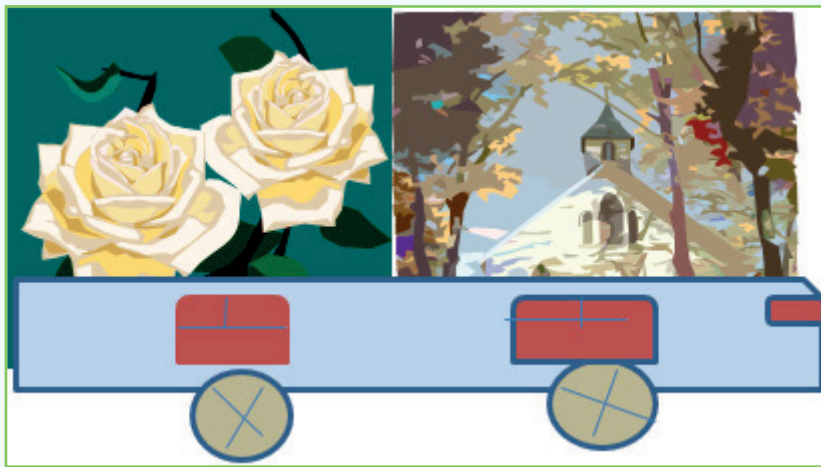


Figure 3. 1. An example of a 2D image

1. Describe what you see.
2. Differentiate a picture to an image
3. How do you measure the size of each picture?
4. Describe how the pictures inside are arranged. Are these pictures created using the same material?
5. What is the importance of modifying a picture? Give one example of an application that can be used to modify a picture
6. Why is it important to have good pictures in media communication?
7. Discuss the positive and negative effects on long time conservation of images

## 3.1.Introduction to computer graphics

### ACTIVITY 3.1

Scan your students ID card and use a smart phone to take a picture of the same students ID card. After, save both pictures in one folder

- a. Observe carefully both picture and give the difference that you find between them.
- b. Explain what could be the cause of that difference.

Modifying a hard drawing can be hard, swapping colors or resizing a picture on such a drawing is more complicated. That's why it is more efficient to draw a picture on a computer screen and the drawing is now a piece of digital information which is easy to modify.

Computer Graphics involves the ways in which images can be displayed, manipulated and stored using a computer.

Computer graphics provides the software and hardware techniques or methods for generating images.

#### 3.1.1. Definitions of different terms

- **Computer graphic:** This is the use of a computer and specialized programs to produce and manipulate pictorial images.
- **Pixel:** is the smallest unit of a digital image or graphic that can be displayed and represented on a digital displayed device. Is also known as a picture element. A pixel can have different colors produced by mixing the three colors RGB (Red, Green and Blue) and each of the three colors can take values ranging from 0 to 256.
- **2D (2Dimensional)** images are objects that are rendered visually on paper, film or on screen in two planes representing width and height (X and Y). Two-dimensional structures are also used in the construction of 3D objects.



Figure 3. 1. An example of a 2D image

- **3D computer graphics or three-dimensional computer graphics**, (in contrast to 2D computer graphics) are graphics that use a three-dimensional representation of geometric data (often Cartesian) that is stored in the computer for the purposes of performing calculations and rendering 2D image.



Figure 3. 2. An example of a 3D Image

- **Morphing:** is a technique which involves using a computer to make an image on film or television appear to change shape or change into something else. For example a human face may be transformed into a lion one and the human eye will find it unbelievable how the human has changed him/herself.
- **Random scan:** Random Scan System uses an electron beam which operates like a pencil to create a line image on the CRT (Cathode Ray Tube) screen. The picture is constructed out of a sequence of straight-line segments. Each line segment is drawn on the screen by directing the beam to move from one point on the screen to the next, where its x & y coordinates define each point. After drawing the picture. The system cycles back to the first line and design all the lines of the image 30 to 60 time each second. The process is shown in figure:

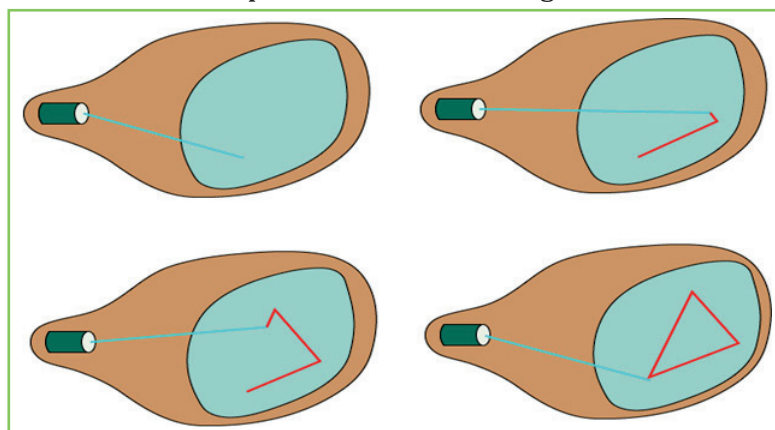


Figure 3. 3. Illustration of how Random scan works

**Raster scan:** A raster scan display is based on intensity control of pixels in the form of a rectangular box called Raster on the screen. Information about On and Off pixels is stored in a refresh buffer or Frame buffer. Televisions in homes are based on Raster Scan Method. The raster scan system can store information of each pixel position, so it is suitable for realistic display of objects. Raster Scan provides a refresh rate of 60 to 80 frames per second.

Frame Buffer is also known as Raster or bit map. In Frame Buffer the positions are called picture elements or pixels. Beam refreshing is of two types. First is horizontal retrace and second is vertical retrace. When the beam starts from the top left corner and reaches the bottom right scale, it will again return to the top left side called at vertical retrace. Then it will again more horizontally from top to bottom. The figure below illustrates the process

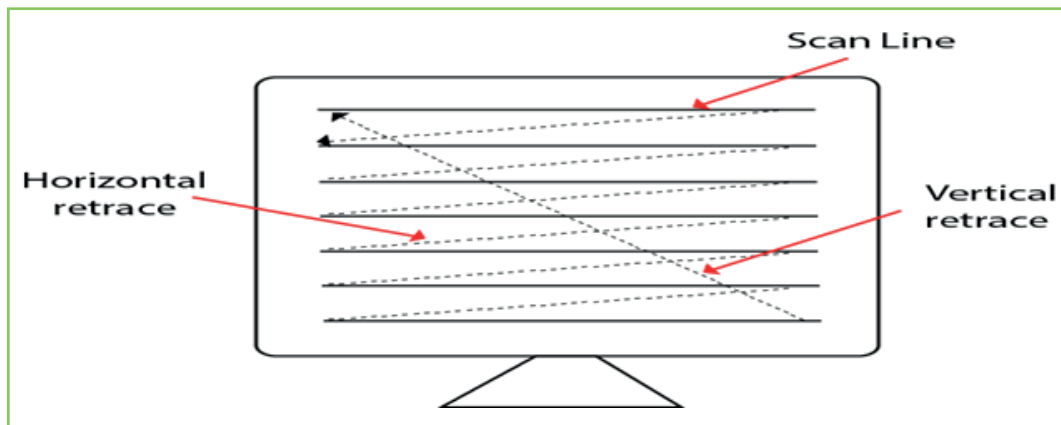


Figure 3. 4. Illustration of the working of a Raster scan screen

#### Comparison between Random scan and Raster Scan:

Random Scan	Raster Scan
It has high Resolution	Its resolution is low.
It is more expensive	It is less expensive
Any modification if needed is easy	Modification is tough
Refresh rate depends or resolution	Refresh rate does not depend on the picture.
Only screen with view on an area is displayed.	Whole screen is scanned.

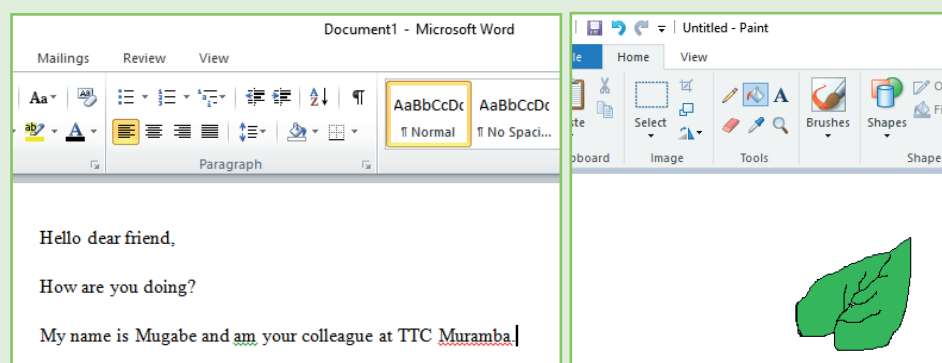
Table 3.1. Random vs Raster scan

### APPLICATION ACTIVITY 3.1

1. Using an example, give the difference between 2D images to 3D image?
2. Define morphing and give an example
3. With comparison, differentiate Random scan and Raster scan?
4. Discuss how computer graphics can be used in decoration services?

## 3.2. Image format

### ACTIVITY 3.2



1. Observe the above images and describe what you see
2. Are those images having the same formats? Explain
3. Discuss the importance of saving a document with a proper file extension

#### 3.2.1. Definition

**Image file formats** are standardized means of organizing and storing digital images. Image files are composed of digital data in one of the formats that can be rasterized for use on a computer display or printer.

There are 4 main formats in which to store images including TIFF, JPEG, GIF and PNG. Their differences are given in the table below:

IMAGE FILE FORMAT	DESCRIPTION
TIFF	<p>TIFF stands for Tagged Image File Format. TIFF images create very large file sizes. TIFF images are uncompressed and thus contain a lot of detailed image data (which is why the files are so big)</p> <p>TIFF is the most common file type used in photo software (such as Photoshop), as well as page layout software (such as Quark and InDesign), again because a TIFF contains a lot of image data.</p>
JPEG	<p>JPEG stands for Joint Photographic Experts Group, which created this standard for this type of image formatting. JPEG files are images that have been compressed to store a lot of information in a small-size file. Most digital cameras store photos in JPEG format, because then you can take more photos on one camera card than you can with other formats.</p>
GIF	<p>GIF stands for Graphic Interchange Format. This format compresses images but, as different from JPEG, the compression is lossless (no detail is lost in the compression, but the file can't be made as small as a JPEG).</p>
PNG	<p>PNG stands for Portable Network Graphics. It was created as an open format to replace GIF, because the patent for GIF was owned by one company and nobody else wanted to pay licensing fees. It also allows for a full range of color and better compression.</p>

Table 3. 2. Different image formats and their descriptions

### 3.2.2. Image compression

Image compression is minimizing the size in bytes of a graphic file without degrading the quality of the image to an unacceptable level. The reduction in file size allows more images to be stored in a given amount of disk or memory space. It also reduces the time required for images to be sent over the Internet or downloaded from web pages. Know an image's file size and dimensions before or after uploading it into the Library

#### Image compression techniques Lossy and Lossless

**Lossless:** The compression technique where compressed data (byte) will be the same replica of actual data. In this case, compressed file is required to be reproduced exactly when get decompressed again.

**Lossy:** File compression results in lost data and quality from the original version. Lossy compression is typically associated with image files.

### 3.2.3. Viewing an image's file size and dimensions

The determination of an image's file size and dimensions depends on an Operating System being used.

Open the image in Windows Explorer to check dimensions and file size by clicking the Windows Start button on the taskbar.

- Right clicking the icon of the image file,
- In the pop up menu, click on property and details.
- The result will look like below. The wanted information are circled with red line.

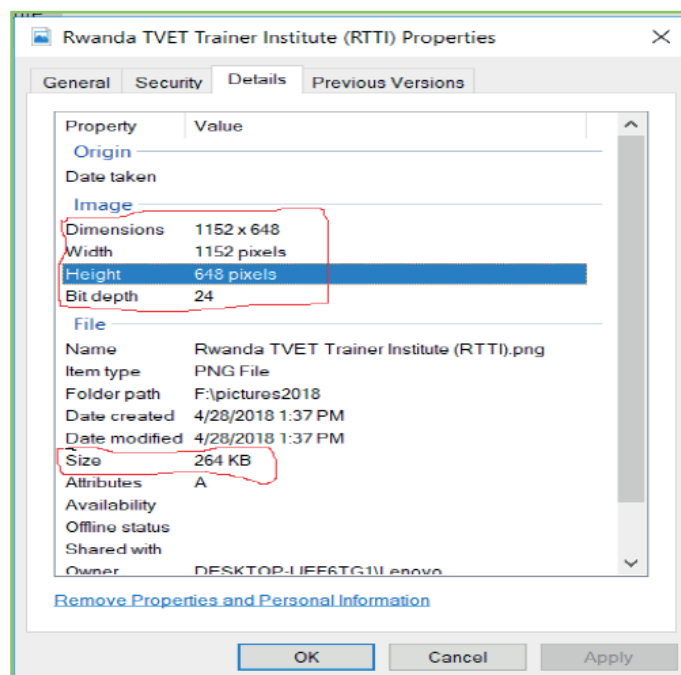


Figure 3. 5. Window for viewing the image size

### 3.2.4. Calculating size of an uncompressed image file

Computer storage and memory is measured in Megabytes (MB) and Gigabytes (GB).

A **bit** is the smallest unit of measurement used to quantify computer data and **byte** is a group of 8 binary digits.

**Unit of memory size.**

1Byte= 8bits

1KB= 1024Bytes

1MB = 1024 KB

1GB=1024 MB

1TB=1024 GB

It takes 2 to 3 bytes to store one pixel of a color image. The pixels in an image store a color at a given point in the image, but it takes 2 to 3 bytes of storage to record this value. If we consider 3 bytes of storage, the file size of a color image is equivalent to: **width \* height \* 3**

**Example:** Let's consider an image whose Width is 1152 and height is 648.

If we consider 3 bytes of storage, the file size of a color image is equivalent to: **width \* height \* 3** which is  $=1152*648*3 = 2,239,458$  which gives the file size in bytes. This file size number is so big, it needs to be converted in Kilobytes or even megabytes. There are 1,024 bytes in a kilobyte and 1,024 kilobytes in a megabyte which makes this file have the size of 2.187 Kilobytes

### APPLICATION ACTIVITY 3.2

1. Define an image.
2. Compare GIF to PNG image formats. Which is the best format to use and why?
3. Explain the term "compressing an image"
4. How an image size is calculated?
5. Mugabo has a flash disk of 32GB. How many films each having 600MB can his flash disk store? How many word documents each of 900Kb can it keep?

### 3.3. Image capturing tools

#### ACTIVITY 3.3



1. Observe the above pictures and describe each
2. Which device is most used in our daily life? Explain why

The process of obtaining a digital **Image** from a vision sensor, such as camera usually entails a hardware interface known as a frame grabber, which **captures** single frames of video, converts the analogue values to digital, and feeds the results into the computer memory.

### 3.3.1. Digital camera

The first digital camera was invented by STEVEN SASSON in 1975. Digital cameras are normally used to capture pictures or video through the use of an electronic image sensor.

**There are two types:**

- **SLR:** Single Lens reflex camera; which is a camera that typically uses a mirror and a prism system that permits the photographer to view through the lens and see exactly what will be captured.
- **DSLR:** is a digital camera that combines the optics and the mechanisms of a single lens reflex camera with a digital imaging sensor.

#### a. Definition

A digital camera is a camera which produces digital images that can be stored in a computer and displayed on screen. It records and stores photographic images in digital format.

These stored images can be uploaded to a computer immediately or stored in the camera to be uploaded into a computer or printed later.

Digital cameras use an image sensor instead of photographic film.

