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Ministry of Labor and Skills

Animal Production

Level-III

Based on March 2022, Version _ Occupational Standard



Module Title: - Applying Digital Technology in Agriculture

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Addis Ababa, Ethiopia

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Ministry of Labor and Skills

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Introduction to the Module

This module covers the knowledge, skills and attitude required to Understand the Concept of digital technology, apply Digital technologies among rural population and recording and documentation system.

LG #46	LO #1 Understand the Concept of digital technology

Instruction Sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Understanding digital technologies
- Understanding importance of digital technologies
- Identification the role of digital technologies in agriculture
- Identification principles of agricultural technology
- Understanding smart phones and template functions

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Understand digital technologies
- Identify importance of digital technologies in agricultural sector
- Know role of digital technologies in agriculture
- Identify Principles of Agricultural technology
- understand mobile/Smart phones and template functions to collect data
- Use agricultural technology in the reporting system

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks

Information Sheet 1

1.1 Understanding digital technologies

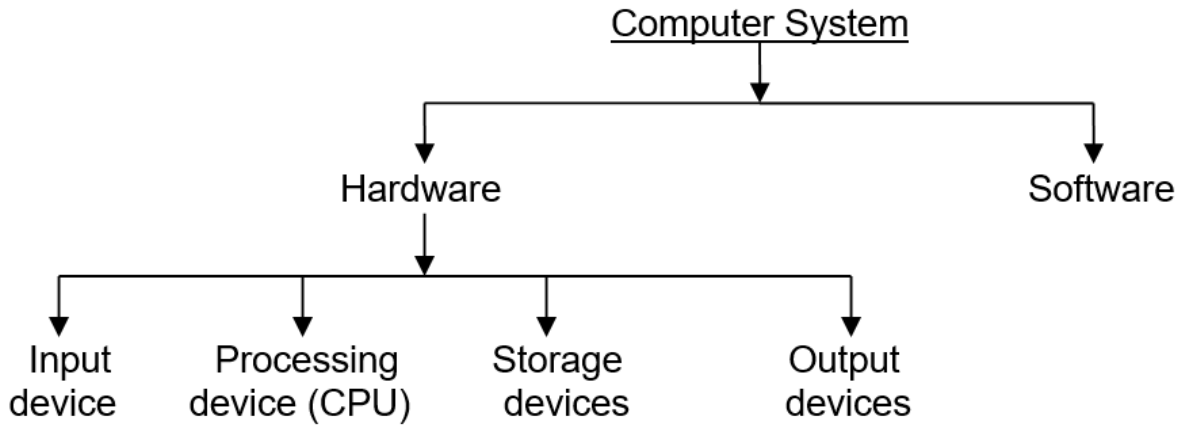
What is digital technology?

Digital technology is a term that covers electronic tools, devices, and systems that process, store, and transmit data. Digital technologies are electronic systems and resources that help us learn, communicate, play and more. When we use digital technology, the main thing we need is infrastructure internet, such as the added computer, smart phone, tablet, GPS, web browser.

Before you learn about the computer and software application, we need to know what computer and software means.

1.1.1. Basic Anatomy of Computer System

Basically, computer system is divided in to two major parts.



- **Hardware**

It is the visible part of the computer or the physical pieces of equipment in a computer system.

- ✓ **Input devices:** are devices that help us to enter data or program to the computer. It also converts human understandable language to computer understandable language.

Example Input devices: Keyboard, Mouse, Scanner, Light pen, Digital Camera, Modem, etc.….

- ✓ **CPU (Central Processing Unit):** is the heart of the computer uses to process data and contains three units:
  a. **The Arithmetic & Logical Unit (ALU):** This contains the circuitry for performing the basic arithmetic operations. The unit can also perform logical operations such as comparing the magnitude of two values.

b. **Control Unit (CU):** This contains the circuitry to monitor and control all operations of the computer. It acts as an interface between the peripheral unit and main memory and as an interface between the arithmetic-logical unit and main memory.

c. **Memory Unit/Register:** This is a Permanent storage location for specific types of data. Files and programs necessary for the CPU itself (For CU and ALU)

Example: **BIOS** Memory (Controls Basic Input Output System)

✓ **Storage devices:** are hardware devices that store data either temporarily or permanently. There are **two types of storage devices**, namely:

I. **Primary storage devices (Main memory):** The two basic types of main memory are RAM (Random Access Memory) and ROM (Read Only Memory).

a. RAM: Random Access Memory, as it is popularly known, is the key working area of the memory that is used for our problems and data. This area is often called User memory.

- It holds active data & program.
- It is a working area of the CPU.
- It is temporary (power dependent), volatile.
- It is small in capacity.

b. ROM: Read Only Memory, as the name itself implies, holds permanent data or instructions that can only be read from, but not written on to.

- It is permanent storage.
- It stores instructions to checking the computer.
- The program is stored during manufacturing period.

II. **Secondary Storage device (Auxiliary memory):** It stores data or instruction permanently that is important for the future use.

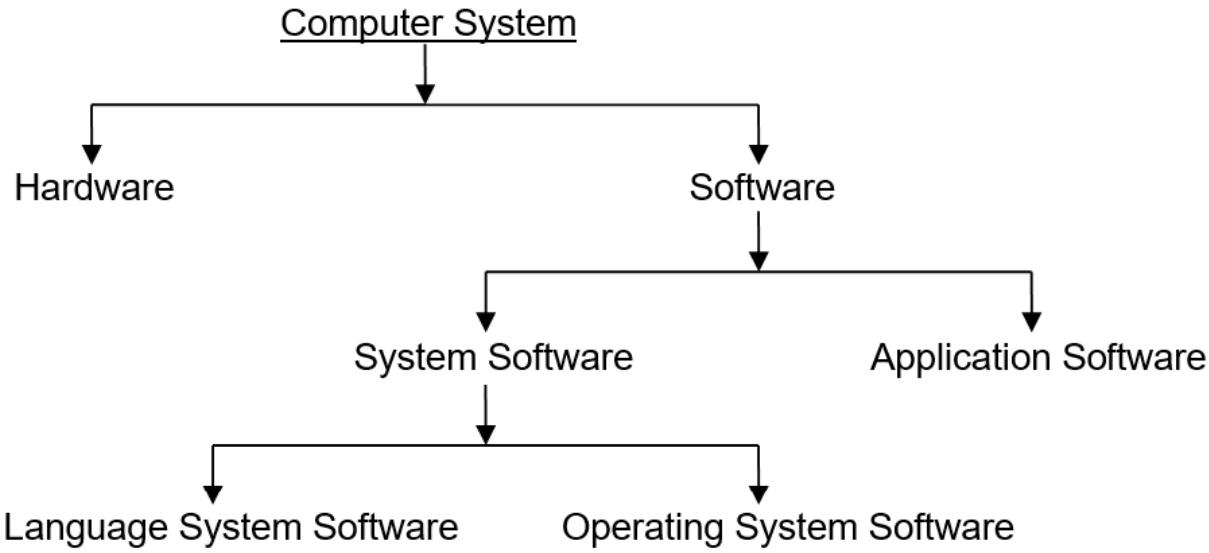
- It is non-volatile.

