SPREADSHEETS

A spreadsheet is a grid of rows and columns that accepts entry of data, allows editing, formatting and manipulation of numeric data. Spreadsheets can also display data graphically with the help of charts and graphs.

**TYPES OF SPREADSHEETS**

1. **Manual spreadsheets**. The manual spreadsheet is the most commonly used type by book keepers as a ledger book with many sheets of papers divided into rows and columns on which various amounts of money are entered manually using a pen or a pencil and manipulated manually with the help of a calculator.
2. **Electronic spreadsheets**. An electronic spreadsheet is a spreadsheet prepared using a computer program that enables the user to enter values in rows and columns and to manipulate them mathematically using formulae and functions automatically.

Examples of electronic spreadsheet programs include; ViscCalc, Lotus 1-2-3, Microsoft Office Excel, Quattro Pro, Microsoft Works, Multiplan, View sheet, Lucid 3D, etc.

**Advantages of Manual Spreadsheets**

1. They are easy and cheap to acquire
2. They are easily portable
3. They are suitable for draft or rough work
4. They are not electronic, thus, can be used without electric power
5. No skills are needed, hence, even a computer illiterate can use manual spreadsheets

**Disadvantages of Manual Spreadsheets**

1. They require a lot of manual effort and time
2. Many errors are bound to be made
3. Rubbing out to correct errors makes the work untidy
4. They do not have pre-existing tables as opposed to electronic spreadsheets
5. They are very small in size
6. They are not durable. They can easily wear and tear out
7. They do not have automatic formulas that would otherwise quicken the work
8. You cannot easily insert or delete extra columns and rows

**Advantages of Electronic Spreadsheets**

1. They have pre-existing tables, thus, no need to draw gridlines
2. They have in-built formulas and functions, enabling automation in calculations and work manipulations
3. There are minimal errors and in case of any, they are easily corrected
4. They have very large worksheets that can store a lot of work easily and for long
5. Extra columns and rows can be inserted and deleted without any bad effect
6. The work can be protected with passwords thus ensuring security
7. Work can be enhanced to look very attractive with various formats to suit the user’s needs
8. The records can be sorted and filtered to get only those that you want
9. They allow printing of multiple copies without re-creation

**Disadvantages of Electronic Spreadsheets**

1. They are expensive to buy and maintain
2. They are electronic, thus cannot be used without electricity
3. They require computer skills and continuous training
4. There is data loss due to virus attacks and system failure
5. There are privacy problems like unauthorised access over networks
6. Health related hazards as they are associated with use of computers

**FEATURES OF ELECTRONIC SPREADSHEET SOFTWARE**

1. **Workbook**. This is a collection of multiple worksheets in a single file
2. **Worksheet**. This is a single page of a workbook. It is an equivalent of a work area in Microsoft Word. A worksheet is made up of rows and columns which intersect to form cells. Worksheets are labelled sheet1, sheet2, sheet3 by default, but they can be renamed. A workbook by default has 3 worksheets, however, these can be increased in the user’s interest and renamed
3. **Columns**. These are vertical lines which run through the worksheet. Worksheet columns are labelled by letters; A, B, C, D, E… which are displayed in grey buttons across the top of the worksheet
4. **Rows**. Are horizontal lines across a worksheet. Worksheet rows are labelled by numbers; 1, 2, 3, 4, 5… which are displayed in grey buttons across the left of the worksheet
5. A **cell**. This is an intersection of a column and a row. Each cell on the spreadsheet has a cell address. *A cell address* is a unique name of a cell. It is given by the column letter and row number, e.g. A1, B5, G6, D12, C1, A4, B3, etc. Cells can contain; text, numbers, formulas, etc.
6. **Range**. It is a group of adjacent cells defined as a single unit. A range address is a reference to a particular range. It has a format of top left cell address : bottom right cell address. e.g. D5:G10
7. **Value**. This is a numerical entry in a cell. All values are right aligned in a cell by default.
8. **Labels**. This is a text entry in a cell. All labels are left aligned in a cell by default
9. **Name box**. This displays the address of the selected cell or cells. Also you can rename a selected cell or cells using the name box
10. **Formula bar**. Is a bar at the top of the Excel window that you use to enter or edit values or formulas in cells or charts.
11. **Autofill**. This is the feature that allows you to quickly fill cells with repetitive or sequential data such as chronological dates or numbers, and repeated text. To use this feature, you type one or two initial values or text entries, and then Autofill does the rest using the fill handle, which is the small black square in the lower-right corner of the selection. When you point to the fill handle, the pointer changes to a black cross. Autofill recognises series of numbers, dates, months, times and certain labels.
12. **Sorting data** is to arrange records in either ascending or descending order.
13. **Filtering data**is the displaying of records that satisfy the set condition from the parent list.
14. **Database**. These are data values that can be entered in the cells of the spreadsheet and managed by special spreadsheet features found on the data menu. ***The special spreadsheet features include***; cell referencing, data replication, automatic recalculation, formulas and functions, data filtering, copy, cut and paste, clip art.
15. **Graphs**. A graph is a pictorial representation of the base data on a worksheet. Most spreadsheets refer to graphs as charts.**A *chart*** is a graphical representation of data. A chart may be 2-D or 3-D
16. **What-if analysis**. Is a process of changing the values in cells to see how those changes affect the outcome of formulas on the worksheet. For example, varying the interest rate that is used in the paying-back table to determine the amount of the payments.
17. **Freezing panes**. This is where rows and columns are frozen such that they remain visible as you scroll through the data especially if the database is too big to fit on one screen.