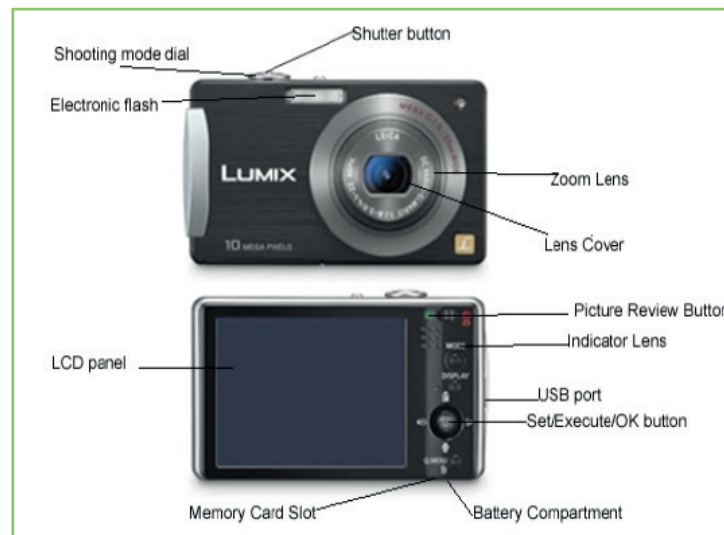


Figure 3. 6. Parts of a Digital camera

## **b. Digital camera parts**

There are 10 basic camera parts to identify in today's digital world. These parts will inevitably be found on most cameras being digital compact or single-lens reflex camera (SLR)

- **Lens**

The lens is one of the most vital parts of a camera. The light enters through the lens, and this is where the photo process begins. Lenses can be either fixed permanently to the body or interchangeable. They can also vary in focal length, aperture, and other details.

- **Viewfinder**

The viewfinder can be found on all digital single-lens reflex cameras (DSLR) and some models of digital compacts. On DSLRs, it will be the main visual source for image-taking, but many of today's digital compacts have replaced the typical viewfinder with Liquid Crystal Display (LCD) screen.

- **Body**

The body is the main portion of the camera, and bodies can be in different shapes and sizes. DSLRs tend to be larger bodied and a bit heavier, while there are other consumer cameras that are a conveniently smaller size and even able to fit into a pocket.

- **Shutter Release**

The shutter release button is the mechanism that "releases" the shutter and therefore enables the ability to capture the image. The length of time the shutter is left open

- **Aperture**

The aperture affects the image's exposure by changing the diameter of the lens opening, which controls the amount of light reaching the image sensor. Some digital compacts will have a fixed aperture lens, but most of today's compact cameras have at least a small aperture range.

- **Image Sensor**

The image sensor converts the optical image to an electronic signal, which is then sent to the memory card. There are two main types of image sensors that are used in most digital cameras: Complementary Metal-Oxide-Semiconductor (CMOS) and Charge-Coupled Device (CCD) Both forms of the sensor accomplish the same task, but each has a different method of performance.

- **Memory Card**

The memory card stores all of the image information, and they range in different size and speed capacity. Memory cards can be taken out of the camera and inserted in a computer memory card bay for reading.

- **LCD Screen**

The LCD screen is found on the back of the body and can vary in size. On digital compact cameras, the LCD has typically begun to replace the viewfinder completely. On DSLRs, the LCD is mainly for viewing photos after shooting, but some cameras do have a “live mode” as well.

- **Flash**

The on-board flash will be available on all cameras except some professional grade DSLRs. It can sometimes be useful to provide a bit of extra light during dim, low light situations.

- **User Controls**

The controls on each camera will vary depending on the model and type. The basic digital compacts may only have auto settings that can be used for different environments, while a DSLR will have numerous controls for auto and manual shooting along with custom settings.

### **c. Importing pictures using USB cable**

The images taken by using a camera are stored automatically in its memory. However, for different purposes, the images can be printed or inserted in documents for illustrations. The camera is then connected to the printer or the computer by using a USB cable appropriately designed for such action. The fact of taking pictures from the camera to the computer is called importing pictures.

The following steps are followed to successfully import a picture from camera to computer by using a USB cable.

**Step 1:** Connect one end of the USB cable to the port in your camera.

**Step 2:** Connect the other end of the USB cable to the USB port in the computer. This may be in the front or back of the computer.

**Step 3:** Turn on the camera

**Step 4:** A dialog box may appear on the screen. If it does, select “View Files” or “Open Folder.” If the dialog does not appear, click the Windows “Start” menu, select “Computer” and then choose the drive labeled for the connected camera.

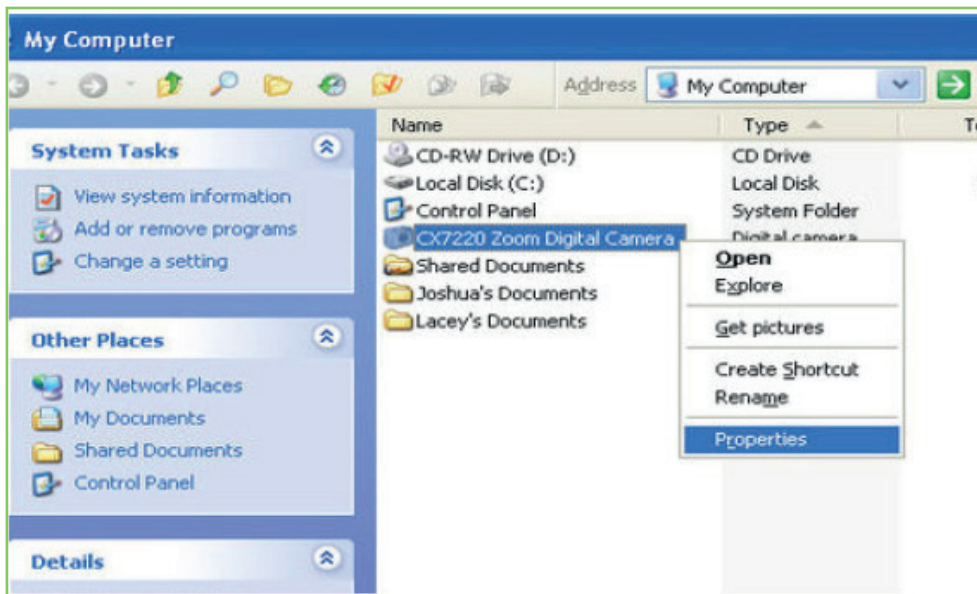


Figure 3. 7. Window for viewing the camera connected to a computer

The pictures are probably located in a particular photo folder on the camera. Open that folder. Drag individual photos from the folder to the desktop or some other folder on the computer. All the photos can be selected by pressing “Ctrl-A” and then pasted into a folder on the computer by pressing “Ctrl-V.”

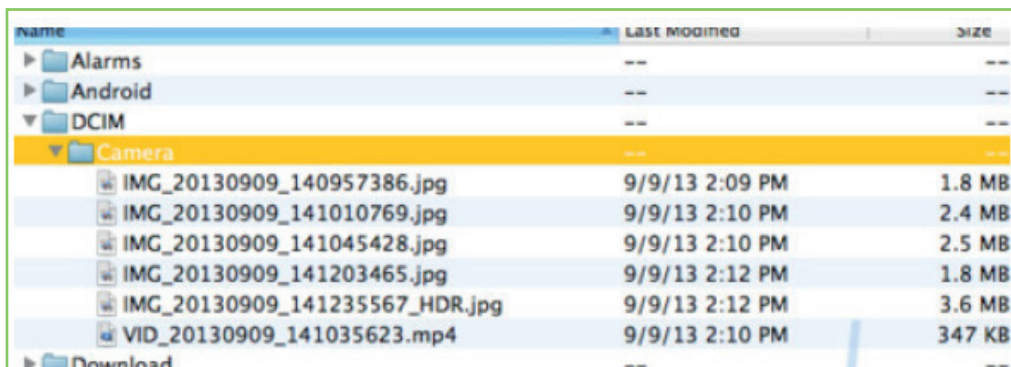


Figure 3. 8. Many photos in the folder of a camera

### 3.3.2. Scanner

A scanner is an electronic device which can capture images from physical items (printed text, handwriting, photographic prints, posters, magazine pages, and similar sources) and convert them into digital formats, which in turn can be stored in a computer and viewed or modified using software applications.

Very high resolution scanners are used for scanning for high-resolution printing, but lower resolution scanners are adequate for capturing images for computer display.

### a. The different parts of scanner

A scanner has the following five parts visible externally: (1) Start button, (2) Copy button, (3) Scan to E-mail button, (4) Scan to Web button, (5) Scanner cover

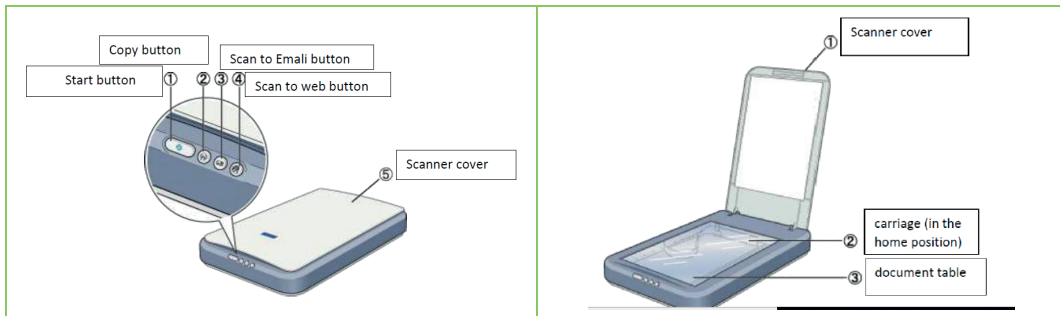


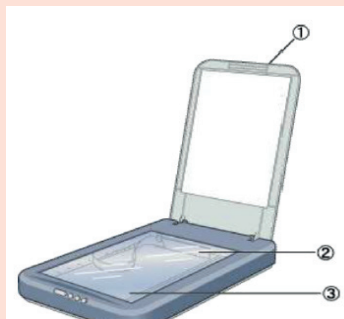
Figure 3. 9. Different parts of a scanner (left) and a scanner with an opened cover (right)

#### Note:

- Parts, size and looks of scanners vary depending on the type of scanner and some scanning and photocopying functionalities are combined in one physical device therefore some of the parts may not be visible
- Some scanners have touch screen capabilities therefore they may not have some of the buttons

### APPLICATION ACTIVITY 3.3

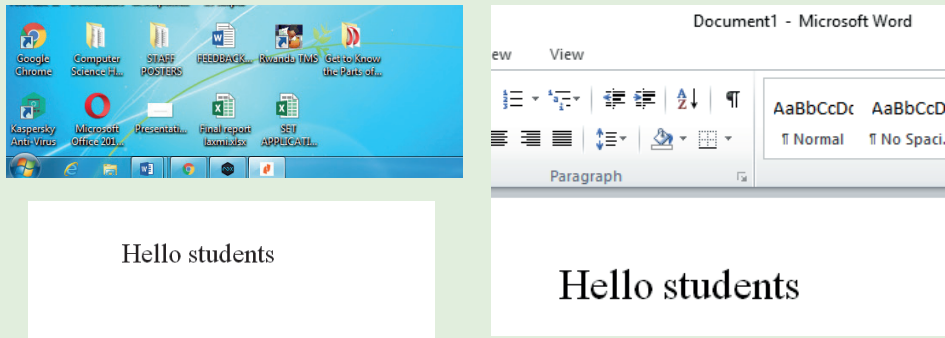
1. Compare digital camera to scanner?
2. Discuss the importance of digital camera in computer graphic.
3. With your camera, take a picture of the school computers, import it in your computer and insert it in one of your text documents created in MS Word.
4. At your school, what are the advantages and disadvantages of keeping scanned documents?
5. Give the names of the 3 scanner parts indicated in the following image.



## 3.4. Screenshots capturing

### ACTIVITY 3.4

Observe the image below and answer related questions



1. Observe the above figure and describe what you see?
2. Explain how such images may have been taken?
3. Explain how you can take a picture of an active window on your computer?

A screenshot is an image of a computer desktop that can be saved as a graphic file. (The mouse cursor is not included in the image). The main ways used to get the screen of computer is to use the **Print Screen key** (PrtSc) or the **Snipping Tool**

#### 3.4.1. Use of Print Screen Key

A print screen is a computer key which is used to copy to the clipboard an image of the screen and paste it in any other application for saving or manipulation

Steps to follow in screen shot capturing using Print screen key:

- a. Open the screen that is going to be copied.
- b. Press the Print Screen key **PrtScn** Paste (CTRL+V) the **image** into an Office program or any other application.

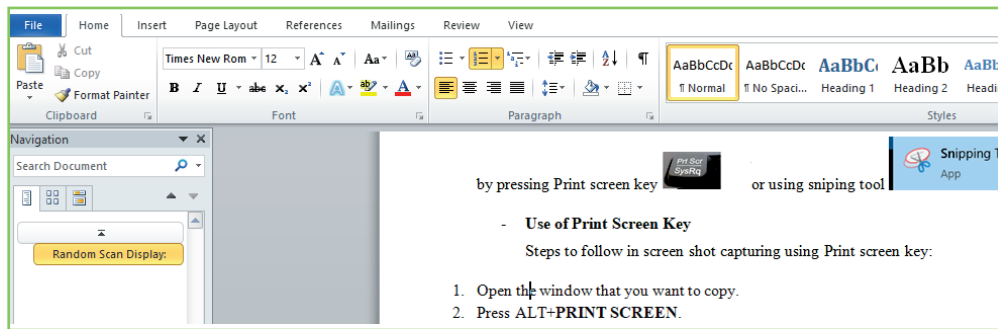


Figure 3. 10. A copied screen shot using PrtSc Key

The taken image can be edited depending on the options provided by the program in which it is pasted. For example in word an image can be edited using the **Picture Tools** available on the word menu when the image has been selected.

### 3.4.2. Use of Snipping tool

**Snipping Tool** is a Microsoft Windows screenshot utility included in Windows Vista and in later versions. It can take still screenshots of an open window, rectangular areas, a free-form area, or the entire screen.

#### a. To open the Snipping tool:

- Click on **Start**
- Write **Snipping Tool** in the search box and once found click on it to launch or click on **All Programs** then click on **Accessories** and click on the snipping tool

An opened Snipping tool will look like in the image below:

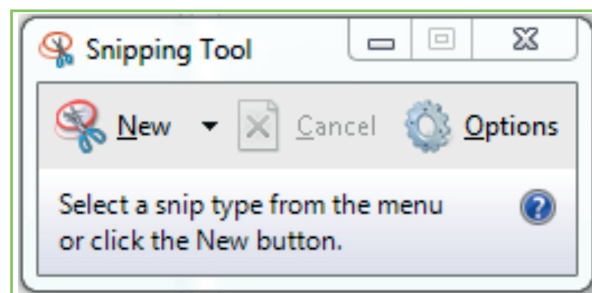


Figure 3. 11. Snipping tool window

#### b. To take a screenshot using Snipping tool

To take a screenshot in the opened Snipping tool

- Click on **New** tab and choose among the snipping options (free form, Rectangular, Window, Full screen)

- Hold down the left button and hover over the screen area to take.
- Release the cursor to take the snip

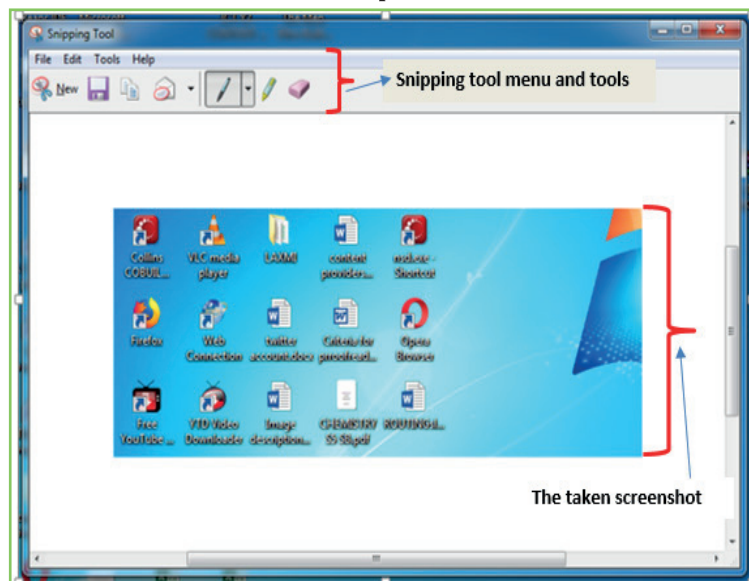








Figure 3. 12. Screenshot taken using snipping tool

### c. Options with a taken screenshot

As provided by the Snipping tool menu a taken screenshot can be saved using the Save  tool, can be copied using the copy  tool, can be sent via email by using the message  tool, can have its sections highlighted by using the Pen  and the Highlight  tools. The highlights added to the screenshot can be deleted by using the erase  tool.