Examples: Hard Disk, Floppy Disk, CD-ROM, Flash Disk, etc….

✓ **Output devices:** are hardware devices that are capable of bringing out processed data to the users and it converts computer understandable language to human understandable language.

Output devices: Monitor, Speaker, Printer, Modem, etc…

- **Software**



It is the invisible part of a computer system; it is a computer program or instruction that drives the hardware (the machine) to do.

- ✓ **System software:** consists of all the programs, languages and documentation supplied by the manufacturer with the computer. They are used to the internal activities of the computer.
- ✓ **Operating System software:** used to control I/O devices, memory and used to manage files & folders. It is also used as interface between application software and hardware. Examples of Operating System Software: MS-DOS, MS-Windows.
- ✓ **Language System software:** used to write programs. Examples of Language System Software: C, C++, VB, COBOL, FORTRAN.
- ✓ **Application software:** These are programs employed by the user to perform specific functions. Examples of Application Software: MS - Word, MS - EXCEL, MS –ACCESS.

1.1.2. Internet: The Internet is an increasingly important part of everyday life for people around the world. But if you've never used the Internet before, all of this new information might feel a bit confusing at first. The Internet

is a vast network that connects computers all over the world. Through the Internet, people can share



information and communicate from anywhere with an Internet connection.

Figure: 1.1 How the Internet connects to our planet.

1.1.3. Computer**:** computer is a machine that can store and process information.

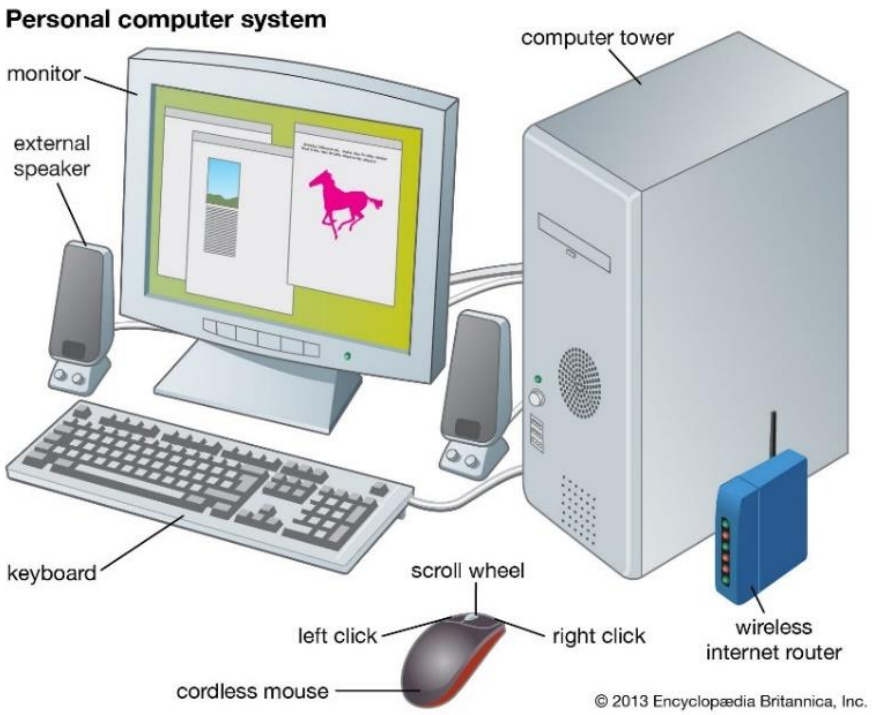


Figure: 1.2 computer with accessories.

1.1.4. Web Browser

A web browser is a software program that allows a user to locate, access, and display web pages. When a user requests a web page from a particular website, the browser retrieves its files from a web server and then displays the page on the user's screen. Browsers are used on a range of devices, all of them have a URL, URL is the web address, or URL (Uniform Resource Locator), that you type into the address bar tells the browser where to obtain a page or pages. For example, when you enter the URL http://www.lifewire.com into the address bar, you're taken to Lifewire's home page.



Figure: 1.3 different web browsers.

Some of the web browser types are as follows:

- **Microsoft Edge**: is a web browser developed and maintained by Microsoft. It was first released for Windows 10 in 2015 as the default browser to replace Internet Explorer. Since then, it has been made available for other operating systems such as macOS, iOS, and Android.



Figure: 1.4 Microsoft edge browser icon.

- **Google Chrome**: is a web browser developed by Google and released in 2008. It is currently one of the most popular web browsers in the world and is available for Windows,



macOS, Linux, iOS, and Android operating systems.

Figure: 1.5 Google Chrome browser icon.

- **Mozilla:** is a free and open-source web browser developed by the Mozilla Foundation and its subsidiary, the Mozilla Corporation. It is available for multiple operating systems including Windows, OS X and Linux, and its source code can be accessed online.



Figure: 1.6 Opera browser icon.

- **Opera:** is a proprietary web browser developed by Opera Software and available on various operating systems including Windows, OS X and Linux. It is known for its speed and low resource requirements, as well as its advanced features such as built-in ad blocking and VPN



services.

Figure: 1.7 Opera browser icon.

1.1.5. GPS: Which stands for Global Positioning System, is a radio navigation system that allows land, sea, and airborne users to determine their exact location, velocity, and time 24 hours a day, in all weather conditions, anywhere in the world.



Figure: 1.8 GPS graphics system on the phone.

1.2 Understanding importance of digital technologies

Digital technologies are a powerful instrument that can help improve education in various ways, such as making it easier for instructors to generate instructional materials and providing new methods for people to learn and collaborate.

Digital technology enables the storage of massive amounts of information in relatively small spaces. Large amounts of media, such as photos, music, videos, contact information, and other



documents can be carried around on small devices like mobile phones.

Figure: 1.9 Importance of technology

1.2.1 Need for digital technologies in education

The globalization of education has already necessitated the application of digital technologies. Online platforms were available for conducting classes, sharing resources, doing the assessment and managing the day-to-day activities of academic institutions. However, the use of these platforms was proactive.

1.2.2 Sharing and searching information

Farmers can also collaborate to share knowledge about innovative farming techniques and best practices. The benefits of sharing in agriculture include reduced costs, increased yields, and improved sustainability through the more efficient use of resources. Sharing can also help build stronger social connections among farmers and foster a sense of community.

The ability to search for information online is one of the most important digital literacy skills you can possess. It allows you to quickly find what you're looking for without having to sift through pages of irrelevant results. The most important tool in this process is the search engine, which is a specialized

website that searches for information across the Internet. You've probably heard of the most popular ones, including Google,

Yahoo!, and Bing, and while each of them is useful, they can also yield different results.