**Uses/Applications of Spreadsheets**

1. Preparation of budgets
2. Preparation of cash flow analysis
3. Preparations of financial statements
4. Processing basic business information, like, job costing, payment schedules, stock control, tax records
5. Analysis of data from questionnaires
6. Presentation of information in tabular form, graphical or charts forms
7. Mathematical techniques and computation like trigonometry
8. Statistical computations like standard deviations.

**OPERATORS**

Operators specify the type of calculation that you want to perform on the elements of a formula. There is a default order in which calculations occur, but you can change this order by using brackets.

**Types of Operators**

There are four types of calculation operators: arithmetic, comparison, text concatenation, and reference.

**Arithmetic operators**

These are used to perform basic mathematical operations such as addition, subtraction, division or multiplication; combine numbers; and produce numeric results.

**Arithmetic operator Meaning Example**

+ (plus sign) Addition 3+3

– (minus sign) Subtraction 3–1

Negation –1

\* (asterisk) Multiplication 3\*3

/ (forward slash) Division 3/3

% (percent sign) Percent 20%

^ (caret) Exponentiation 3^2

**Comparison Operators**

These are used to compare two values, and the result is a logical value either TRUE or FALSE.

**Comparison operator Meaning Example**

= (equal sign) Equal to A1=B1

> (greater than sign) Greater than A1>B1

< (less than sign) Less than A1<B1

>= (greater than or equal to sign) Greater than or equal to A1>=B1

<= (less than or equal to sign) Less than or equal to A1<=B1

<> (not equal to sign) Not equal to A1<>B1

**Reference Operators** combine ranges of cells for calculations. Examples include;

**Reference operator Meaning Example**

: (colon) Range operator, which produces one reference to all the B5:B15

cells, between two references, including the two references

, (comma) Union operator, which combines multiple SUM(B5:B15,D5:D15) references into one reference

(space) Intersection operator, which produces one reference B7:D7 C6:C8

to cells common to the two references

& (ampersand) Connects two values to produce one continuous text value ("North"&"wind")

**CELL REFERENCES**

**A Cell reference** is an address given to a particular cell or group of cells on a worksheet. e.g. A2, B6, B3. There are three types of cell references;

1. **Relative cell reference**. Here, the address of a cell is based on the relative position of the cell that contains the formula and the cell referred to. If you copy the formula, the reference automatically adjusts. A relative cell reference takes the form: A1, B17, G20, C2.
2. **Absolute cell reference**. Here, the exact address of a cell is used in the formula, regardless of the position of the cell that contains the formula. An absolute cell reference takes the form: $A$1, $D$6, $B$3, $E$6.
3. **Mixed cell reference**. This is a type that uses both relative and absolute cell references at once. It may use an absolute column reference and a relative row reference or vice versa, e.g. $G17, B$14, D$2, $E2.