For additional options needed to be carried out on a taken screenshot, it can be pasted in other image manipulating programs like Paint and edited to the user's wish.

### APPLICATION ACTIVITY 3.4

1. What is the difference between a snip and an image
2. Take a screenshot of the start menu of your computer and save it as JPEG on the desktop
3. Take a screenshot of Office MS Word 2013 environment and label its different parts using the pen tool

## 3.5. Graphic software-Paint

### ACTIVITY 3.5



1. Describe what you see on the pictures below
2. Discuss how such an image can be created and modified?
3. Which tools can you use to create and modify a picture?

In computer graphics, graphics software refers to a program or a collection of programs that enable a person to manipulate images on a computer.

Examples of such programs include Adobe Photoshop, Microsoft Publisher, Paint, Etc.

#### 3.5.1. Starting and saving a Paint file

A paint program is a software graphics program that allows the user to draw or paint bitmapped images on a computer.

To start Paint go through the following steps:

1. Type Paint in the search box which appears in the startup menu
2. Click Paint to open the program. The following window will appear

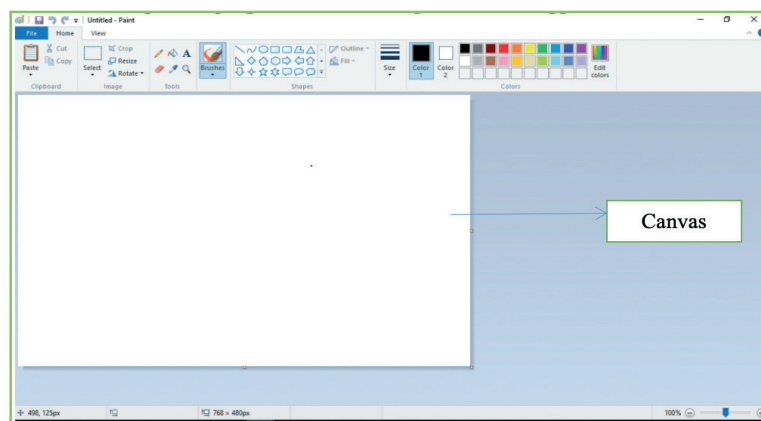


Figure 3. 13. Microsoft Paint at start

### a. Understand the canvas

When Paint launches, the white “canvas” will appear on the screen. Imagine this canvas as a piece of paper to draw or write on. The size of the canvas can be adjusted before starting to create images.

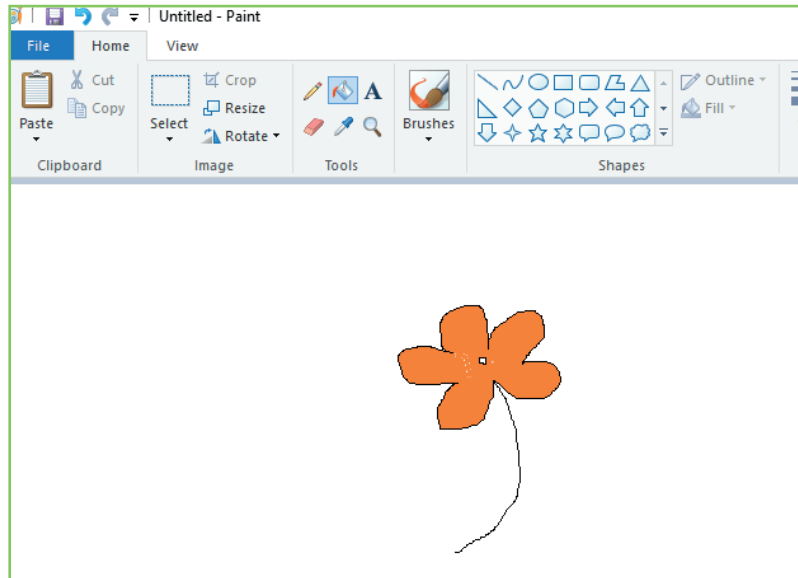


Figure 3. 14. A flower drawn in Canvas

The flower above has been drawn using the Pencil tool which was used to draw lines and the Fill with color tools was used to fill the red color on the leafy part of the flower.

### b. Saving a paint file

1. From File menu, choose Save as.
2. From a dialog box, choose **PNG picture** or any other image file format

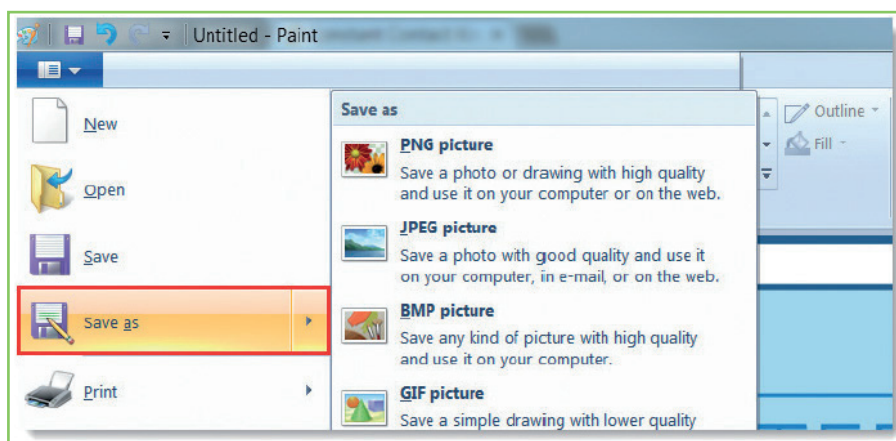


Figure 3. 15. Different image file formats

3. In the next window type the file name, choose file format then click on save button.

### 3.5.2. Paint tools

The paint program has got many tools which help its user manipulate images and do any activity Paint is supposed to do. Some of the Paint tools are shown in the image below:

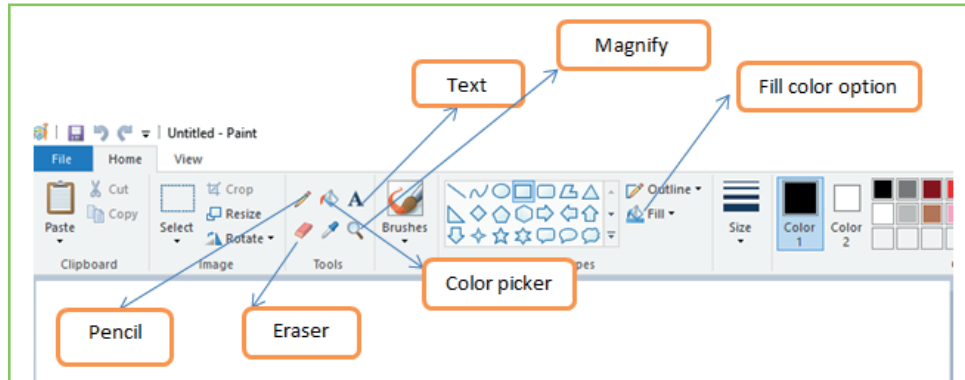


Figure 3. 16. Different paint tools

1. **Text tool:** The tool allows **text** to be typed onto the current layer using the primary color. The text controls in the Toll Bar can be used to change the font, the size of the font, formatting...

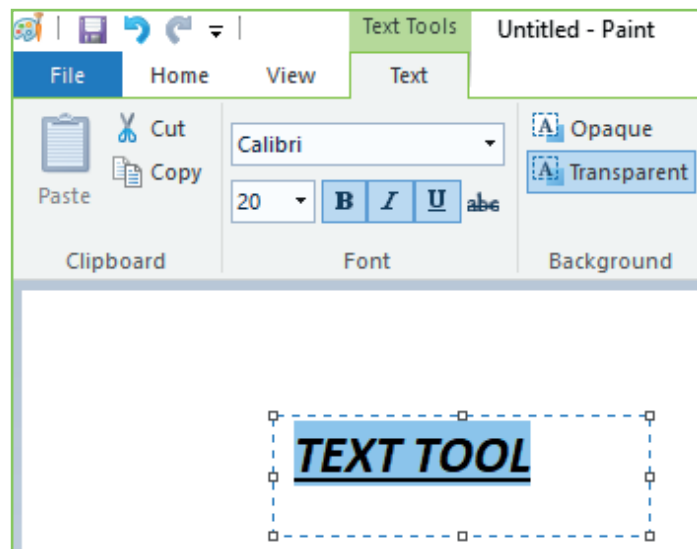


Figure 3. 17. Text tool in Paint

2. **The pencil tool:** is a freehand drawing tool, much like an actual pencil. The width of the line can be adjusted by clicking the Size menu and selecting a different line width.

To draw, simply press the mouse button as you move the mouse on the canvas.

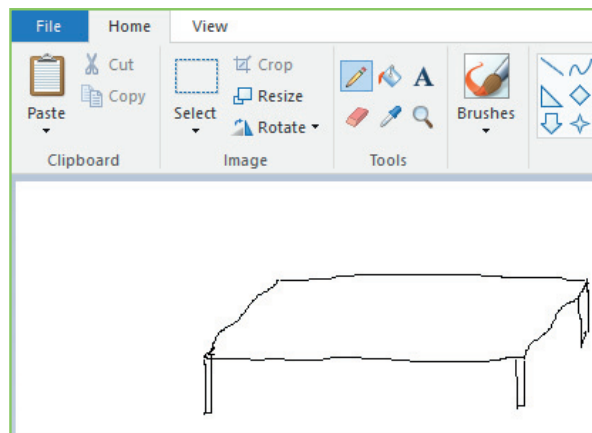


Figure 3.18. A table drawn using Pencil

- Eraser tool:** This tool is used to remove parts of the active layer or selection like in the image below

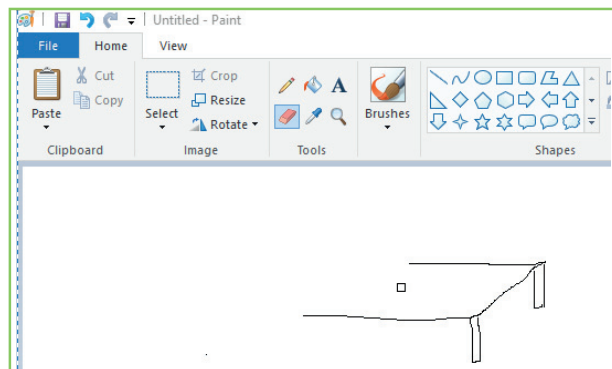


Figure 3.19. Use of eraser tool

- Fill color tool:** Is used to fill an area of similar color with another color.

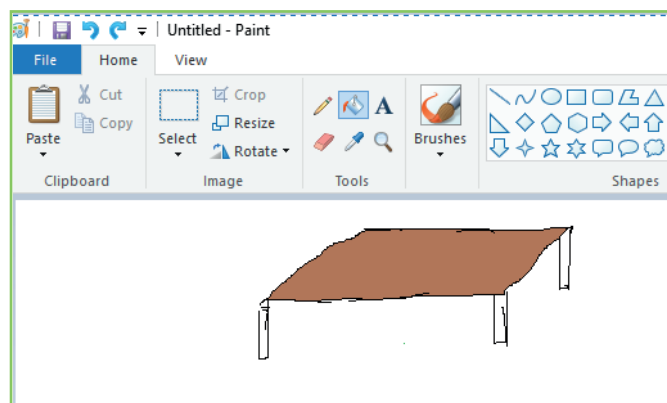


Figure 3.20. A table colored using the fill color tool

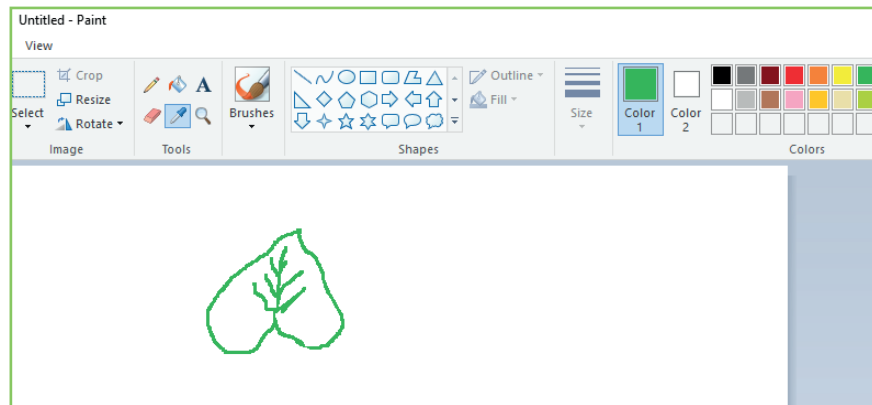


Figure 3. 21. A drawing in which color picker has been used

5. **Magnifier:** next to the “Pick color” button is the “Magnifier” button, which looks like a magnifying glass. Selecting this tool will allow the user to zoom in and out of an image.

### 3.5.3. Insertion of shapes

A shape is a geometric figure such as square, triangle or rectangle. Using illustrator’s shape to draw can be an effective way to create smooth paths and predictable results.

Below are different shapes in Paint:

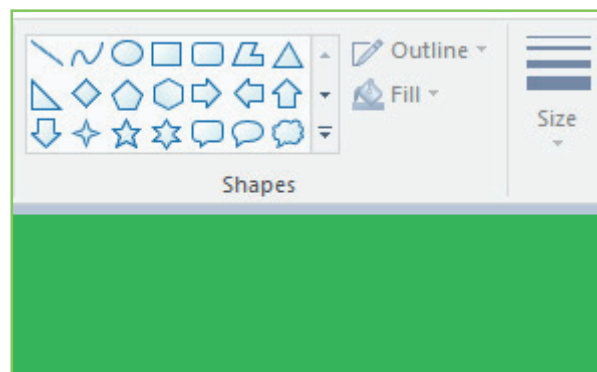


Figure 3. 22. Different shape types in Paint

Select any shape from the toolbar to draw that shape. Once you’ve chosen a shape, you’ll notice some options for the shape’s appearance.

- Click the “Outline” and “Fill” menus to view your options.
- Select your preferred outline and fill options,
- Then, click the canvas where you’d like to place your shape.
- Hold down the mouse button as you drag the cursor to enlarge the shape.
- Let go of the mouse button when reach the desired shape size.

After choosing a shape with an outline, the color of the outline will be the current foreground color. If the shape has a solid filling, the fill color will be the background color.

### 3.5.4. Select, cut, copy, paste and crop

#### i. Copy and Paste

- Press and hold down the left mouse button inside the selection box and move the picture to relocate the image.
- If you wish to **copy** the image:
  - Right-click inside the selection box
  - And click “**Copy**.”

An image can be pasted to another paint document or in another program.

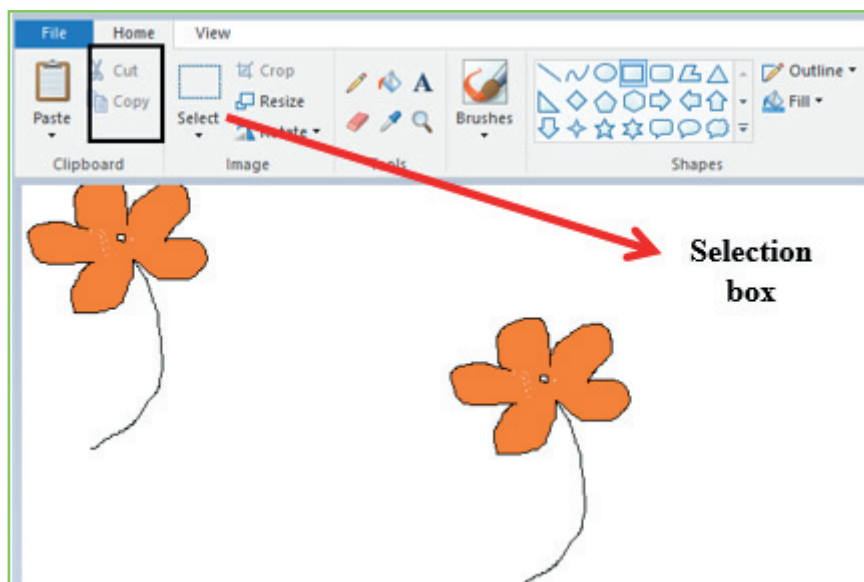


Figure 3. 23. Paint document with a copied image (Flower)

#### ii. Cut and Paste

- a. Click on the area of an image you want removed, click and hold the mouse to drag the box as far down and over as needed
- b. Press and hold “Ctrl” and “X” to cut the selection.
- c. Press and hold “Ctrl and “V” to paste the selection, either elsewhere in the same document or in a separate document.