Figure: 1.10 Method of Sharing information

- **How to start searching**

When it comes to starting a search, there are two common methods that are both easy to find and user-friendly.

- ✓ **Option 1: The homepage**. Go to the search engine's homepage, for example (google.com), and type your search terms into the text box. To see your results, you can press the **Enter** key, or you can click an icon, such as the Google Search button or a magnifying glass.

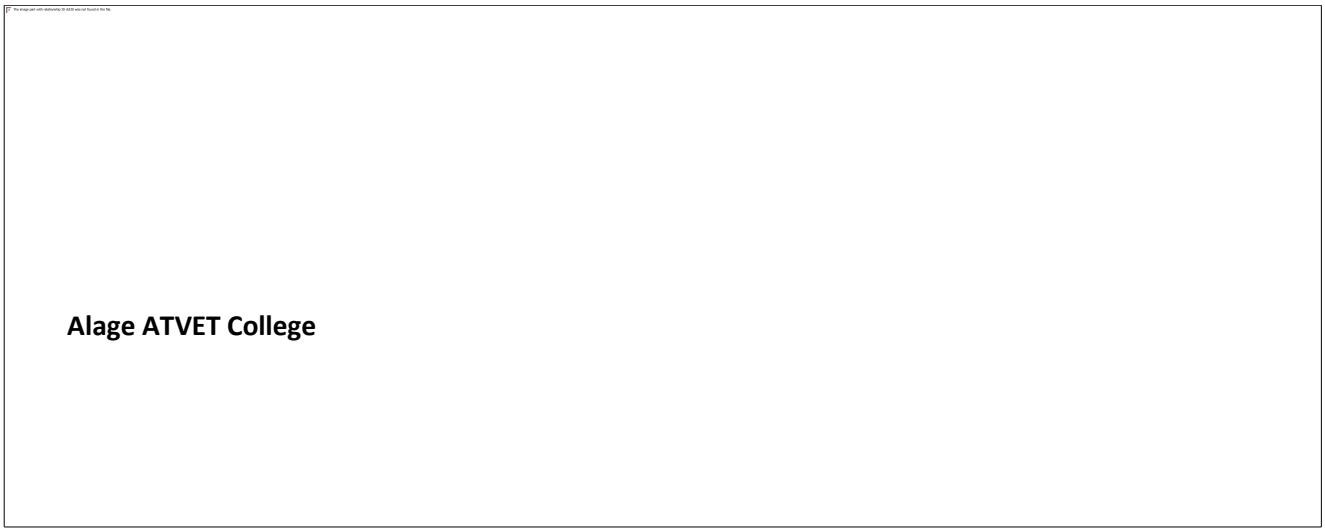


Figure: 1.11 Google search bar.

- ✓ **Option 2: Your browser's address bar**. Depending on your browser, you may be able to conduct a search right from the browser's interface. For example, in Chrome, you can enter your search term directly into the **address bar**. In Internet Explorer (pictured below), you can use either the address bar or the built-in **search bar** to start a search.



Figure: 1.12 URL web address.

1.2.3 Collect data: Data collection is the process of gathering and measuring information on variables of interest, in an established systematic fashion that enables one to answer stated research questions, test hypotheses, and evaluate outcomes. The collection of data for statistical research in the Statistical Office shall be through PAPI (Paper and Pencil Interviewing), the reporting method, from administrative sources, through compilation of data and CATI, CAPI and CAWI method since 2015 for several pilot studies.

1.2.4 Enable storage of massive information. There are several ways to store massive information. One way is to use cloud storage services such as Google Drive, Dropbox, or Microsoft OneDrive. These services allow you to store large amounts of data on remote servers that can be accessed from anywhere with an internet connection.

1.2.5 Time saving: There are many ways technology can help you save time. For example, you can invest in a computer system that's easy to use and is able to run programs you'll be able to understand1. You can also use shortcuts on your PC, Mac, iPhone or Android device2. Additionally, you can take advantage of recording technology and save time by skipping commercials during the shows you can't live without. You can save even more time. Consider these eight tools to help you save time.

1.2.6 Cost minimization: Digital technology can play a crucial role in reducing costs in agriculture. Here are some ways in which it can help with cost minimization:

- **Accurate data collection:** With digital tools such as sensors and software applications, farmers can collect precise data on crop performance, soil health, and weather. This allows them to make more informed decisions about inputs, irrigation, and other management practices, which can optimize yields and reduce waste.
- **Precision agriculture:** Precision agriculture tools leverage data analytics and sensing technologies to optimize crop growth and reduce wastage. By minimizing input waste, precision agriculture can greatly reduce operational costs.

- **Improved supply chain management:** By using digital tools to better manage supply chain logistics, farmers can reduce the cost of transporting produce to markets, improve efficiency and timeliness, all of which ultimately reduce product waste.
- **Increased efficiency:** Digital technology allows for streamlined operations, reduced manual labor, and increased overall efficiency throughout the crop cycle. This results in lower costs for farmers across all stages of production.
- **Data accuracy and reliability:** Data accuracy and reliability are crucial for businesses. Accurate data can help companies improve their decision-making ability and increase their efficiency. It also helps prevent wasting money on unprofitable methods, such as sending mail to the wrong address. Any data you provide must be accurate, as this is what gives your business credibility.
- **Data centralizing and administration:** Data centralization and administration in agriculture center refers to the process of collecting, storing, and managing data from various sources within an agriculture center. This data can include information on crop yields, soil quality, weather patterns, and more. By centralizing this data, agriculture centers can gain a better understanding of their operations and make more informed decisions.



Figure: 1.13 centralize data base

- **Improve collaboration:** Improving collaboration in digital technology is essential for the successful implementation of technology in agriculture. Here are some ways to enhance collaboration:
  - ✓ **Create an open platform for data sharing:** By sharing data with other farming communities, researchers and technology companies involved in the agriculture sector, stakeholders can benefit from diverse perspectives, and resources that will improve technology infrastructure. Participating in existing organizations that serve as platforms for data sharing or setting up new digital platforms to share information can enhance cooperation and knowledge transfer that would support farmers as well as advance agricultural research.
  - ✓ **Foster cooperative partnerships:** With a shared interest in promoting digital technology in agriculture, farmers, researchers, and technology providers should collaborate to identify and address common problems and solutions.

Additional structures include academic and industry partnerships that bring new technologies into the agriculture sector.

- ✓ **Implement transparent standards:** To promote consistency across the sector, common standards should be established in areas such as data formatting, analysis methods, and equipment integration.
- ✓ **Knowledge sharing:** Use of programs aimed at creating a culture of knowledge sharing such as farmer field schools (FFS) also helps agriculture stakeholders learn from each other through participatory approaches that encourage opinion-sharing, experimenting, learning, and problem-solving.