**FORMULAS**

Formulas are equations that perform calculations on values in your worksheet and return a value in a chosen cell, e.g. =A2+B2, =(A3+B3+C3+D3)/4, =A6\*B4, =C4-D4, =E10/G10

**LOGICAL FUNCTIONS**

**Function Description**

AND Returns TRUE if all of its arguments are TRUE; Returns FALSE if any argument is FALSE

FALSE Returns the logical value FALSE

IF Specifies a logical test to perform

IFERROR Returns a value you specify if a formula evaluates to an error; otherwise, returns the result of the formula

NOT Reverses the logic of its argument

OR Returns TRUE if any argument is TRUE

TRUE Returns the logical value TRUE

**ERROR ALERTS**

Microsoft Excel displays an error value in a cell when it cannot properly calculate the formula for that cell. Below are some common error values and their meanings.

**Error message Meaning**

1. ##### Column is not wide enough, or a negative date or time is used.
2. #DIV/0! A number is divided by zero
3. #N/A! A value is not available to a function or formula
4. #NAME? Microsoft Office Excel does not recognise text in a formula.
5. #NULL! You specified an intersection of two areas that do not intersect
6. #NUM! The numeric values used in a formula or function are invalid
7. #REF! The cell reference is not valid, e.g. 6E instead of E6
8. #VALUE! An argument or operand used is of wrong type

**FUNCTIONS**

A function is a prewritten formula that takes a value or values, performs an operation, and returns a value or values in a chosen cell. Examples of functions in MS Office Excel include the following:

|  |  |  |
| --- | --- | --- |
| **Function** | **Description** | **Example** |
| SUM | Adds all the numbers in a range of cells | =SUM(B2:G2) |
| PRODUCT | Multiplies all the numbers given as arguments and returns the product | =PRODUCT(A2:D2) |
| QUOTIENT | Returns the integer portion of a division | =QUOTIENT(D4,A1) |
| MAX | Returns the largest value in a set of values | =MAX(D4:D10) |
| MIN | Returns the smallest number in a set of values | =MIN(A2:A12) |
| LARGE | Returns the kth largest value in a data set, e.g. the fifth largest value | =LARGE(B1:B9,5) |
| COUNT | Counts the number of cells in a range that contains numbers | =COUNT(A1:E9) |
| COUNTIF | Counts the number of cells in a range that meet the given criteria | =COUNTIF(A1:C9,”<10”) |
| CountBlank | Counts the number of empty cells in a specified range of cells | =COUNTBLANK(A2:H8) |
| AVERAGE | Returns the average (arithmetic mean) of the arguments | =AVERAGE(B2:B15) |
| MEDIAN | Returns the median, or number in the middle of the set of given numbers | =MEDIAN(D4:D10) |
| MODE | Returns the most frequently occurring, or repetitive, value in an array or range of data. | =MODE(C2:C9) |
| Frequency | Calculates how often values occur within a range of values, and then returns a vertical array of numbers | =FREQUENCY(A1:A9, C2:C6) |
| VAR | Estimates variance based on a sample | =VAR(A2:A9) |
| STDEV | Estimates standard deviation based on a sample. | =STDEV(D2:D9) |
| RANK | Returns the size of a number relative to other values in a list of numbers. The order of ranking can be in ascending or descending | =RANK(A2,$A$2:A9,0) |
| SQRT | Returns a positive square root | =SQRT(B5) |
| POWER | Returns the result of a number raised to a power | =POWER(number, power) |
| IF | Returns one value if a condition you specify evaluates to TRUE and another value if it evaluates to FALSE. Use IF to conduct conditional tests on values and formulas. | =IF(A2<50,”fail”, “pass”) |
| LOOKUP | Returns a value either from a one-row or one-column range or from an array |  |
| VLOOKUP | Searches for a value in the first column of a table array and returns a value in the same row from another column in the table array | =VLOOKUP(A2,grades,2) |
| HLOOKUP | Searches for a value in the top row of a table or an array of values, and then returns a value in the same column from a row you specify in the table or array |  |

ELECTRONIC PRESENTATION SOFTWARE

This is application software used to create presentations, which can communicate ideas and other information to a group of audience. The presentation can be viewed as a slide show, which usually displays on a large monitor or projected screen. Some presentation software can convert an existing slide show into a format that can be accessed on the web.

***Examples of popular electronic presentation software include***; Microsoft PowerPoint, Corel Presentations, Lotus Freelance Graphics, Microsoft Producer, Open Office Presentation, etc.