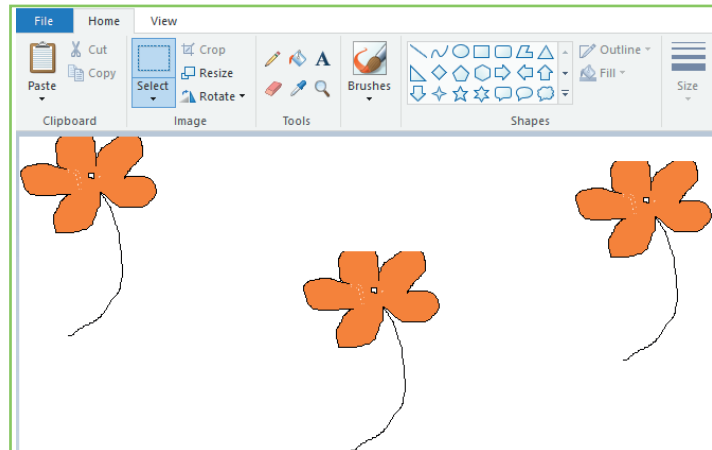


Figure 3. 24. A pasted image in Paint document

### Paste in Ms Office word

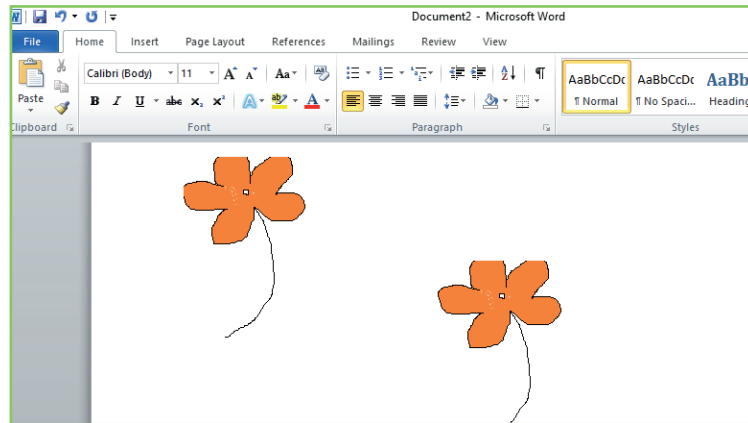


Figure 3. 25. Copied image in Ms Word document

### After cutting in Paint

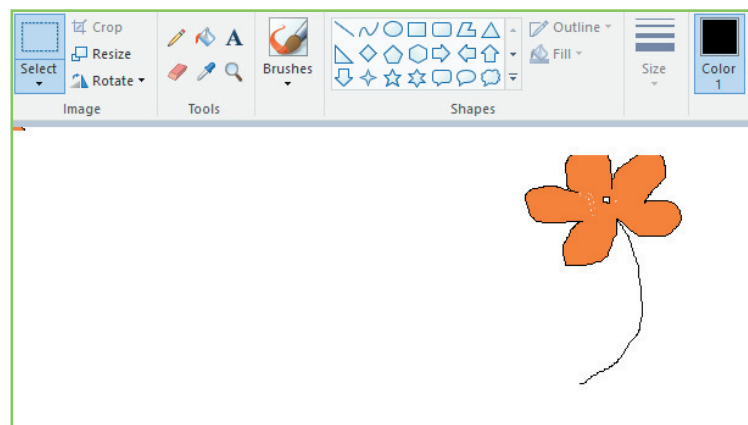


Figure 3. 26. Paint image after cropping unwanted parts

### iii. Crop

- a. Select the portion of the image you want to **crop** using the Select tool.
- b. Once selected right-click with the mouse anywhere in the image selection and select **Crop** or go to Crop in tools bar.

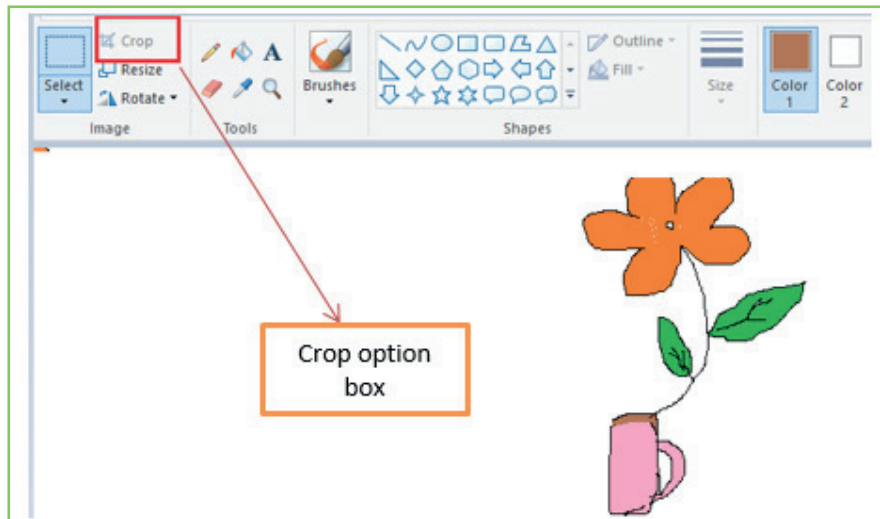


Figure 3. 27. Image before crop

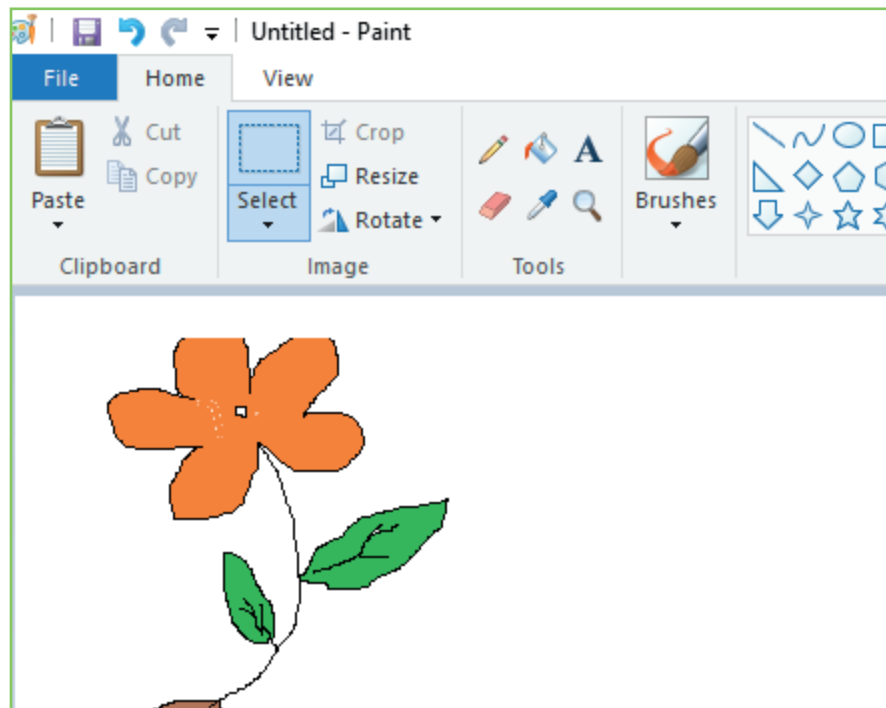


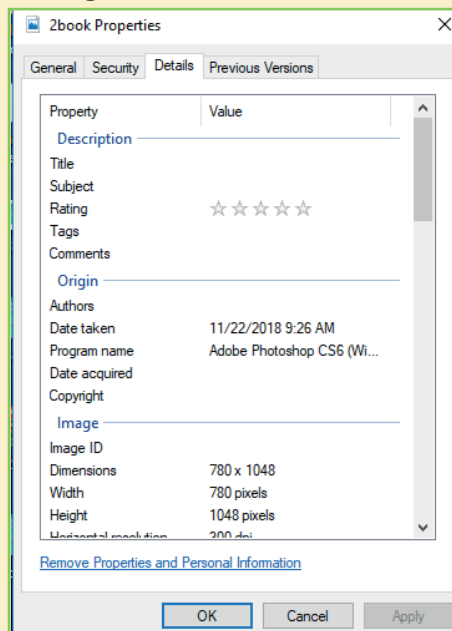
Figure 3. 28. Image after crop

### APPLICATION ACTIVITY 3.5

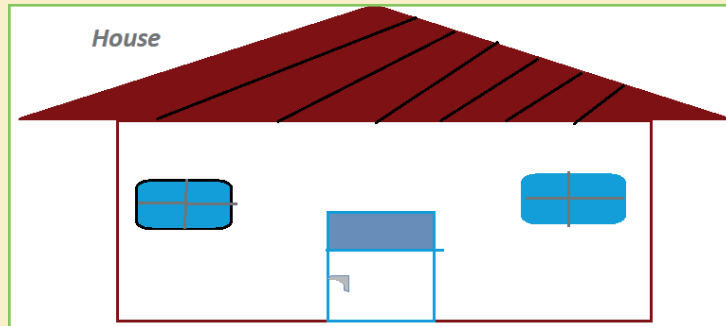
1. Differentiate computer graphics to Paint
2. What is the importance of Ms Paint in computer graphics?
3. Discuss the use of Ms Paint and its importance in advertisement
4. Differentiate the use of Fill Color and Pick Color tools.
5. Draw a red flower in Paint and save it on desktop
6. As a student teacher who is going to teach the parts of the human body draw a human on a paper, scan the image and put labels on it using the **Insert, Shapes** options available in word Paint and Word

### END UNIT ASSESSMENT

1. Define the following terms: Pixel, snipe, Morphing, Paint and Aperture
2. Explain the following abbreviations: i) JPEG ii) CMOS iii) PNG
3. Discuss the importance of computer graphics in decoration services
4. Based on information on figure below, you are requesting to calculate the image file size and to convert it in MB and GB



5. Using Ms Paint, draw the following picture and put labels on it to show its different parts (roof, door, window)



6. Use any available photo on your computer change its color, copy and paste it in Ms word.

# UNIT 4

## E COMMERCE, SOCIAL MEDIA AND ONLINE SERVICES

**Key Unit competence:** To be able to request for online services and access social media

### 4.0 INTRODUCTORY ACTIVITY

Holly City Technology Ltd manager needs to buy computer spare parts products from outside of Rwanda. The manager doesn't have time to go out of the country and he decided to search on the Internet the websites which sell computer spare parts.

- a. Discuss ways the manager can use to communicate with the supplier to obtain the price of the goods
- b. Discuss the type of business conducted via the Internet
- c. Give social media platforms used for daily communication
- d. Discuss the way that can be used for payment

### 4.1. E commerce

#### ACTIVITY 4.1

1. Kamikazi wants to buy a Psychology book. She visited many libraries in the country but she could not find the title she wanted. She decided to search for the book using google.com. Finally, she realized that the book is available online on amazon.com and the price is at 15 \$.
  - a. Discuss the process Kamikazi will go through in order to buy that book and have it delivered to her
  - b. Brainstorm the other local and global online platforms that can be used to buy goods and services
2. What do you understand by Customer to Business relationship?

### 4.1.1. Understanding e commerce

#### a. History

E-Commerce or Electronic Commerce also known as e-Business, Is the buying and selling of goods, products, or services over the internet using electronic means of payment like credit cards. This commerce provides to buying parties physical goods but also electronic materials (goods) where possible.

The history of ecommerce dates back to the invention of the very old notion of “sell and buy”, electricity, cables, computers, modems, and the Internet. Ecommerce became possible in 1991 when the Internet was opened for commercial use

At first, the term ecommerce meant the process of execution of commercial transactions electronically with the help of the leading technologies such as Electronic Data Interchange (EDI) and Electronic Funds Transfer (EFT) which gave an opportunity for users to exchange business information and do electronic transactions. The ability to use these technologies appeared in the late 1970s and allowed business companies and organizations to send commercial documentation electronically.

#### b. Some Ecommerce platforms

With ecommerce the buying and selling parties don't need to meet at the same location, the buyer does not go to the store but there is an electronic platform that is used as a market where the buyer and the seller meet. An example of such a platform is amazon.com.

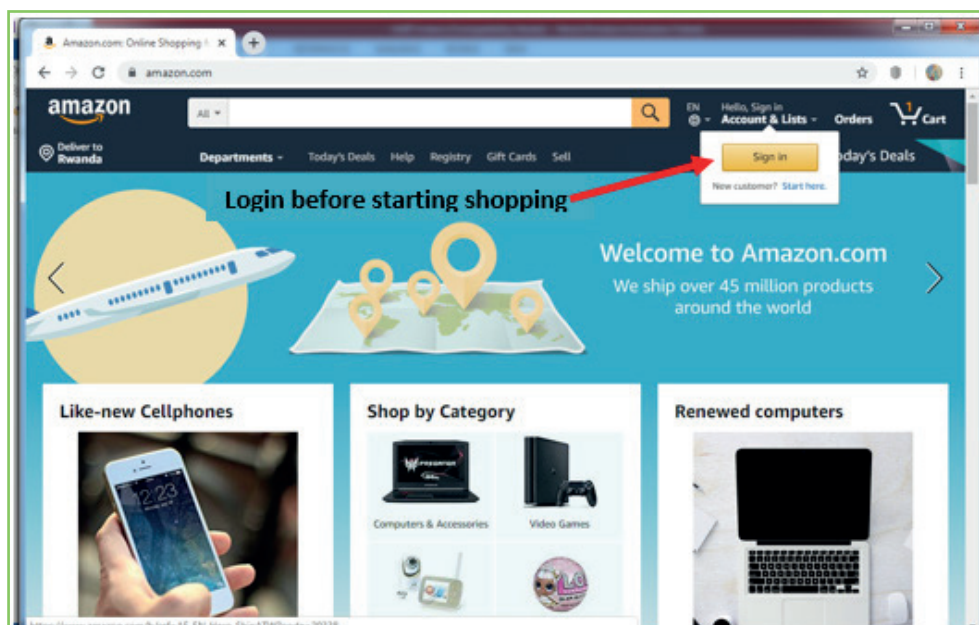


Figure 4.1. Amazon.com one of the most known Online shopping platforms

To buy goods on amazon.com or any other online chopping platform (ecommerce website), the buyer must have an Amazon account, must log in using that account, choose among the list of provided goods, choose location where the goods are to be delivered and pay using acceptable payment means like Credit cards.

As of November 2019, the online shopping platforms available in Rwanda are among others food.jumia.rw and kikuu.com. Through this platforms one can buy food (jumia food) or clothes (kikuu.com).