Figure: 1.13 sharing information

✓ **Industry education and awareness activities:** Agricultural stakeholders should be given access to regular educational opportunities on the potentials and benefits of digital technologies and trends within the industry, both online and offline methods including workshops, seminars, webinars etc.

- **Improving creativity in digital technology involves:** fostering an environment that encourages experimentation, exploration, and innovation. Here are some ways to do so:



Figure: 1.14 delivery of methods to boost creativity.

✓ **Encourage idea sharing:** Create an environment where team members feel comfortable sharing their ideas and perspectives. This can be done through brainstorming sessions or by creating channels in collaboration software for sharing ideas.

✓ **Provide opportunities for experimentation**: Allow team members to experiment with new technologies, tools, and methods. This can be done through hackathons, innovation sprints, or dedicated time for experimentation.

✓ **Provide feedback and recognition:** Provide feedback and recognition for creative ideas and solutions. This can be done through regular check-ins, performance reviews, or recognition programs.

✓ **Enhancing work accuracy in digital technology** involves implementing processes and tools that help minimize errors and improve the quality of work. Here are some ways to do so:

1.3 Identification the role of digital technologies in agriculture:

1.3.1 The role of digital technology is vast and encompasses virtually every aspect of modern life. Digital technology has transformed the way we live, work, communicate, and interact with the world around us. Here are some of the key roles' digital technology plays in our lives:

- ✓ **Communication:** Digital technology has revolutionized the way we communicate with each other, enabling us to connect with others from anywhere in the world through a variety of channels such as email, social media, video conferencing, and instant messaging.
- ✓ **Information access:** Digital technology has made it easier than ever to access information on virtually any topic. With the internet, we have access to a vast amount of information at our fingertips, enabling us to learn, research, and explore like never before.
- ✓ **Entertainment**: Digital technology has transformed the way we consume and enjoy entertainment, with streaming services, online gaming, and social media platforms providing endless options for entertainment and leisure.
- ✓ **Education**: Digital technology has had a profound impact on education, with online learning, educational apps, and digital resources providing new opportunities for learning and skill development.

Another important role of digital technologies in agriculture is to increase collaboration and communication between various stakeholders in the value chain. These include farmers, input suppliers, traders, processors and consumers. Digital technologies can help create new business models that improve efficiency and reduce transaction costs, leading to greater profitability for



everyone involved.

Figure: 1.15 electronics devices for digital technology

Examples of Digital Technology.

- ✓ **Websites** is a collection of web pages that are linked together and can be accessed via the internet. Websites can be used for various purposes such as sharing information, selling products or services, and providing entertainment.



Figure: 1.16 Different web pages.

- ✓ **Computers** Laptops, tablets, desktops, and other forms of computer depend upon digital technology to function. Originally computers were huge and used mainly by large companies and scientific projects for performing complex calculations and storing large amounts of information.
- ✓ **Buying and Selling Online** Shopping online continues to grow and provides consumers with increasing choices and value. You can buy from a large retailer at the other end of the country, or from an individual in your home town.
- ✓ **Smartphones** The introduction of mobile phones revolutionized communications, both through voice and texting. Now we have smartphones, which incorporate many other types of digital technology such as cameras, calculators, and mapping. Phone apps are expanding consumer options even more.
- ✓ **Digital Television** Digital technology has transformed televisions in numerous ways. For starters, both the picture and audio quality have undergone dramatic

improvements. Modern televisions can also be used to stream movies and shows, rather than just receive programs via an antenna or cable connection.

- ✓ **eBooks** Digital alternatives to traditional print are now plentiful. This enables users to access a multitude of reading materials from a single, portable device, so there's no longer the same need to carry around a lot of bulky, heavy books. It's easy to alter the font size and style to suit reader preferences. Plus, unlike with print books, there are no trees cut down to make them.
- ✓ **Social Media** Social media sites, such as Facebook, Twitter, and Instagram, have seen an explosion in popularity in recent years. They bring together multiple pieces of digital technology to enable users to interact via text, photos, video, as well as form social groups.
- ✓ **Digital Cameras** These devices have much greater versatility than traditional cameras, especially when used in conjunction with other other digital technology. Digital images are easier to store, organize, edit, email, and print. Most digital cameras can also capture video too.

1.3.2 Create connectivity between operation: Creating connectivity between operations involves integrating different systems, processes, and data sources to enable seamless communication and collaboration across different departments and functions. Here are some ways to create connectivity between operations:

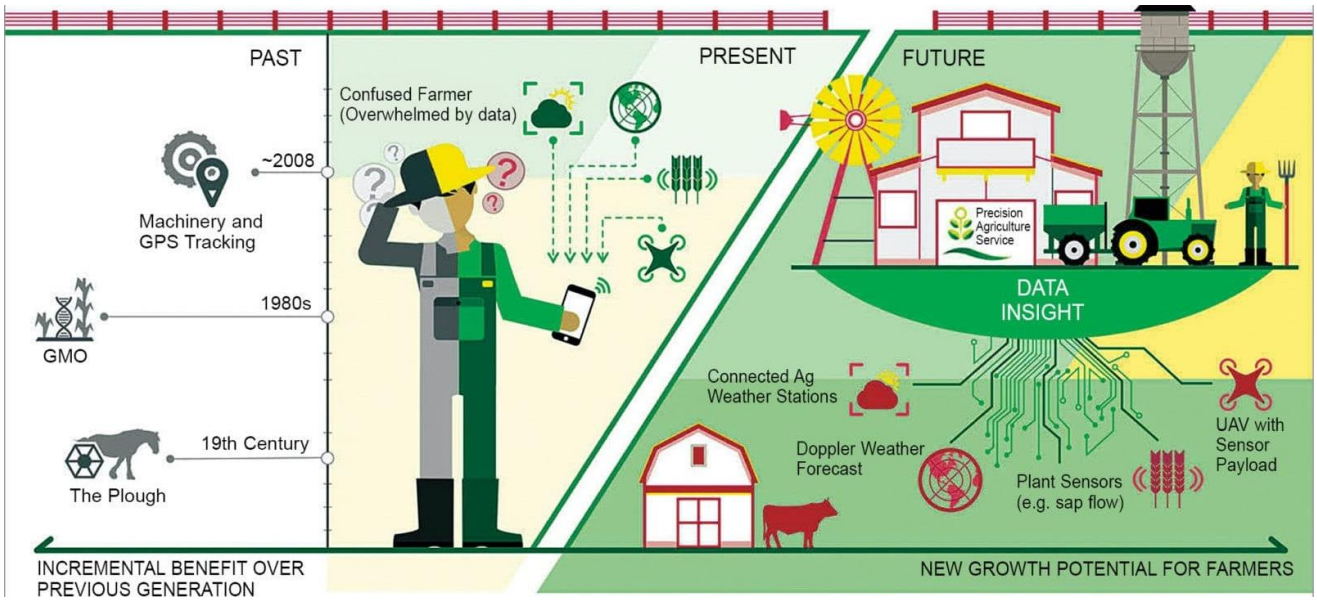


Figure: 1.17 connecting technology in operations.