**Applications of Presentation Software**

1. Presenting learning materials to students in schools (CAL)
2. Presenting speeches and minutes in meeting
3. Used in training sessions
4. Used in presenting campaign manifestos
5. Used in conferences and seminars
6. Used in sales promotions to market products
7. Used in business shows, mobile kiosks and clinics

**Principles of a Good Presentation**

When preparing a presentation, you must consider the following principles. This improves the quality of your presentation, makes it more effective and enjoyable and in the long run saves you time and effort.

* Simplicity of the presentation. The best slide is usually simple, easy and to the point. The audience may need more time to understand complicated slides while time is always limited during presentations.
* Know the audience and their expectations in order to give the right message to the right people. e.g. are they children, matures or a mixture. Are they clients or seniors of the organisation
* Relevance of the content. Ensure that the content of your slides is relevant to the topic of discussion in order to capture the attention of the audience
* Use of images, graphics and diagrams. Slides are visual aid to help you explain complex ideas in an easy way. Therefore, use the right and relevant images, graphics and charts to represent your ideas visually.
* Make the right choice of colours, font styles, font sizes, transitions, animations, links which suit the viewers

**Advantages of Presentation Software**

1. Presentation software usually provides a wide variety of presentation formats and layouts for the slides
2. Multimedia components such as clip art images, video clips and audio clips can be incorporated into slides
3. The timing of the slides can be set so that the presentation automatically displays the next slide after a predetermined period of time.
4. Special transition effects can be applied between each slide
5. The presentation can normally be viewed and printed in different formats

**FEATURES OF ELECTRONIC PRESENTATION SOFTWARE**

1. **Presentation**. This is a PowerPoint file made up of a series of slides, audience hand-outs, speaker’s notes and outline among others.
2. **Slide**. Is an individual page of a presentation
3. **A slide master.** Is the top slide in a hierarchy of slides that stores information about the theme  and slide layouts of a presentation, including the background colour, fonts, effects, placeholder sizes, and positioning.
4. **A PowerPoint template**. This contains layouts (layout: The arrangement of elements, such as title and subtitle text, lists, pictures, tables, charts, shapes, and movies, on a slide.), theme colours (theme colors: A set of colors that is used in a file. Theme colors, theme fonts, and theme effects compose a theme.), theme fonts (theme fonts: A set of major and minor fonts that is applied to a file. Theme fonts, theme colors, and theme effects compose a theme.), theme effects (theme effects: A set of visual attributes that is applied to elements in a file. Theme effects, theme colors, and theme fonts compose a theme.), background styles, and even content.
5. **Animation**. Refers to special effects for introducing text in a slide during a slide show.
6. **Placeholder**. Placeholders are the containers in layouts that hold such content as text (including body text, bulleted lists, and titles), tables, charts, SmartArt graphics, movies, sounds, pictures, and [clip art (clip art: A single piece of ready-made art, often appearing as a bitmap or a combination of drawn shapes.)](javascript:AppendPopup(this,'ofclipart_1_1')).
7. **Transition effects**. This refers to different styles in which slides come and leave the screen during a presentation. ***Slide transition*** is a special effect for introducing an entire slide during a slide show
8. **Graphics**. A general term used to mean pictures, images, charts, photo, tables, etc, that you can add to a presentation
9. **ClipArt**. A general term for a library of pictures in the computer. ***Presenter’s notes***,these contain ideas you want to discuss for each slide in your presentation.
10. **Action buttons**. Are ready-made buttons that can be inserted into your presentation. These enable you to perform actions upon clicking or moving mouse over them
11. **Auto content wizard**. This is a presentation wizard that contains data from which one can select and edit to create a personalised or customised presentation.
12. **Slide layout**. Slide layouts contain formatting, positioning, and placeholders for all the content that appears on a slide. Layout contains the theme (colours (theme colors: A set of colors that is used in a file. Theme colors, theme fonts, and theme effects compose a theme.), fonts (theme fonts: A set of major and minor fonts that is applied to a file. Theme fonts, theme colors, and theme effects compose a theme.), effects (theme effects: A set of visual attributes that is applied to elements in a file. Theme effects, theme colors, and theme fonts compose a theme.), and the background) of a slide. ***Master layout*** is a term applied to a presentation’s overall design.
13. **Timing**. Is a technique by which slides or text appear on the screen during a presentation, i.e. on mouse click or automatically after a defined period.