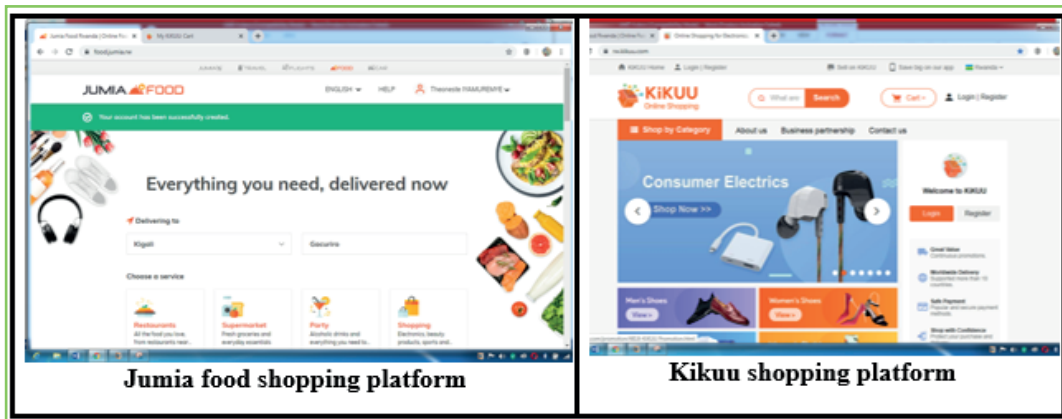


Figure 4. 2. Main interfaces of the shopping platforms in Rwanda (food.jumia.rw and rw.kikuu.com)

### c. Buying on an e-commerce platform case of kikuu.com

As stated earlier kikuu.com is one of the platforms available in Rwanda with which one can buy available goods and have them delivered to his/her preferred location in Kigali. To buy with Kikuu, as it is a principle for other e-commerce the buyer has to have an account. To create that account go through these steps:

1. In the address bar write kikuu.com and once the platform loads click on Register to create a login account. Fill in the provided form the requested details. Or
2. If the user account is already created login

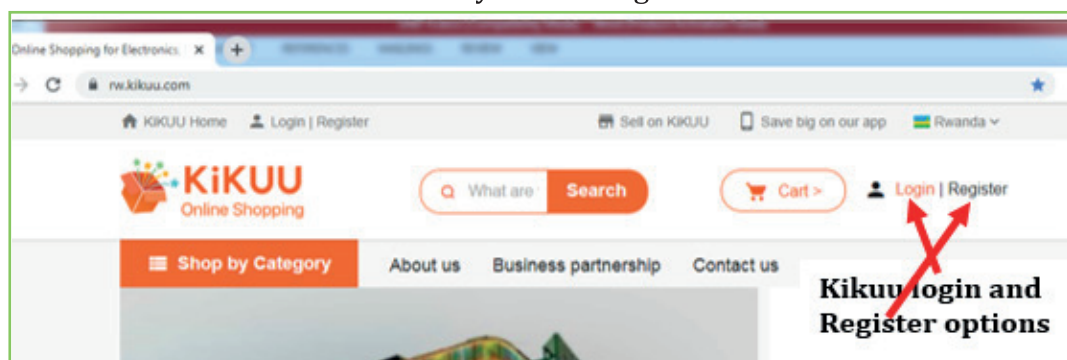


Figure 4.3. Kikuu login and Register options

3. Once the login is successful choose goods to buy.

For most platforms goods have pictures and accompanying image and for selecting the goods just click on its image. Select the goods specifications carefully so as to get what is wanted. In the case of the shoes chosen like in the image below the customer has to choose the shoe's color and the size.

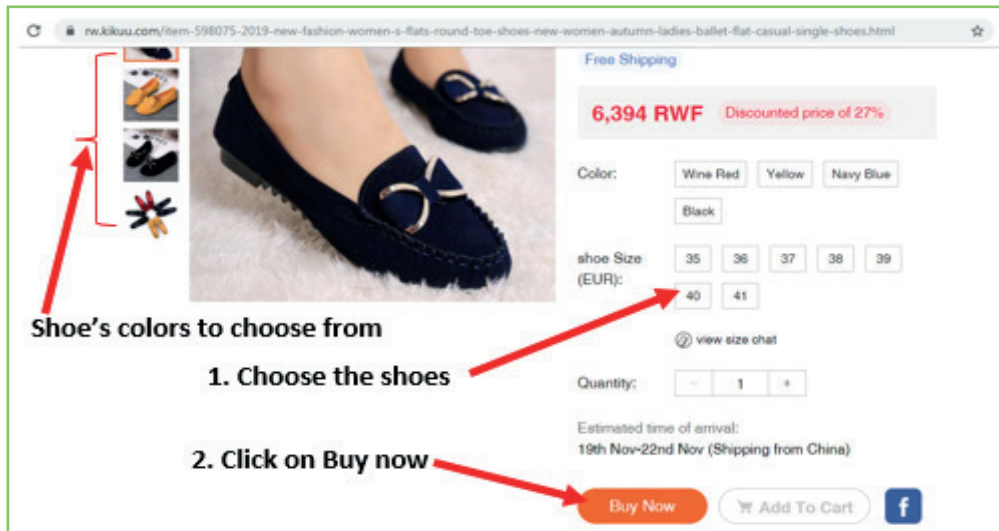


Figure 4. 4. Screen to choose shoe specifications

4. Pay the amount due by using the preferred payment method

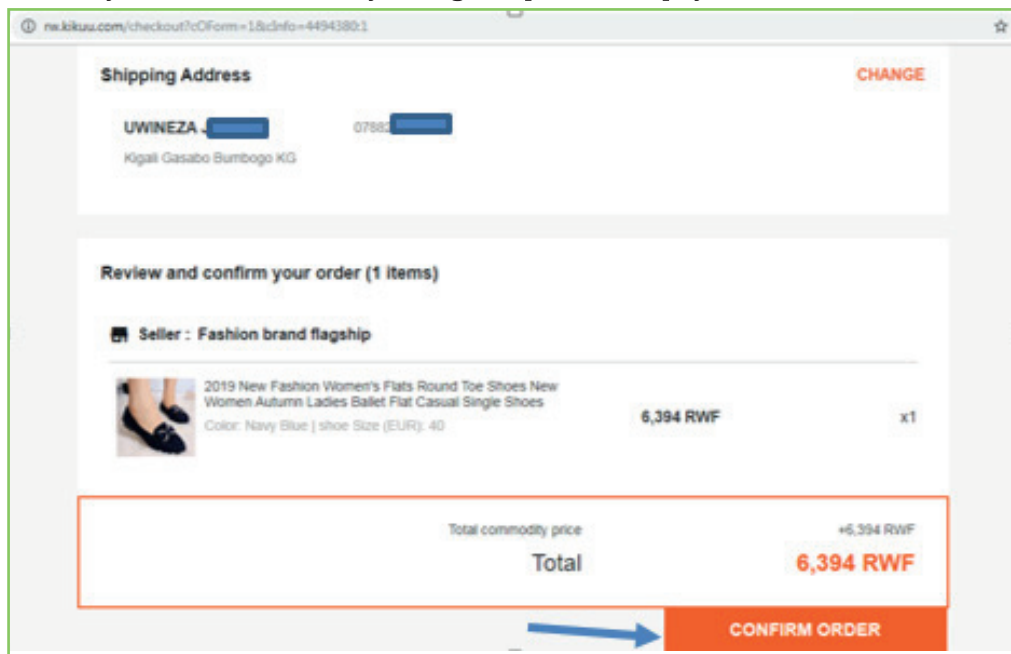


Figure 4. 5. Shipping address and confirm order Window

In the next two screens choose the payment method and click on **PAY <Amount>**. In the other screen as MTN Money has been chosen as payment method fill the account and click **PAY <Amount>**

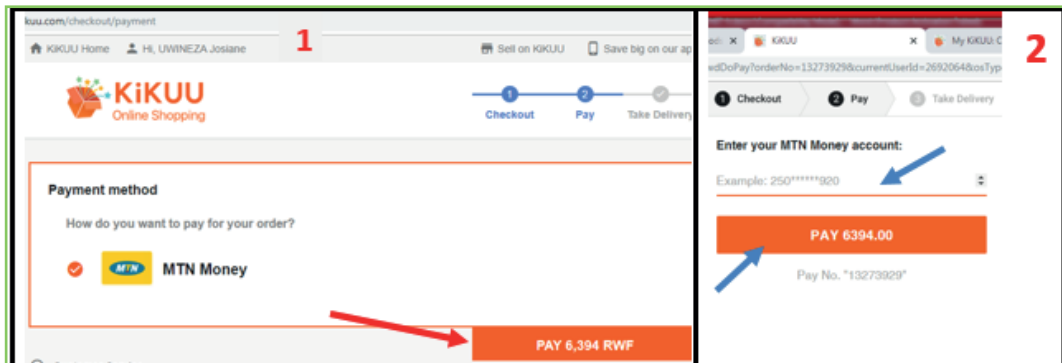


Figure 4. 6. Screens for choosing the payment methods and paying

#### d. Advantages and disadvantages of e commerce

There is no good thing without a bad side. Ecommerce presents to its users many advantages but has also disadvantages.

##### a. Advantages of E-commerce

- Does not require physical displacement of the buyer hence saving money and time
- Products and services are easy to find on the platform rather than moving in so many stores, warehouses or supermarkets
- Transactions can be done all the time of the day and the week (24/7).
- No geographical limitations translates as a bigger customer reach.
- Higher quality of services and lower operational costs.

##### b. Disadvantages of E-commerce

- No guarantee of product quality as the product is not physically viewed
- Customer loyalty becomes a bigger issue as there is a minimal direct customer-seller interaction.
- Anyone can start an online business, which sometimes leads to scam and phishing sites.
- Hackers target web shops which may lead to disruption of service.

#### 4.1.2. E-commerce models

Electronic commerce can be classified into four main categories. The basis for this simple classification is the parties that are involved in the transactions. The four basic electronic commerce models are:

#### a. **Business to Business**

In a business to business model companies are doing business with each other. The final consumer is not involved. So the Online transactions only involve the manufacturers, wholesalers and retailers, etc.

#### b. **Business to Consumer**

Here the company will sell their goods and/or services directly to the consumer. The consumer can browse their websites and look at products, pictures, read reviews. Then, they place their order and the company ships the goods directly to them.

#### c. **Consumer to Consumer**

Consumers are in direct contact with each other. No company is involved. It helps people sell their personal goods and assets directly to an interested person.

#### d. **Consumer to Business**

The consumer provides goods or services to the company.

**For example** an IT freelancer who demos and sells his software to a company.

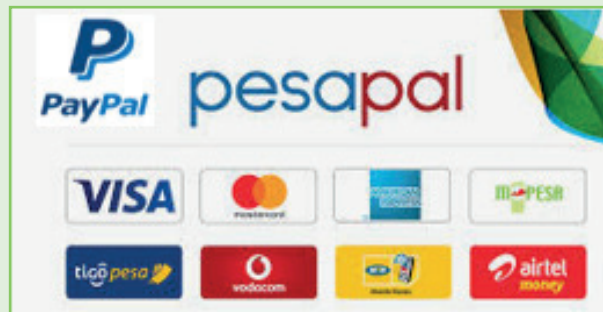
### APPLICATION ACTIVITY 4.1

1. Discuss the major benefits of E-commerce
2. What are two advantages of electronic commerce over traditional commerce?

#### 4.1.3. Online Payment methods

### ACTIVITY 4.2

Observe the picture below that shows the different online payments methods



Answer the below questions:

1. Among the above payment method , list payment method use in Rwanda
2. Discuss steps to make payments online

Is the way that a buyer chooses to compensate the seller of a good or service that is also acceptable to the seller. Typical payment methods used in a modern business context include cash, checks, credit or debit cards, money orders, bank transfers and online payment services such as PayPal.

### 1. Cash Payment

Buying online requires using electronic means which are acceptable by the selling companies for example as seen in previous sections buying with Kikuu requires using MTN Money. Other online platforms may require special cards known as debit or credit cards.

In Rwanda, banks provide means to pay using those cards. For example, Bank of Kigali provides options to buy on POS (Point of Sale) or on ecommerce platforms using Visa or MasterCard debit cards.

#### a. Debit & credit cards

A debit/credit card is a plastic card normally issued by a financial institution to allow its user to pay at Points of Sale in order to complete a purchase. They also allow the same purchase on online shopping platforms.

Debit and credit cards look alike and it is not easy to identify them simply by looking at them except when it is written on them. The main difference is where money is got from: for the debit cards money is immediately got from the owner bank account while for the credit card money is charged to the customer's credit line.

The image below shows the front and back side of a credit/debit card

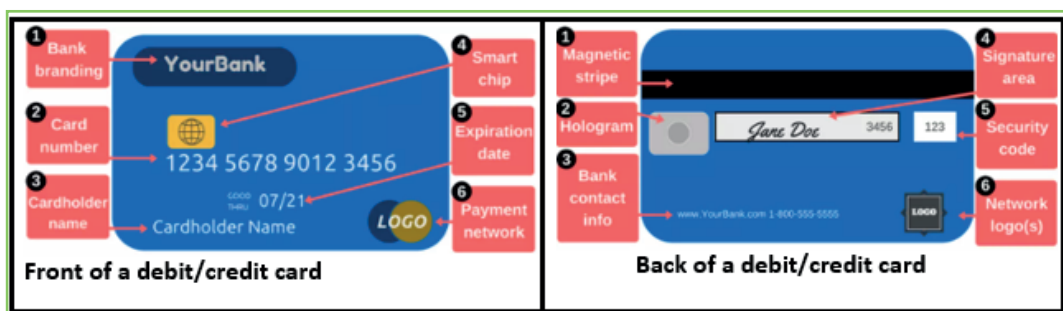


Figure 4. 7. Parts of a debit/credit card

### **The parts found on the front side of the credit card are:**

1. **Bank branding** which identifies the bank name that issued the card
2. **Card number** which is unique and identifies the client with the bank. The card number are the ones provided while purchasing online.

**Note:** Keep the card number a secret as that number can be used by ill-intentioned people

3. **Card holder name** is the name of person authorized to use that card
4. **Smart chip** is the electronic circuit (processor) which stores some information. The smart chip feature makes cards more secure than the magnetic-stripe-card only
5. **Expiration date** is the date after which the card is no longer usable. The reason for this is mainly for the purpose of providing new cards which are more technologically advanced. The expiry date is necessary while purchasing online as most platforms require this information and when it is wrong the transaction can't be done
6. **Payment network logo** is the type of card and this can be MasterCard, Visa and Discover. Services specify which types they accept for payments and knowing the card's type is very essential.

### **The parts found on the back side of the credit card are:**

1. **Magnetic stripe:** the black strip contains information about the card and its owner, and specialized devices known as card readers gather that information when the card is inserted
2. **Hologram:** is a mirror-like area showing a three-dimensional image that seems to move as the viewing angle changes. Holograms are security features which help merchants identify valid cards
3. **Bank contact information**
4. **Signature panel** is the place where the user's signature is put
5. **Security codes** is an additional code to help ensure that anybody using the card number has a legitimate, original card
6. Network logos

An example of a typical debit card is found below:



Figure 4. 8. B.K MasterCard debit card

### **b. 1. Using a debit/credit card to purchase**

The following are the steps of using a Debit/Credit card in online shopping:

1. Enter the address of the website where to purchase from in the address box of the browser's window.
2. Select items to purchase and click the appropriate button used for purchasing the item.
3. Enter the shipping, billing and debit/credit card details.
4. Click the appropriate button to complete the transaction.
5. Print the confirmation screen or proof of purchase received upon completing the transaction, and keep it until the item arrives.

For using debit cards at POS or ATMs insert the card and follow the prompts

### **c. Mobile Phone based Money**

Also called Mobile money is a technology that allows people to receive, keep and spend money using a mobile phone. It's sometimes referred to as a '**Mobile Wallet**' or by the name of a specific service

There are more different mobile money services around the world. Although they are most popular in Africa, Asia and Latin America. Mobile money is a popular alternative to both cash and banks because it's easy to use, secure and can be used anywhere there is a mobile phone signal.

Mobile money keeps funds in a secure electronic account linked to a mobile phone number. In some cases, the mobile money number will be the same as the phone number. Mobile money is often provided by the same companies that run the mobile phone services and it is available to both pre-pay and contract customers.

### APPLICATION ACTIVITY 4.2

1. List 5 public services that are paid using Mobile money here in Rwanda
2. Discuss the payment method at your school used to pay school fees?
3. What are the advantages of Mobile money payment method over paying cash at the bank counter ?

## 4.2. Social media

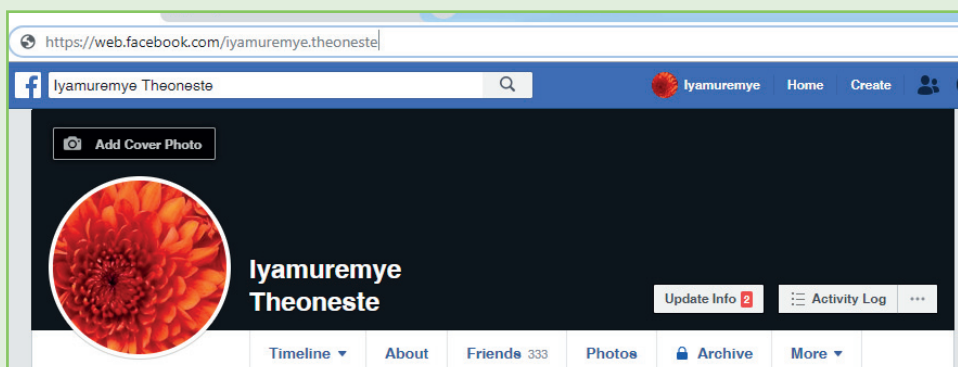
Social media is the collective of online communications channels dedicated to community-based input, interaction, content-sharing and collaboration which enable users to create or share content or participate in social networking.