1.3.3 Identifying and enhancing agricultural development through the role of digital technology involves a combination of strategies that leverage the latest technological advancements to optimize agricultural practices. Here are some ways to identify and enhance agriculture development in the role of digital technology:

- **Identify the areas for improvement:** Identify the areas where digital technology can be leveraged to improve agriculture development. This could include areas such as crop management, soil analysis, water usage, and livestock management.
- **Assess the available digital technologies:** Assess the available digital technologies that can be used to improve agricultural practices, such as precision agriculture, farm management software, agricultural robotics, and data analytics.
- **Monitor and evaluate progress:** Continuously monitor and evaluate progress to ensure that the digital technologies are effectively enhancing agriculture development, and adjust the strategy as necessary to optimize results.
- **Pilot test the digital technologies:** Pilot test the identified digital technologies to assess their effectiveness and determine any necessary adjustments that need to be made.

1.3.4 Facilitating communication in the agriculture sector is essential for farmers, agribusinesses, and other stakeholders to share information, collaborate, and make informed decisions. Here are some ways to facilitate communication in the agriculture sector:

- **Use digital communication tools:** Digital communication tools such as email, instant messaging, and video conferencing can help farmers and other stakeholders stay connected and communicate effectively, regardless of their location.
- **Develop a communication plan:** Developing a communication plan that outlines the key messages, audience, and channels for communication can help ensure that stakeholders receive the information they need in a timely and effective manner.
- **Conduct training and workshops:** Conducting training and workshops on communication skills can help farmers and other stakeholders improve their ability to communicate effectively, both in person and online.
- **Encourage feedback:** Encouraging feedback from farmers and other stakeholders can help improve communication by providing insights into their needsand preferences, and ensuring that their voices are heard.

- **Leverage social media:** Social media platforms such as Facebook, Twitter, and LinkedIn can be used to share information, connect with other farmers and agribusinesses.

1.3.5 **Globalizing communication** in agriculture involves leveraging digital technologies to connect farmers, agribusinesses, and other stakeholders from around the world, enabling them to share information,

- ✓ **Use social media:** Social media platforms such as Twitter, Facebook, and LinkedIn can be used to connect with farmers and agribusinesses from around the world, enabling them to share information, ask questions, and build relationships.



Figure: 1.18 social media platform

- ✓ **Participate in online forums:** Online forums and discussion boards can be used to connect with other farmers and agribusinesses from around the world, enabling them to share information, ask questions, and learn from each other.
- ✓ **Attend virtual conferences and webinars:** Virtual conferences and webinars can be used to connect with other farmers and agribusinesses from around the world, enabling them to learn about new technologies, best practices, and industry trends.
- ✓ **Use video conferencing:** Video conferencing platforms such as Zoom and Skype can be used to connect with farmers and agribusinesses from around the world, enabling them to communicate in real-time and build relationships.

1.3.6 **Strengthening market linkage** in agriculture involves creating more efficient and effective connections between farmers and markets, enabling farmers to sell their

products at fair prices and enhancing their income. Here are some ways to strengthen market linkage in agriculture:

- ✓ **Develop market information systems:** Develop market information systems that provide farmers with real-time information on market prices, demand, and supply, enabling them to make informed decisions about what to produce and where to sell their products.
- ✓ **Use e-commerce platforms:** Use e-commerce platforms to connect farmers with buyers, enabling them to sell their products online and reach new markets.
- ✓ **Facilitate access to credit:** Facilitate access to credit for farmers, enabling them to invest in their farms, increase production, and meet market demand.
- ✓ **Build partnerships:** Build partnerships between different stakeholders in the agriculture value chain, such as farmers, processors, traders, retailers, and financial institutions, to create more efficient and effective market linkages.

1.4 Identification principles of agricultural technology

The principles of agricultural technology identification involve assessing the needs of farmers and identifying technologies that can help them meet those needs. Here are some principles of agricultural technology identification:

- ✓ **identify and solve problems** using the technological process
- ✓ **safety rules and regulations** applicable within agricultural environment,
- ✓ **use safety** measures in the transport of animals and livestock
- ✓ **basic operational knowledge** and correct use of agricultural tools, equipment and machinery.
- ✓ **Design with user** One of the principles of agricultural technology design is to design with the user in mind. This means that the technology should be designed to meet the needs of the user and be easy to use.
- ✓ **Understand the existing ecosystem** Another principle of agricultural technology design is to understand the existing ecosystem. This means that the technology should be designed to work within the existing ecosystem and not disrupt it.
- ✓ **Design for scale** principle of agricultural technology design is to design for scale. This means that the technology should be designed to be scalable and able to meet the needs of a large number of users.

- ✓ **Build for sustainability** principle of agricultural technology design is to build for sustainability. This means that the technology should be designed to be environmentally sustainable and not harm the ecosystem.
- ✓ **Data driving** principle of agricultural technology design is to be data-driven. This means that the technology should be designed to collect and leverage data for critical insights and actionable guidance. Crop, soil and resources monitoring are key approaches to help make farming more efficient and easier on the environment. They enable more targeted usage of pest management inputs, water and other field supplements.
- ✓ **Reuse and improve**

  Another principle of agricultural technology design is to reuse and improve. This means that the technology should be designed to be sustainable and not harm the ecosystem. It should also be designed to conserve, protect and enhance natural resources
- ✓ **Address privacy and security**

  principle of agricultural technology design is to address privacy and security. This means that the technology should be designed to protect the privacy of farmers and their data. It should also be designed to be secure and not vulnerable to cyber-attacks.
- ✓ **Collaborative**

  principle of agricultural technology design is to be collaborative. This means that the technology should be designed to be inclusive and involve all stakeholders in the design process. It should also be designed to be accessible and easy to use for all farmers.