**PowerPoint Views**

1. **Normal view**. Is a Tri-pane window that provides the text outline of the entire presentation on the left, the current slide on the upper-right, and speaker’s notes on the lower-right. This is the default PowerPoint view
2. **Outline view**. This enables one to edit and display all presentation text in one location instead of one slide at a time. It appears without the objects or images in the slide.
3. **Slide view**. Shows a graphic view of the current slide for editing and viewing
4. **Slide sorter view**. This displays the entire presentation so that one can add, delete and move slide.
5. **Notes page**. Provides a large area to view or type speaker’s notes on a slide
6. **Slide show**. Is a collection of slides moving in a defined sequence at a present timing that one can control and change with special effects

DATABASES

**Database** is a collection of logically related data with descriptions designed to meet the information needs of an organisation. **Databank** is an enormous/large collection of two or more databases for several users within and outside an organisation.

**Database management system (DBMS)** is software system that allows multiple users to define, create, store, maintain and control access to the database. Examples of DBMSs include; Microsoft Access, Oracle, Microsoft SQL Server, Dbase, Fox Pro, Sysbase

**TYPES OF DATABASES**

1. **Flat databases**. These consist of one table
2. **Relational databases**. These consist of two or more tables and manipulate data by relating the tables.

**FUNCTIONS OF A DATABASE MANAGEMENT SYSTEM**

1. Takes care of storage, retrieval and management of large data sets in a database
2. Used to creates a database structure to accommodate data that may be text, numbers, objects, video, sound
3. It lets you easily add new records, delete out-dated records, update records
4. Allows one to organises records in different ways, i.e. sorted and indexed order
5. Helps to locate specific records, i.e. search, find and replace
6. Eliminates duplicate data say by editing, e.g. deleting and retyping
7. Used to create relationships between tables
8. You can ask questions about your data and get answers using queries
9. Used to create data entry forms
10. Used to create professional good-looking reports
11. Used to change appearance of information, i.e. perform some formatting, etc.

**ADVANTAGES OF DATABASE MANAGEMENT SYSTEMS**

1. **Sharing of data**. Data is easily shared among different users and applications
2. **Data persistence**. Data exists beyond the scope of the process that it was created for.
3. **Data security**. Data is protected from unauthorised access using passwords. It also provides protection of databases through security, control and recovery facilities
4. **Data validity, integrity & correctness**. Data should be correct with respect to the real entity that they represent. Auditing or error check and correction are easily done
5. **Consistency of data**. The system always produces consistent values with respect to the relationships
6. **Data integrity**. Refers to both correctness and consistency of data. Correctness is being free from errors while consistence is having no conflicts among related data items
7. **Large data storage**. It is capable of storing enormous data amounts for personal and organisational use
8. **Non**-**redundancy**. Eliminates or decreases duplication of data in the same container. No two data items in a database should represent the same real-world entity.
9. **Data independence**. Both the data and the user program can be altered independently of each other.

**DISADVANTAGES OF DATABASE MANAGEMENT SYSTEMS**

1. **Complexity**. The systems are complex, costly, and take much time to develop, e.g. they include sophisticated software programs that may require special hardware.
2. **Need for substantial conversion effort**. Changing from a traditional file oriented system to a computerised database system can involve large-scale reorganisation of data and programs. This can create user resistance
3. **Organisation security** may be compromised since a database is used by many people, departments or personnel who may cause havoc by leaking out vital secrets
4. They are difficult to thoroughly test and audit errors
5. **Initial expense**. Because of their complexity and efficiency, they include sophisticated database systems which can be expensive to setup
6. **Requires special skills to handle**. Being complex and enormous, databases require skilled personnel to develop, establish and maintain
7. **Vulnerability**. Data in the database may be exposed to software and hardware failures, sabotage, theft, destruction, virus attacks, etc.
8. **Routine back-up**. Requires back-up systems, which are inconveniencing, complex, tedious and expensive

**DISADVANTAGES OF PAPER/MANUAL/FILE-BASED/FLAT DATABASES**

Before computerised databases management systems and even now data may be kept and managed manually on paper files and filing cabinets. This system has the following drawbacks or deficiencies

1. Data redundancy. Data are often repeated in more than one file.
2. Updating difficulties. Keeping all files up-to-date can be problematic
3. Data dispersion. Scattered data are difficult for programs and people to share
4. Under-utilisation of data. Dispersed data cannot usually be used to full advantage
5. Not durable. Data on manual papers does not last for long
6. Exposed to risks. Data can be easily lost due to fire, rot, termites, rats, etc.
7. Data dependence. Programs may be dependent on the data formats and file organisation.