Examples of social media are: Facebook, twitter, Instagram and WhatsApp

### 4.2.1. Facebook

#### ACTIVITY 4.2

Observe the image below and answer the questions below:



1. Discuss the nature of the window above
2. What do you understand by the term “**Social media**”?
3. Discuss the positive and negative impacts the social media has to the Rwanda Society

Facebook is one of the most popular free social networking websites. It allows registered users to create profiles, upload photos and videos, send messages and stay in touch with friends, family and colleagues.

### a. Creating a facebook account

For most social media before using them an account must be created. An account identifies the user as different from other users in the system.

The following steps are followed to create a facebook account:

1. Open Facebook Home page by entering in the browser's address bar the link [www.facebook.com](http://www.facebook.com)
2. The first page provides the option to login or sign up. Fill in the form the required information and click on sign up
3. Enter personal information (First name, Last name, email or phone number, Birthday and gender)
4. Enter the code provided through SMS or the provided email

The image displays three sequential screenshots of the Facebook account creation process. Screenshot 1, labeled '1', shows the 'Create a New Account' form with fields for 'First name', 'Last name', 'Mobile number or email', and 'New password'. Screenshot 2, labeled '2', shows the same form filled with the name 'Mukashyaka', 'Hemerlette', the phone number '0788766709', and a password. Screenshot 3, labeled '3', shows the verification step titled 'Enter the code from the SMS', with a text box containing the code 'FB- 41839' and a 'Send SMS Again' button. A blue double-headed arrow connects the first two screenshots, and a blue arrow points from the second to the third.

Figure 4. 9. Filling forms for creating facebook account

1. Open the verification email that is sent to the email provided while creating the account
2. Edit the profile information by logging into the new account and clicking on **Edit profile**

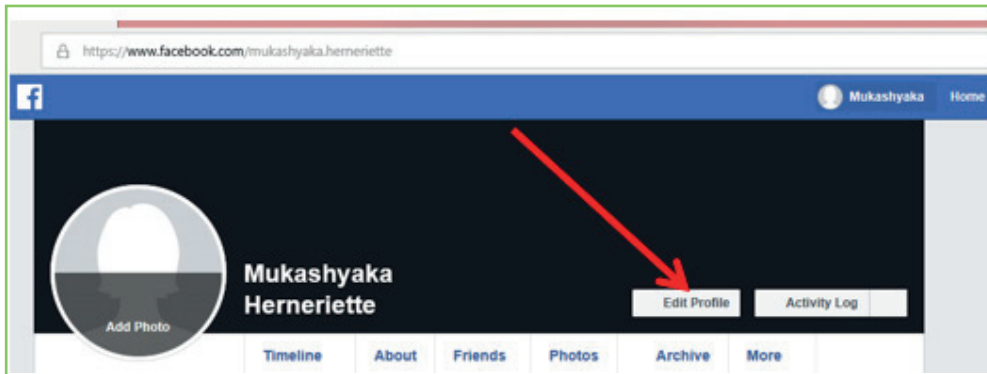


Figure 4. 10. Edit profile window

The following table will be appeared.

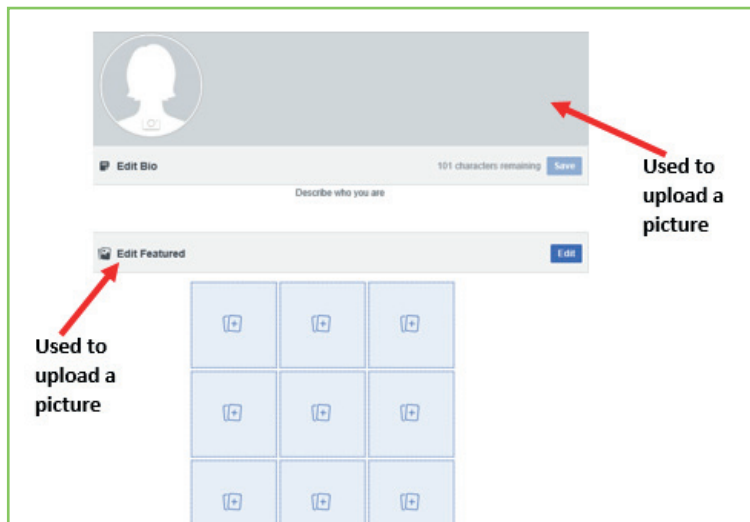


Figure 4. 11. Window to update a facebook profile

**Note:** The account has been created you are able to login into your facebook account:

Go to facebook.com and in the top right form fill in the email and the password then click on:

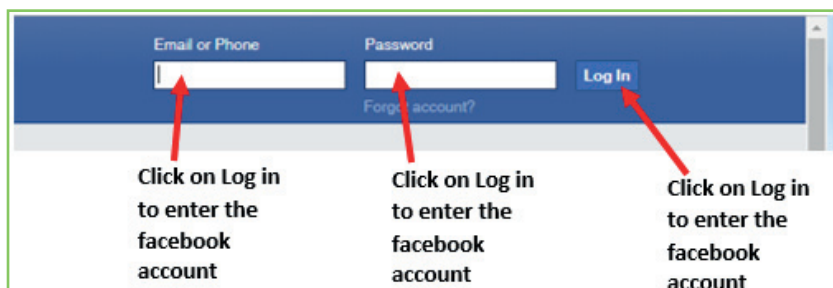


Figure 4. 12. Facebook Window for login

## b. Connecting with friends

Facebook has millions of users, all users are in the public and appear like anonymous to you. As a facebook user you are allowed to search for other users, viewing their profiles, friends, and photos. You can immediately message them in your inbox but once the account owner sets some restrictions on his/her account a non-friend user may view nothing among these.

In order to be able to fully communicate with another facebook user, you just need to be a facebook friend.

To have a friend on facebook go through this process:

- In the facebook search box enter the account of the friend to be



Figure 4. 13. Window to search for an account to make a friend

- Once the account is entered in the search box choose the correct facebook account among the many options and click **Add Friend**. In the image above the account chosen is **Shyaka Emmanuel**

## c. Sharing pictures

A facebook account holder can upload pictures on his/her facebook account, share them or share pictures uploaded by others.

Steps to upload a picture in your account are:

- In the menu click on **Photo** then on **Add Photos/Video**

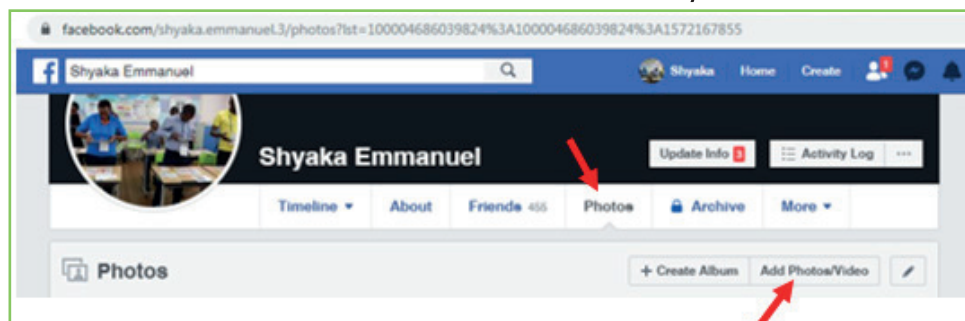


Figure 4. 14. Add photo options in facebook

- In the new window that will appear browse for the picture to upload and open it so that it gets uploaded.

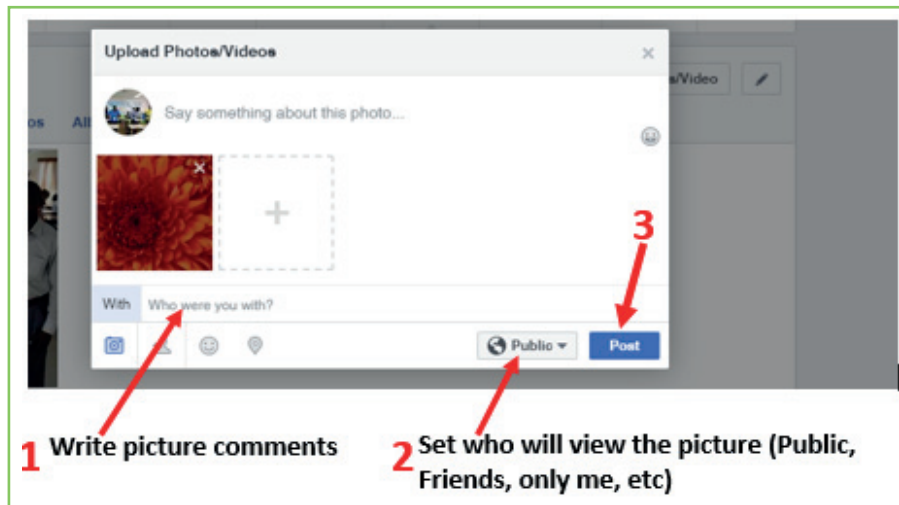


Figure 4. 15. Setting who has rights to view a posted picture

- Comment the picture, set who has rights to view it and click on Post like illustrated in the image above

The uploaded image can then be viewed by anyone (if right to view the image has been set to Public) and they can like, share and comment this image.

#### d. Chatting

Facebook provides the option to converse with friends by using the chat option whose window is available in the far down right zone of a facebook page.

The content of the chat is text but can be also attachments in form of text files, images, GIF files, videos or a laptop camera taken picture/video

### APPLICATION ACTIVITY 4.2

1. List and explain the steps to create a facebook account
2. Create a facebook account and give it your names. Upload your picture on the account's profile
3. Search and request for friends by focusing on your classmates
4. Chat with your friend and send them some documents related to your different subjects lessons

## 4.2.2. Twitter

### ACTIVITY 4.4

Observe the picture below:



- The above picture represent which popular social media
- Discuss the use of the social media stated in a

Twitter is a free microblogging service that allows registered members to broadcast short posts called tweets. Twitter members can broadcast tweets and follow other users' tweets by using multiple platforms and devices.

#### a. Creating an account

- For creating a twitter account first go enter in the browser's address bar twitter.com
- In the first page that will appear click on **Sign up**. This same page is used for sign in when the user has already a twitter account

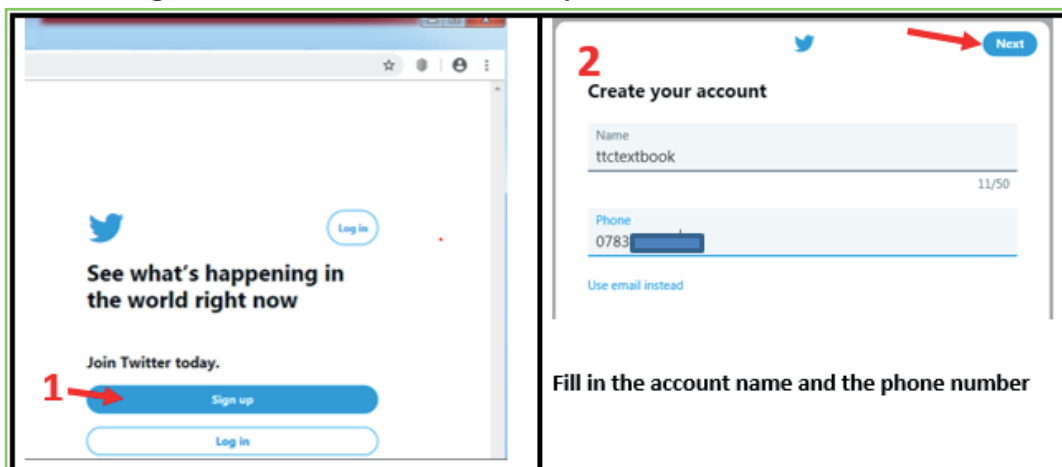


Figure 4. 16. First Twitter page for sign up and sign in (1) and form to fill to create a twitter account

- In the next screen that will appear also click on **Next**. Confirm the telephone number so and use the sent code to continue to the next stage

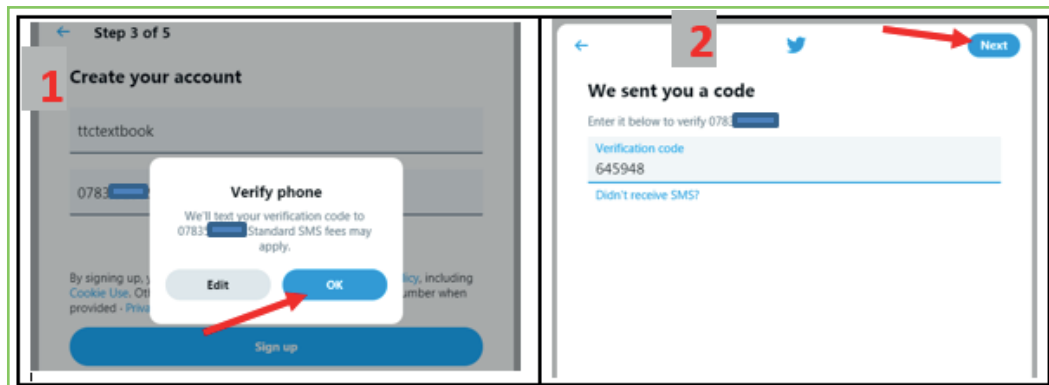


Figure 4. 17. Confirm the telephone number (1) and enter verification code windows

- In the next screen enter the password for your twitter account and click on **Next**.

The screen that will thereafter appear will allow you to edit the twitter account profile picture by clicking on the human head-and-body silhouette but this can be skipped to be done later.

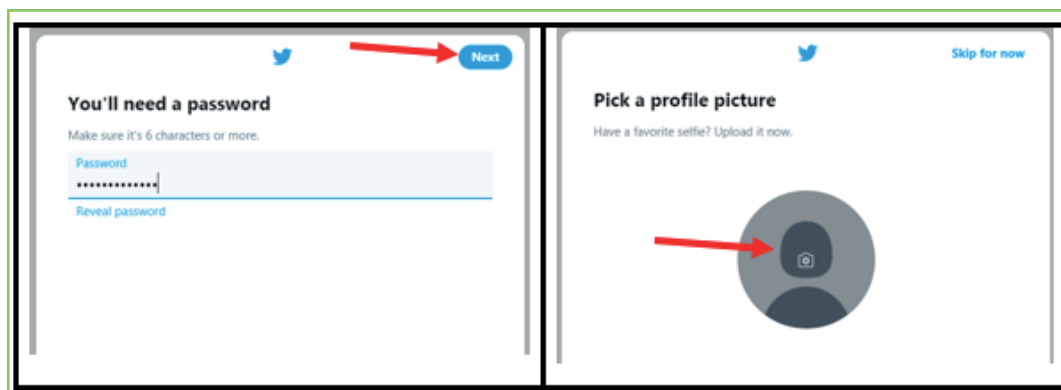


Figure 4. 18. Windows to set the password (1) and to set the account's profile picture (2)

In the next screens that will appear follow the prompts. Those screens will allow describing yourself, setting your interests, suggestions of accounts to follow, turning on notifications

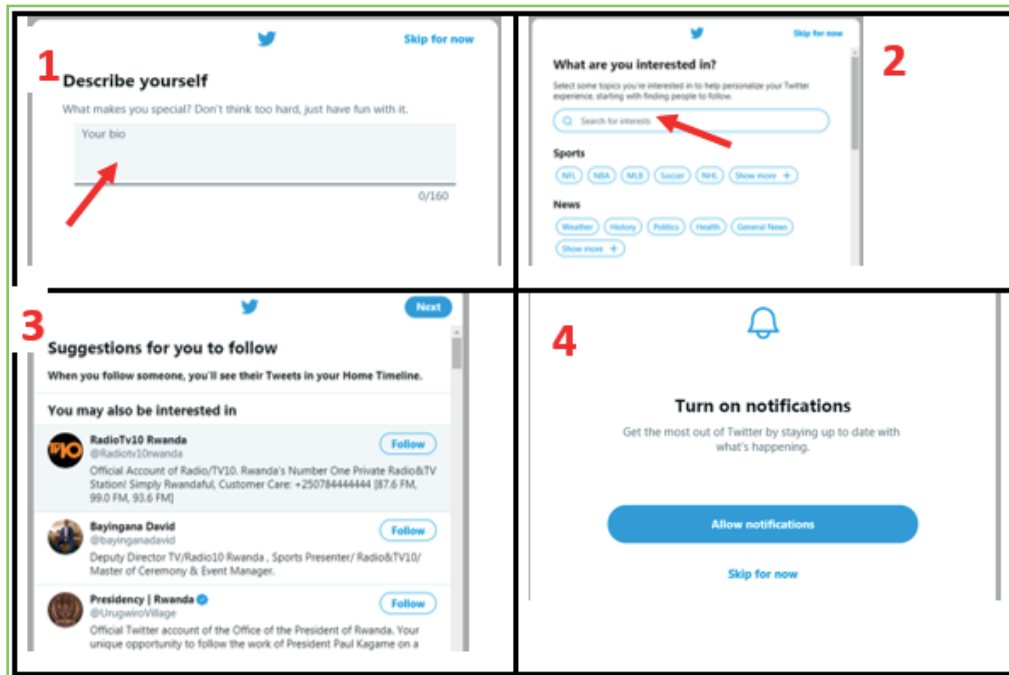


Figure 4. 19. Different windows (1, 2, 3, 4) gone through while creating a twitter account

In the steps given above the account creator may decide to go into additional steps depending on which features to activate. Here most of the options have been skipped or the default provided option was chosen. After going through all the steps the account is created and is ready to be used. However the steps are subject to change and screens may not look like the ones provided here depending on changes brought in by Twitter.