Figure: 1.19 through collaborative practice,

1.5 Understanding smart phones and template functions Mobile data collection with smartphones which belongs to the methodological family of ambulatory assessment, ecological momentary assessment, and experience sampling is a method for assessing and tracking people's ongoing thoughts, feelings, behaviors, or physiological processes in daily life using a smartphone. The primary goal of this method is to collect in-the-moment or close-to-the-moment active data (i.e., subjective self-reports) and/or passive data (e.g., data collected from smartphone sensors)



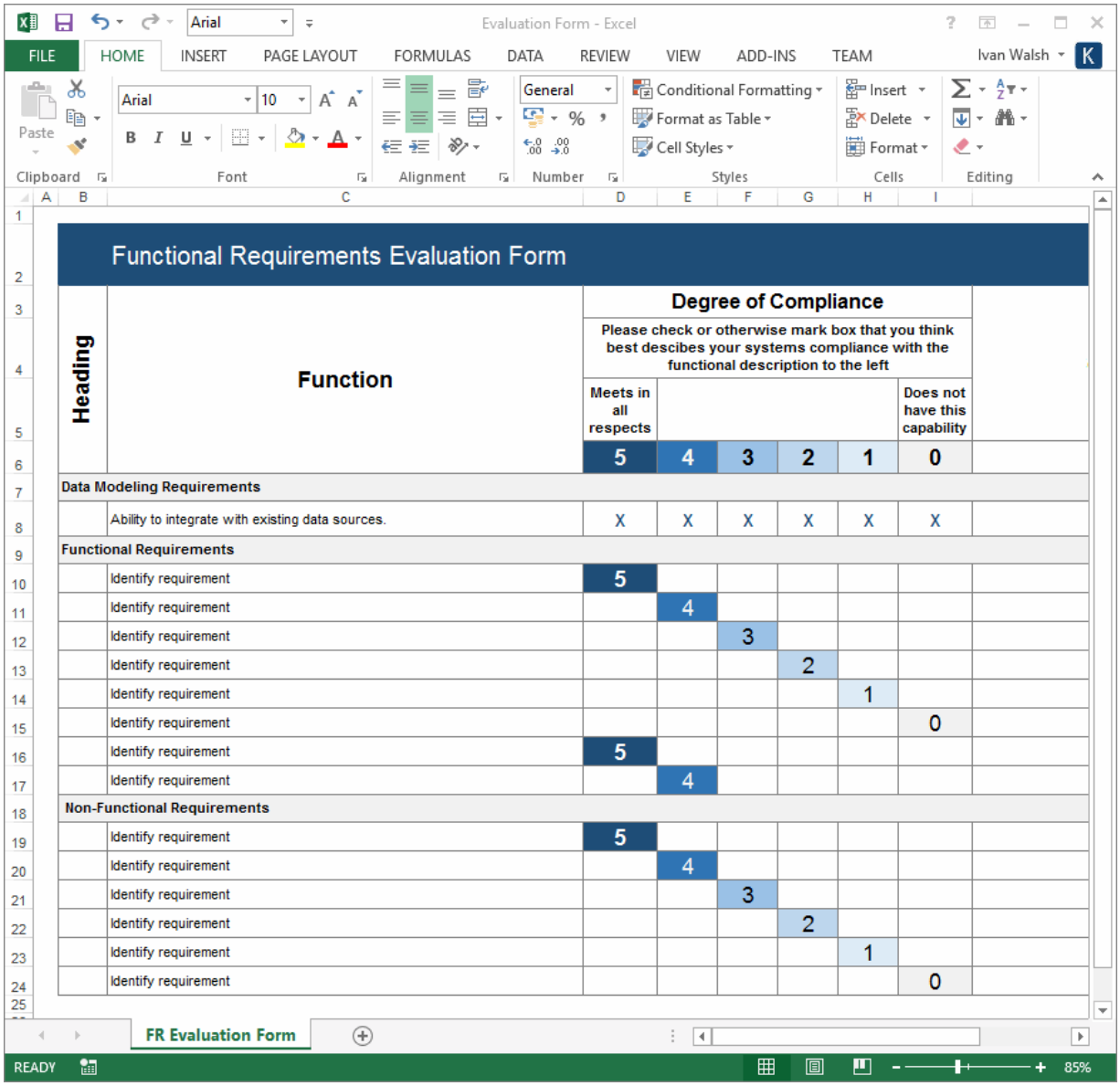
directly from people in their daily lives.

Figure: 1.20 capture information using smart phone.

Smartphones are powerful devices that can be used to collect data in various ways. Here are some steps that you can follow to collect data using a smartphone:

- Define the data collection method: Before collecting data, you need to define the data collection method, whether through a digital survey form or via a mobile application.
- Download a data collection app: There are several data collection apps available for both Android and iOS smartphones that can assist with tasks such as creating surveys and forms, and saving collected data to databases. Some of the apps to consider include Google Forms App, SurveyMonkey, Kobo Toolbox, Open Data Collection (ODK) Collect etc.
- Create questions and forms: Create questions relevant to the area of study and select suitable response options such as open-ended responses, multiple-choice question, rating questions, and more.

- Practice using the app: Once the forms are created, test it thoroughly before administering it to ensure it's working perfectly.
- Collect data: You can now use the smartphone application to administer the survey and record responses. You can also use built-in sensors on your smartphone such as GPS and camera to collect spatial data such as location and visual data respectively.
- Sync or transfer Data: Once completed, you can synchronize the data from your device to a cloud-based storage system or transfer it in other formats like CSV, TXT or XLSX format which can be analyzed using statistical software tools such as SPSS, R, Stata etc.
  - ✓ Overall, template functions are a valuable tool in digital technology that can help streamline development processes and improve the efficiency of software and application



Functional Requirements Evaluation Form

Heading	Function	Degree of Compliance (Please check or otherwise mark box that you think best descibes your systems compliance with the functional description to the left)					
		Meets in all respects					Does not have this capability
		5	4	3	2	1	0
Data Modeling Requirements							
	Ability to integrate with existing data sources.	X	X	X	X	X	X
Functional Requirements							
	Identify requirement	5					
	Identify requirement		4				
	Identify requirement			3			
	Identify requirement				2		
	Identify requirement					1	
	Identify requirement						0
	Identify requirement	5					
	Identify requirement		4				
Non-Functional Requirements							
	Identify requirement	5					
	Identify requirement		4				
	Identify requirement			3			
	Identify requirement				2		
	Identify requirement					1	
	Identify requirement						0

creation.

Figure: 1.21 function requirements templet.

Self-Check 1	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below.

1. Give short answer for the following questions.

1. Define the digital technology? (2pts)
2. Define the web browser? (2pts)
3. Define the internet? (2pts)
4. What are the two main parts of computer? (2pts)
5. List down the principles of agricultural technology? (2pts)
6. What is the importance of digital technologies? (2pts)

Test I: Matching (2pt each)

A	**B**
1. Internet	A. a machine that can store and process information.
2. Computer	B. a radio navigation system
3. GPS	C. connects computers all over the world.
4. Voice mail	D. messaging that your voice mailbox
5. URL	E. The web addresses
	F. Data centralizing

Note: Satisfactory rating – 22 points **Unsatisfactory - below 22 points**

LG #47	LO #2 Apply Digital technologies among rural population and farmers

Instruction Sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Identification tools and equipment
- Identification infrastructures
- Developing skills, the rural population
- Developing skills for agricultural transformation.
- Using collect data and report system
- using deliver digital education
- promoting to enhance productivity

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Identify tools and equipment
- Identify digital infrastructure
- Develop digital agri-preneurial skills
- Develop agricultural transformation skills
- Use collects data and report system
- Use delivers digital education
- Promote enhance productivity to implement digital technology

Learning Instructions:

1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 2

2.1 Identification and coordination require tools and equipment

Identifying and coordinating tools and equipment to apply digital technologies in agriculture means that farmers need to have access to digital technologies such as mobile devices, sensors, and other equipment that can help them collect data and make informed decisions1

Digital technologies including the Internet, mobile technologies and devices, data analytics, artificial intelligence, digitally-delivered services and apps are changing agriculture and the food system.