**DATABASE OBJECTS**

1. **Table**. Is a collection of data arranged and stored in rows and columns. It is the basic/primary object where all other objects derive data from.
2. **Query**. Is used to ask questions on table data and find qualifying answers.
3. **Form**. Is a tool for displaying data from data tables easily and for entering & editing data in the data tables.
4. **Report**. Is a summarised and good-looking display of data from tables and queries. It is for output only.

**DEFINITION OF TERMINOLOGIES**

1. **File**. Refers to the entire collection of data in the database.
2. **Field**. This is the entire column that contains similar data items
3. **Field name**. This is the name/title of a particular field
4. **Field type**. This refers to how particular data items are stored in a table
5. **Field properties**. This refers to specific characteristics of particular fields
6. **Record**. This refers to particulars within a file, or a set of entire data items in a row
7. **Macro**. This is an automated procedure of action in a computer
8. **Attribute**. This refers to a group of fields or columns in a table
9. **Primary key**. This is a unique record identifier in the table. It is used to ensure that there are no duplicate fields in the table. It is also used to create relationships among tables.
10. A ***foreign key***, is a copy of the primary key in another table
11. **A view**. Is a virtual table that does not necessarily exist in its own right but may be dynamically derived from one or more base tables
12. **Relationships**. This refers to how two or more entities/tables share information in the database structure. That is, how data in one table are related to data in another table. Relationships are of three types; one-to-one (1:1), one-to-many (1:M) and many-to-many (M:M)
13. **Datasheet view**. This is a table view which allows you to update, edit, format and delete information from the table.
14. ***Design view*** is a table view which provides tools for creating fields in a table, i.e. specify field names, data types, field properties and descriptions (a view for creating the table)

**CHARACTERISTICS OF DATABASE APPLICATIONS**

1. Data is organised in rows and columns
2. Each column has a distinct name and represents an attribute of table entities
3. All values in a column must conform to the same data format or data type.
4. Each row represents a single entity occurrence (entity instance)
5. It contains tools known as database objects such as; forms, queries and reports

**COMPONENTS OF A DATABASE MANAGEMENT SYSTEM**

1. **Data dictionary**. This is an automated or manual tool used to store and organise the data in the database and defines each data field that will be contained in the database file including characteristics of each item
2. **Data definition language (DDL)**. It helps one to create and maintain the data dictionary and define the structure of files in a database. It defines each term as it appears in a database, e.g. delete, create, browse, zap, index, sort, etc.
3. **Data manipulation language**. This is used to manipulate data in the database. That is, it helps one to; add, change, select, and delete data in the database and mine it for valuable information

**DATA TYPES, FIELD PROPERTIES, VALIDATION CHECKS AND ERRORS**

DATA TYPES

Data type specifies and determines the kind/category of values or information entered in the field containers. There are various data types applied in Microsoft Access and these include;

1. **Text**. Are alphabetic letters or numbers that cannot be calculated. Examples of such fields are; names, addresses, subject names, course names, telephone numbers, etc. it can contain up to 255 characters.
2. **Number**. Refers to numerical data you can calculate but not relating to money, e.g. age, height, weight, course duration, score, number of items in stock. It can be whole number or fraction.
3. **Currency**. Are numerical monetary values that can be calculated and may have a currency symbol or not such as £56000.05, 59000.89, $5362, €4563, etc. It is suitable for field like; salary, gross pay, net pay, PAYE, school fees, amount paid, etc.
4. **Memo**. It is for lengthy descriptive text and numbers usually several sentences or paragraphs. It can contain a maximum of 32,000 characters. It is suitable for fields like; remarks, comments, particulars, descriptions.
5. **Date/Time**. For months, date and time values that are in the form; **dd/mm/yy** or **dd-mm-yy**, i.e. date/month/year for dates and **Hr:Min:sec**, i.e. Hour:Minutes:Seconds for time values. It is suitable for fields like; date of birth, date of joining, on/off set date/time, date/time of departure/arrival, etc.
6. **AutoNumber**. A number that automatically increments for each record you enter. It stores sequential numbers entered automatically by Microsoft Access starting with one. They are unique and can make a good primary key. It is suitable for fields like; registration number, ID number, membership number, etc
7. **Yes/No**. Here you can enter and store only one value or answer out of the available two options but not both. It is suitable for fields like; true/false, on/off, smoker/non-smoker, Ugandan/Non-Ugandan, in/out, etc.
8. **Object linking and embedding (OLE object)**. For object data and other binary information such as; sounds, symbols, graphics/pictures such as; signatures, thumbprints, company logos, one’s photo, etc.
9. **Hyperlink**. Stores data in form of hyperlinks, which are the blue-coloured hotspots or connections that can be clicked to open other pages or documents, e.g. e-mail address, website, bookmarks, etc.
10. **Lookup wizard**. Refers to a list of items in form of a list-box from which you can choose the desired item during data entry, especially if that data exists in another table or form. It is suitable for repetitive data such as marital status; single, married, separated, divorced, widowed, etc
11. **Calculated data type.** This new data type lets you create a field that is based on a calculation of other fields in the same table. For example, you might create a Line Total field that contains the product of a Quantity field and a Unit Price field. Then, if you update the Quantity or Unit Price field, the Line Total is updated automatically
12. **Attachment**. This is the preferred data type for storing digital images and any type of binary file, like; Pictures, Images, Office files