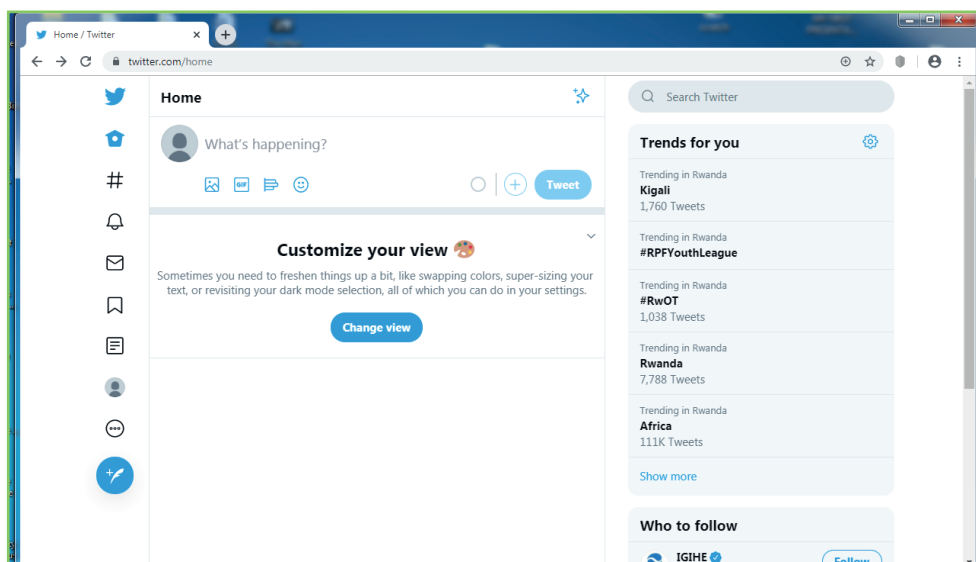


Figure 4. 20. Twitter account ready for use for the first time

## b. Following a twitter account

All social media provide better experience when one is acquainted with other user in the same social media network. For a twitter user to have better experience he/she has to follow other accounts.

Following an account permits one to receive immediately prompts when the followed account posts a tweet in form of text, image or video; updates the profiles immediately after they are posted.

Following a twitter account is done in these steps:

1. Search for the account to follow using the twitter search box
2. Next to the searched account click on **Follow**. The Follow tab will immediately change into **Following**

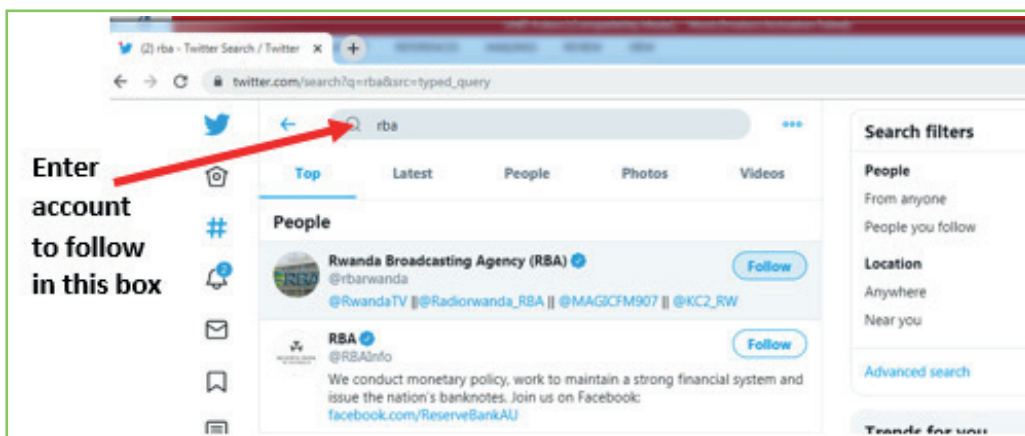



Figure 4. 21. Window to use to search for twitter accounts

## c. Tweeting

Also known as tweeting is posting making a post on the social media Twitter. The post can be just text, images and videos.

To post a tweet go through this process:

1. In the Twitter Home page click on the twitter  icon
2. In the text area that will appear write the tweet text. If images and videos are to be used in the tweet click on the corresponding icons below the text area
3. Once the tweet is ready click on Tweet. The tweet is now posted and can be viewed by the account followers and anyone who searches for it

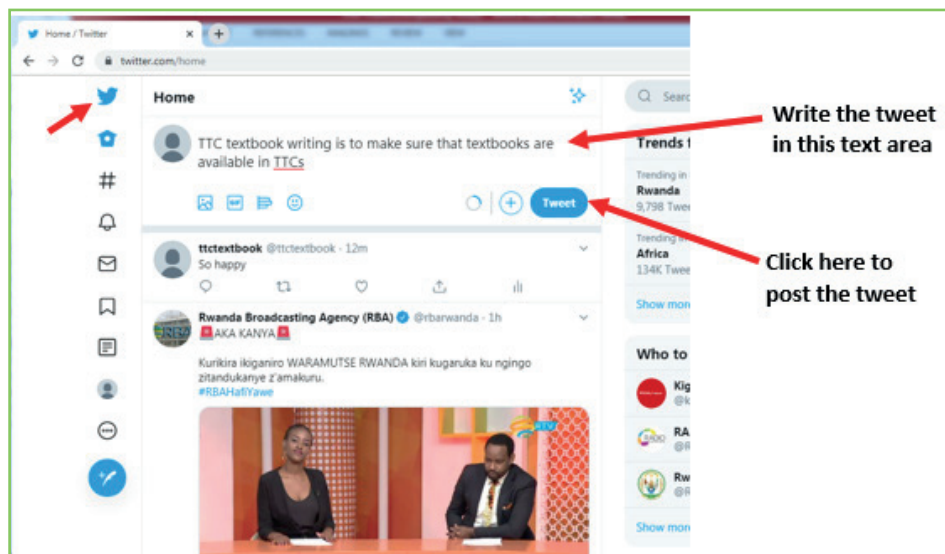






Figure 4. 22. Screen used to post a tweet

**Note:**

- Twitter provides the option to delete the created tweet by clicking on the drop down  $\nabla$  icon next to the tweet and clicking on **Delete**
- As one tweet is only of 280 character while tweeting choose properly the words to use. For this reason tweets contain more shortened words
- Twitter users can create hashtags which are keywords preceded by the hash sign and are easily searchable on twitter

**d. Twitter menu icons**

In the previous sections some of the available twitter options have been elaborated. Those options can however be easily accessed by using the icons located at the left side of a twitter account page. The table below represents those icons and their roles

SN	ICON	USE
1		Used to have the text area used for tweeting or for viewing tweets from other accounts
2		This is the Home icon. As twitter gets opened immediately the home page appears
3		Used to search for tweets containing a certain keyword
4		When clicked on all notification that the account received are displayed







5		Used to write new messages to send privately to twitter accounts. These messages can be sent to an account that follows you or specified to receive messages from anyone
6		Displays messages that have been bookmarked
7		Displays the list of accounts created
8		Provides the option to edit the twitter account profile
9		When clicked on it provides many options among which is one to log out the account
10		Used to have a window in which to write a new tweet and post it

Table 4. 1. Twitter icons and their use

#### APPLICATION ACTIVITY 4.4

1. What is Twitter and why should you use it?
2. Create your twitter account and do the following:
  - a. Make it have your picture as a profile picture
  - b. Search for accounts to follow mainly your classmates
  - c. Post some tweets about your school and lessons

#### 4.2.3. Instagram

##### ACTIVITY 4.5

- Instagram is one of the Social media platform used by many people:
- a. Discuss the use of Instagram
  - b. Do a research and differentiate Instagram from other social media namely facebook and Twitter
  - c. Analyze the Instagram icon and discuss how it relates Instagram use

Instagram is a free social networking service built around sharing photos and videos. It launched in October 2010 on iOS (iPhone Operating Systems) first, and became available on Android in April 2012 and can be accessed via computer internet browsers.

Similar to Facebook or Twitter, everyone who creates an Instagram account has a profile and a news feed. When a photo or video is posted on Instagram it will be displayed on the account's profile and accounts that follow you will see it in their own feed. Likewise posts from other accounts can be viewed if you chose to follow them.

Just like other social networks, an account can interact with others on Instagram by following them, being followed by them, commenting, liking, tagging.

### a. Creating an Account on Instagram

Like other social media one cannot use Instagram without having an account created and for that go through these steps:

1. Enter in the browser's address bar the URL of the application (instagram.com)
2. In the form that appear to the right of the new page fill in the required details and click on **Sign up**

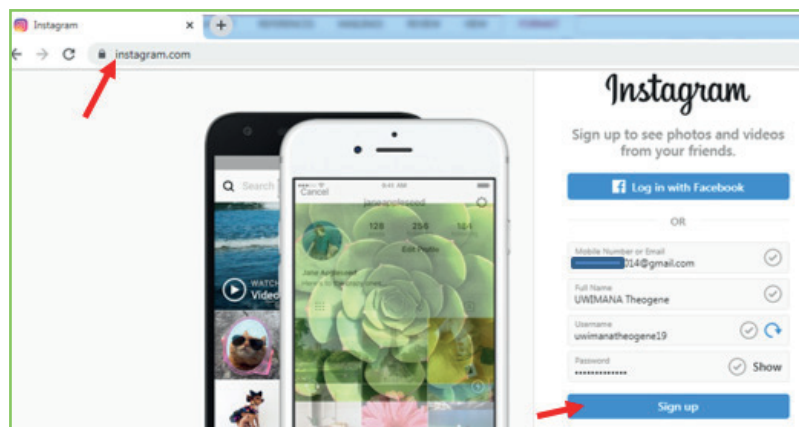


Figure 4. 23. Instagram Create account form

3. in the next screen click on Turn on (to turn on notification) or Not so as to be directed to the Instagram first page

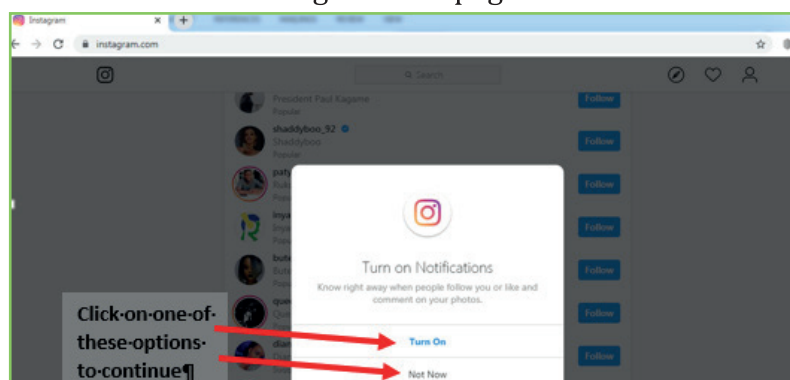


Figure 4. 24. Window to turn on notifications and have access to other accounts

#### d. Instagram main icons

Instagram has got icons which help carry out the basic functions. Those icons are shown in the image below:

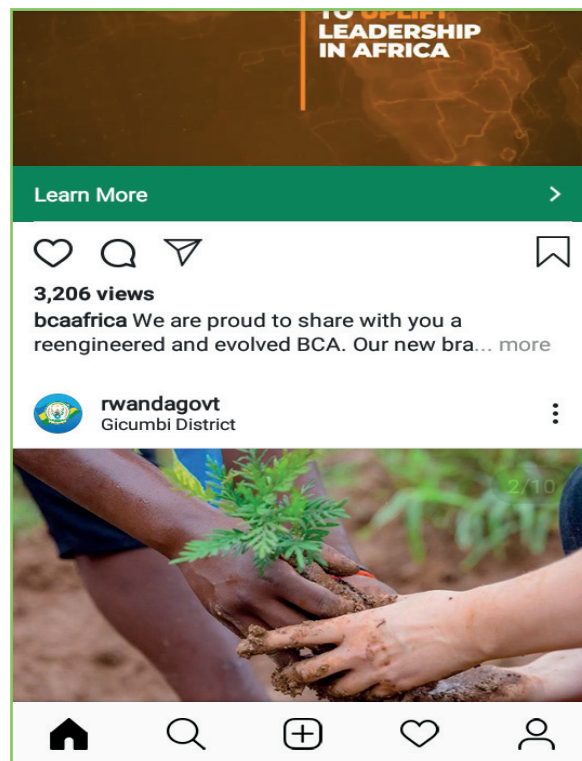








Figure 4. 25. Instagram page with its icons

The role of each icon is explained in the table below:

ICON	USE
	The home icon used to move to the Instagram first page
	Icon used to search for accounts, tags and places
	When clicked on it allows to create a post which can be a picture or video (this icon is not available with web Instagram accessible by using web browsers)
	When it is under a video or picture it is for liking it but when at the bottom side of Instagram it shows all likes in your posts, posts by friends and followers
	Used to view and edit an account's profile
	Used for bookmarking some posts




	This is used when an account user wants to message directly another account
	Used to add a comment on a post
	Used to view the Instagram TV (IGTV)

Table 4. 2. Instagram main icons and their use

### APPLICATION ACTIVITY 4.5

1. Create an Instagram account under your name
2. Follow some of your class mates
3. Create posts and comment posts from other accounts

### 4.2.4. WhatsApp

#### ACTIVITY 4.6

Umurerwa, a grade 2 student, has heard of a phone application that she can use to chat, send a photo and video call. She decided to use her father's phone to find this app.

Observe the screen of Umurerwa's father



Answer the below questions:

1. Among these applications, which application Umurerwa should use?
2. Explain why you have chosen that application

WhatsApp is a popular messaging app with end-to-end encrypted instant messaging that can be used on various platforms, including Android, iPhone and Windows smartphones, and Mac or Windows PCs.

For WhatsApp to be installed on PCs an auxiliary application is needed in order to create a virtual environment resembling a Mobile Operating System in which WhatsApp will be installed. Such auxiliary applications are **NoxPlayer** and **Blue Stack**.

### A. Installing WhatsApp

Installing WhatsApp first requires downloading it through the phone application for downloading applications. For android that application is Play Store. Download WhatsApp by searching for it in Play Store and install it by going through the prompts

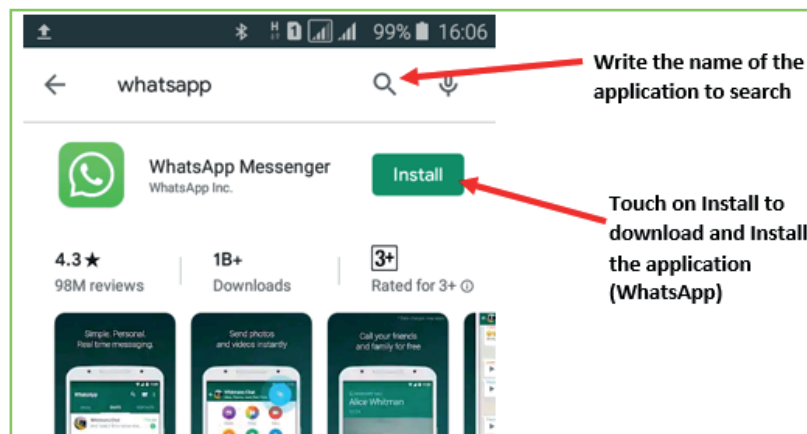


Figure 4. 26. Android phone window for downloading and installing applications (WhatsApp)

In the next screen that will appear touch on Accept and let the application download. When there is not enough space for downloading the application, it will be necessary to delete some files to liberate some space.