2.1.1. Tools and equipment are indeed necessary to apply digital technologies in various industries, including agriculture. Digital technologies often require specialized tools and equipment to function. For example, precision agriculture tools such as,

I. Crop sensor. A crop sensor is a camera sensor that captures a smaller image than a full-frame sensor, which is the same size as traditional 35mm film. A crop sensor reduces the field of view and increases the depth of field of the photos



Figure: 2.1 crop sensor tool.

II. automated machinery requires GPS-enabled hardware and software to function accurately. In order to collect and store data, hardware such as sensors, cameras, or other monitoring devices may be needed to generate accurate data inputs. Software programs, such as databases or machine learning algorithms, may also be an important part of using digital technologies for solving specific problems.

2.2 Identification of Digital technology infrastructures.

Digital technology infrastructures refer to the digital technologies that provide the foundation for an organization's information technology and operations. They include physical and

virtual technologies such as fibber optic cables, IoT objects, compute, storage, network, applications, and platforms. Digital technology infrastructures can include a variety of tools and resources, such as:

- **Hardware:** This includes devices such as desktops, laptops, tablets, smartphones, and sensors that can be used to collect and analyze data.

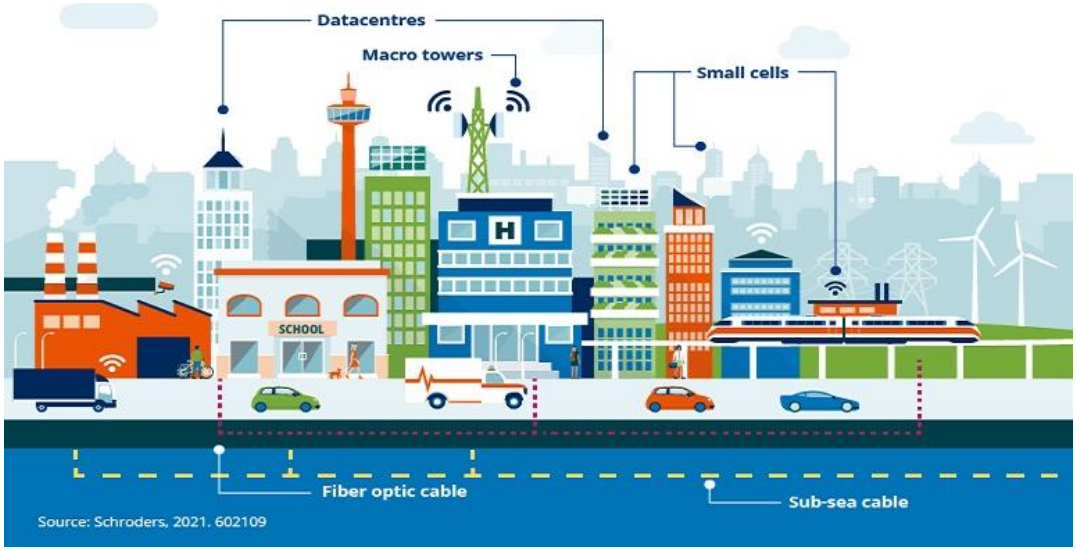


Figure: 2.2 monitoring soil moisture.

- **Software**: There are a wide variety of software applications available for farmers and agricultural professionals, including precision agriculture tools, farm management software, and data visualization programs.
- **Networks**: Reliable access to the internet is essential for the implementation of digital technologies in agriculture. This includes both wired and wireless networks, such as local area networks (LANs), wide area networks (WANs), and cellular networks.
- **Data storage**: As more data is collected through digital technologies, it is important to have a reliable and secure way to store it. This can include cloud storage solutions as well as on-premise servers.
- **Integration tools:** To fully realize the benefits of digital technologies, it is important for these tools to be able to work together. Integration tools help connect different systems and enable data sharing between them.
- **Security protocols:** With the increased use of digital technologies comes an increased risk of cybersecurity threats. Robust security protocols and measures are necessary to protect sensitive data and ensure safe and secure technology use.

  These are just a few examples of the types of digital technology infrastructures that support agriculture.

- **Fixed Broadband:** Networks that connect regions and cities with wired internet. This includes last mile connections to homes, businesses, data centers, facilities and infrastructure.
- **Telecommunication infrastructure:** refers to the physical and virtual components that enable communication over long distances. This includes telephone wires, cables (including submarine cables), satellites, microwaves, and mobile technology such as fifth-generation (5G) mobile networks. Communication infrastructure is the backbone of the communications system upon which various broadcasting and telecommunication services



are operated.

Figure: 2.3 IT infrastructure.



Figure 2.4 centralized data center

- **Data Centers:** Facilities that manage computing, data storage and network services.
- **Charger**: A charger is a device used for charging or recharging batteries1. It stores energy in a battery by running an electric current through it. For example, you can use a charger to recharge the battery of your mobile phone or laptop and others.





Figure: 2.5 Laptop, USB and C-type charger.

- **Smart phone:** Smartphones have become a useful tool in agriculture because of their mobility and computing power.



Figure: 2.6 all-in-one our hands.

- **Tablet:** Tablets are also used in agriculture for various purposes such as data collection and analysis. They can be used to record crop yields, monitor soil moisture levels, and track weather patterns.



Figure: 2.7 IOT in Agriculture using tablet device.

- **iPad:** The iPad is a line of tablet computers designed, developed, and marketed by Apple Inc.



Figure: 2.8 iPad tablet

- **GIS:** GIS (Geographic Information System) is used in agriculture for various purposes such as crop management and precision agriculture. GIS can be used to map soil types, monitor crop yields, and track weather patterns.