**FIELD PROPERTIES**

These are traits or characteristics defining data entered in particular fields. Common properties include

1. **Field size**. This specifies the maximum length of a field. That is, the maximum number of characters to be stored in the field. e.g. if you specify field size as 5, only 5 or less characters will be allowed in the column.
2. **Format**. Specifies the way that the field appears by default when displayed or printed.
3. **Decimal Places**. It is used to specify the number of decimal places to use when displaying numbers
4. **Input Mask**. Specifies the pattern or format for data to be entered in that field, e.g. (--/--/--) for date.
5. **Caption**. Used to set the text displayed by default in labels for forms, reports, and queries.
6. **Default Value**. A value that appears in the field automatically even before you enter there anything.
7. **Validation Rule**. An expression that must be true whenever you add or change the value in a given field. e.g. >=10 for age, “married” or “single” for marital status, etc.
8. **Validation Text**. A message displayed when a value violates the expression in the *Validation Rule* property. e.g. “please, marital status is either single or married”
9. **Required**. Specifies whether or not an entry must be entered in that field. That is, if **yes**, you must type an entry, but if **no**, you may proceed without entering anything.
10. **Allow Zero Length**. A provision for a field to be left blank in case of unavailable data to be entered later even if the setting for *required* is *yes*. Nulls indicate that data may exist but it is unknown. To enter a null, leave the *required* property as no and leave the field blank, e.g. a company without a fax number
11. **Indexed**. It specifies whether or not duplicates in the field should be allowed in order to speed up the data search, sort, filter, etc.
12. **Text Align**. Specifies the default alignment of text within a control.
13. **New Values**. Specifies whether an AutoNumber field is incremented or assigned a random value when a new record is added
14. **Unicode Compression**. Compresses text stored in this field when a small amount of text is stored (< 4,096 characters).
15. **IME Mode**. Controls conversion of characters in an East Asian version of Windows.
16. **IME Sentence Mode**. Controls conversion of sentences in an East Asian version of Windows.
17. **Smart Tags**. Attaches a smart tag (smart tags: Data recognized and labeled as a particular type. For example, a person's name or the name of a recent Microsoft Outlook e-mail message recipient is a type of data that can be recognized and labeled with a smart tag.) to this field.
18. **Append Only**. Tracks the history of field values (by setting the property's value to **Yes**).
19. **Text Format**. Choose the property's *Rich Text* value to store text as HTML and allow rich formatting. Choose the property's *Plain Text* value to store only unformatted text.

**DATA VALIDATION**

*Validation* is the process of comparing the data entered with a set of predefined rules or values to check if the data is acceptable. Validation is the name for the checks that detect incorrect data, display an error message and request another input or just reject the data.

*Data validation* is the checking of input data for errors (e.g. of the correct data type) before processing. Common data validation checks include; presence/existence or completeness check, range check, limit check, data type check or character check or alphanumeric check, format check, consistency check, control total check, and hash total check.

**ERRORS**

An error is a fault or an issue that arises unexpectedly causing the program not to function properly and to close. Common types of errors include; transcription errors and transposition errors. Transpositions errors include; error of omission, error of addition, random error, overflows error, rounding up error, and truncation errors.