Downloading and installing WhatsApp will go through these steps shown in the screenshots below:

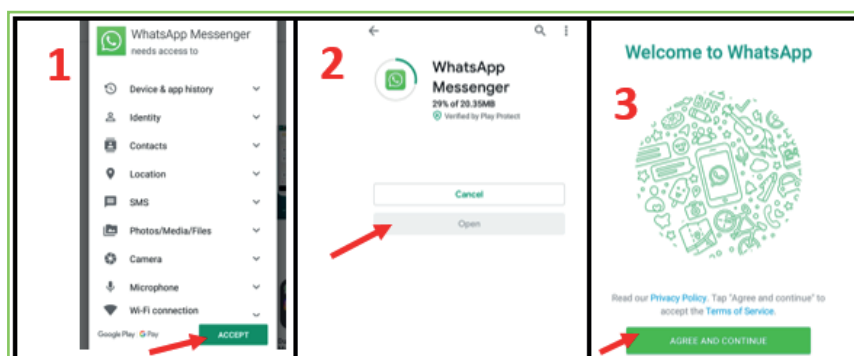


Figure 4. 27. Screens download and install WhatsApp

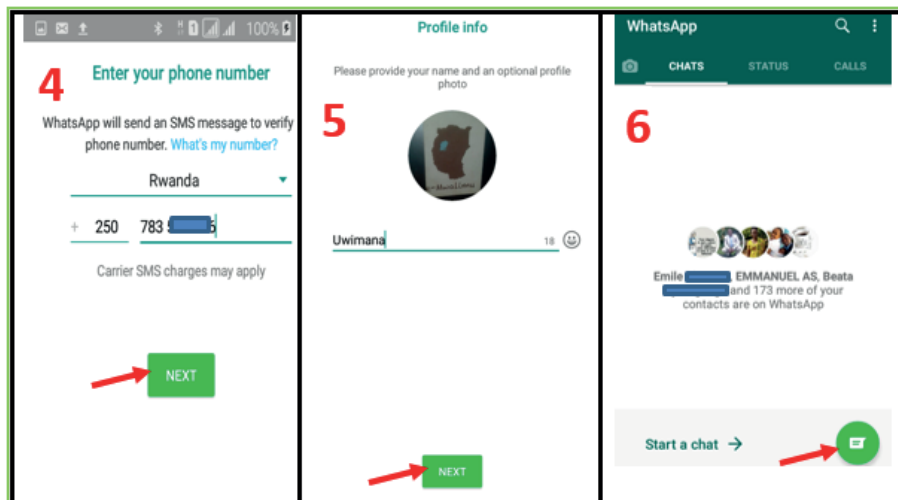


Figure 4.28. Setting WhatsApp installation

### Interpretation of the screens:

- a. **Screen One:** The choosing of the application to download and install has already been done now the person has to agree that WhatsApp will have rights to have access to some of the resources in the telephone.
- b. **Screen Two:** WhatsApp is now being downloaded and is at 26%. Once downloading is over the application will install itself and when finished the user will touch on **Open** to do further configurations.
- c. **Screen Three:** Once the **Open** option is touched in the next screen touch on **Agree and Continue** to agree to the terms of service.
- d. **Screen Four:** In this screen fill in the phone number to use on WhatsApp and touch on Next. A WhatsApp code message will be sent to your telephone. Enter it in the next screen and continue
- e. **Screen Five:** Configure WhatsApp by uploading an image that will be used as a profile picture to your account and set the account name.
- f. **Screen Six:** WhatsApp is now installed. Start chatting by touching on the icon shown by an arrow.

### B. Adding a Status in WhatsApp for Android

Similar to apps like Snapchat and Instagram, WhatsApp Status is a place for snapping pictures of whatever you're doing and then uploading them to your profile where they're available for your contacts to see for 24 hours. To get started with Status:

- Tap the Status bar on the home screen.
- Tap the camera icon at the bottom-right.

- Take a picture or video.
- Add any filters, stickers, text, or whatever else you'd like.
- Tap the green circle at the bottom-right to add the post to your Status.

#### APPLICATION ACTIVITY 4.6

1. Discuss the improvement WhatsApp has brought in the communication area in Rwanda
2. Compare options provided by WhatsApp and Instagram

### 4.3. Online Services

An online service refers to any information and services provided over the Internet. These services not only allow subscribers to communicate with each other, but they also provide unlimited access to information. Online services may include E Banking, E payment, etc

#### 4.3.1. E-Banking and E-Payment

#### ACTIVITY 4.7

##### Read the scenario below:

During the weekend, Kamana was sent home for school fees issues but on Monday, 7:30 AM he must attend the exam after the payment of the school fees. Umwalimu Sacco Cooperative where Kamana's parents keep their money did not open as it was on Sunday.

Answer the questions below:

1. What Kamana should do to not miss the exam?
2. Give examples of services that can be paid electronically in Rwanda

#### E-Banking and E-Payment

It is an electronic transfer of money from bank account, usually checking account without the use of the paper check. E-cash is a form of an Electronic payment system where a certain amount of money is stored on client's device and made accessible for online transaction.

### **a. E Banking**

Electronic banking is a form of banking in which funds are transferred through an exchange of electronic signals rather than through an exchange of cash, checks, or other types of paper documents

It is also a method of banking in which the customer conducts transactions electronically via the Internet.

Transfer of funds occur between financial institutions such as banks and credit unions. They also occur between financial institutions and commercial institutions such as stores. Whenever someone withdraws cash from an Automated Teller Machine (ATM) or pays for services using a debit card, the funds are transferred via electronic banking.

E-banking is a safe, fast, easy and efficient electronic service that enables an access to a bank account and to carry out online banking services, 24 hours a day, and 7 days a week.

With this service you save your time by carrying out banking transactions at any place and at any time, from home or office provided there is internet access.

#### **E-banking enables the following:**

- Accurate statement of all means available in your bank account
- Statement of current account, credits, overdrafts and your deposits
- Execution of national and international transfers in various currencies
- Execution of all types of utility bill payments (electricity, water supply, telephone bills, and many others)
- Carrying out customs payments
- Electronic confirmation for all transactions executed by E-banking
- Management of your credit cards

#### **Disadvantages**

The disadvantages presented by E-banking are linked to the fact that it is a new technology which is not usable by anyone especially in countries where ICT literacy is still a problem.

Other disadvantages are also linked to weaknesses in the system that may be exploited by hackers who may steel money using weaknesses found in the system

## **b. E payment**

An e-payment system is a way of making transactions or paying for goods and services through an electronic medium, without the use of checks or cash. It's also called an electronic payment system or online payment system. E-payment includes the use of Debit/credit card, Mobile Money

### **Services done by mobile money**

Services provided by Mobile Money include money transactions whereby money can be sent from one telephone user to another who can then withdraw the money as cash or keep it and use to pay for different goods and services.

### **Example**

In Rwanda mobile money services are provided by TIGO Cash, MTN Mobile Money and Airtel Money. They include money transfer and withdrawal from a mobile money account and from even a bank account, payment of different bills like water and electricity.

### **APPLICATION ACTIVITY 4.7**

1. Give 3 differences between credit card payment and mobile money payment
2. By conducting a research on the Internet, analyze the Rwandan context in terms of electronic payment. Give the benefits to Rwandans if the country adopts electronic payment in all transactions.

### **4.3.2. Irembo local online services**

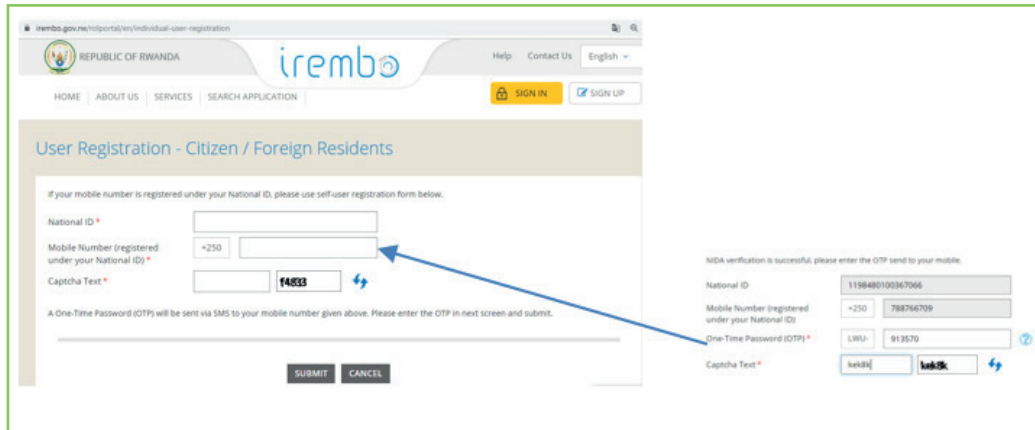
#### **ACTIVITY 4.8**

By searching the Internet, list the services available for Irembo.rw and analyze them if they meet the expectations of the local population.

Irembo is an initiative by the Government of Rwanda aiming at improving its service delivery to the citizens and businesses. Irembo is the one-stop portal for e-Government services. Irembo as a platform has the role of the provision of Government services online with ease, efficiency and reliability.

## How to create account from irembo

- Type [www.irembo.gov.rw](http://www.irembo.gov.rw) in the address bar of your browser

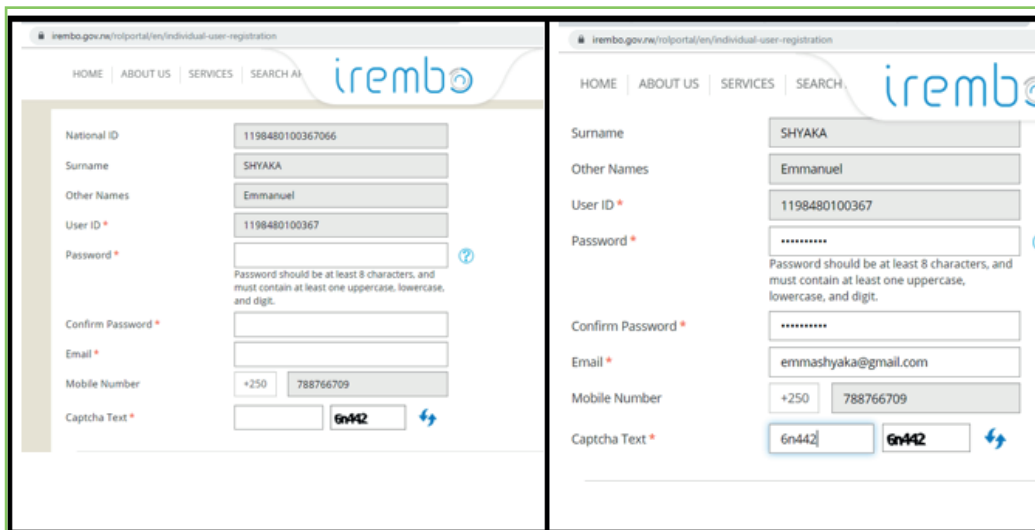


The screenshot shows the 'User Registration - Citizen / Foreign Residents' page on the Irembo portal. It features a form with the following fields: National ID, Mobile Number (with a '+250' prefix), and a Captcha Text field. A blue arrow points from the Captcha Text field to the right side of the page, where a verification message states: 'NIDA verification is successful, please enter the OTP send to your mobile.' Below this message, there are fields for National ID (1198480100367066), Mobile Number (788766709), One-Time Password (OTP) (913570), and another Captcha Text field.

Figure 4. 29. User Registration Form

Fill in dialogue box black space

- a. Password place
- b. Confirm Password
- c. Email
- d. Captcha Text



The image shows two side-by-side screenshots of the Irembo account creation process. The left screenshot shows the 'User Registration' form with the following filled-in fields: National ID (1198480100367066), Surname (SHYAKA), Other Names (Emmanuel), User ID (1198480100367), Password (masked with dots), Confirm Password (masked with dots), Email (empty), Mobile Number (+250 788766709), and Captcha Text (6n442). The right screenshot shows the 'User Registration' form with the following filled-in fields: Surname (SHYAKA), Other Names (Emmanuel), User ID (1198480100367), Password (masked with dots), Confirm Password (masked with dots), Email (emmashyaka@gmail.com), Mobile Number (+250 788766709), and Captcha Text (6n442).

Figure 4. 30. Forms used to create an Irembo account

These services are subject to changes as some services can be added but the ultimate goal is to have all services offered through this platform.

### a. Requesting for Irembo service

Requesting for services on Irembo requires first to have a username which is the identity card number without the last three digits and a password

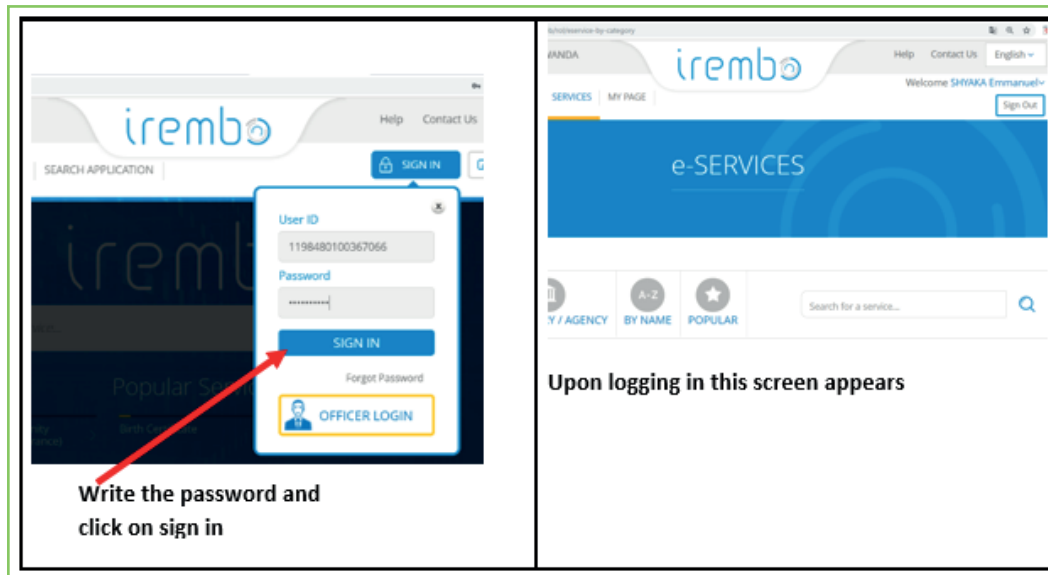


Figure 4. 31. Signing into an Irembo account

### b. Current Irembo services

Currently, Irembo services are into these categories:

1. Immigration and emigration
2. Land
3. Local government
4. National ID
5. Notarization and Gazette services
6. Police
7. Rwandans living abroad
8. Media
9. Education
10. Health
11. Ubudehe and mutuelle
12. Institutions of national meseum of Rwanda
13. Transportation
14. Tourism

### **Requesting for a criminal records clearance**

1. Open irembo website
2. Enter your ID and Password
3. Payment using VISA, MasterCard , MTN Mobile money(\*182#), airtel (\*182#), Tigo(\*310#) Mobicash or BK
4. After paying you send sms/email confirming that you have requested a service and service paid
5. Feedback of certificate must be sent to you after 3 days

### **Advantages of using irembo**

1. Helps citizens to save a time
2. Save transport
3. People can request a service when he or she is at home
4. Reducing corruption malpractices
5. It creates jobs
6. It simplifies access to the Government services
7. Avoiding friendship

### **APPLICATION ACTIVITY 4.8**

1. List and explain 5 advantages of using IREMBO Service
2. Explain at least 3 problems that Irembo services have come to solve

### **END UNIT ASSESSMENT**

1. Give the difference between WhatsApp , Instagram and Twitter ?
2. Using a clear example, explain 3 common features of social media
3. Give examples of services that can be paid electronically in Rwanda
4. Give 3 differences between credit card payment and mobile money.

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