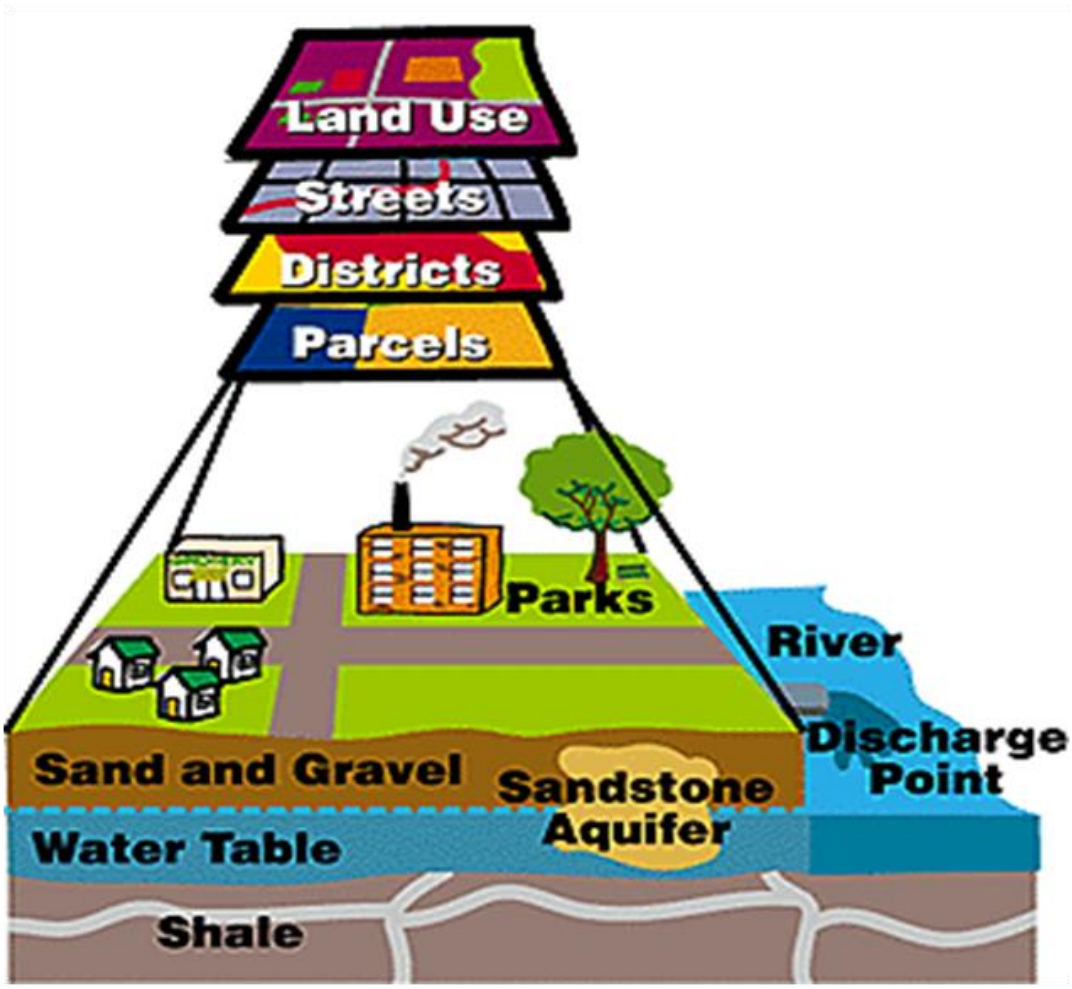


Figure: 2.9 GIS mapping image.

- **Website:** A website is a collection of web pages that are linked together and can be accessed via the internet. Websites can be used for various purposes such as sharing information, selling products or services, and providing entertainment.



Figure: 2.10 Different web pages.

- **Online resources:** Online resources for students can include a variety of tools and platforms that can help students learn and study more effectively. Some popular online resources for students include Khan Academy1, Google for Education2, and Open Library's Student Library.



Figure: 2.11 Online resource through internet.

- **Digital programs:** Digital programs can refer to a variety of different types of programs that are delivered digitally. Some examples of digital programs include online executive education programs1, digital transformation programs and so on.

- **Electricity power:** Electric power is the rate at which electrical energy is transferred by an electric circuit[1]. It is generated through the conversion of other forms of energy, such as mechanical, thermal, or chemical energy.
- **Server:** In computing, a server is a piece of computer hardware or software (computer program) that provides functionality for other programs or devices, called "clients"
  A server can provide various functionalities, often called "services", such as sharing data or resources among multiple clients.

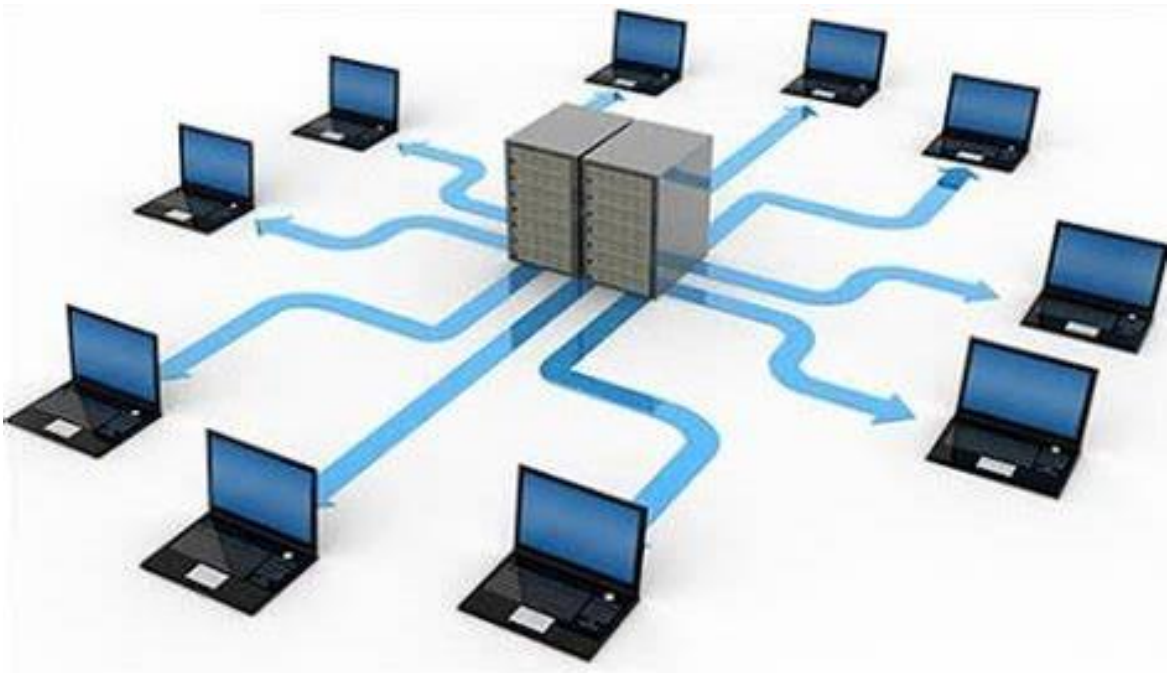


Figure: 2.12 Shared hosting server

2.3 Developing digital technology skills.

- There are many ways to develop digital technology skills. You can identify areas where you can improve based on your existing strengths and your profession. You can also ask your managers or colleagues for their feedback.
- Digital skills are critical both for job success and to participate fully in a digital society. Such skills include generic competencies like searching online, communication via email, or instant messaging, as well as the ability to use work-related online platforms and knowledge of digital financial services

✓ **Email:** Email is a method of exchanging messages between people using electronic devices 1. To send an email, you can use email clients such as Gmail or Outlook.

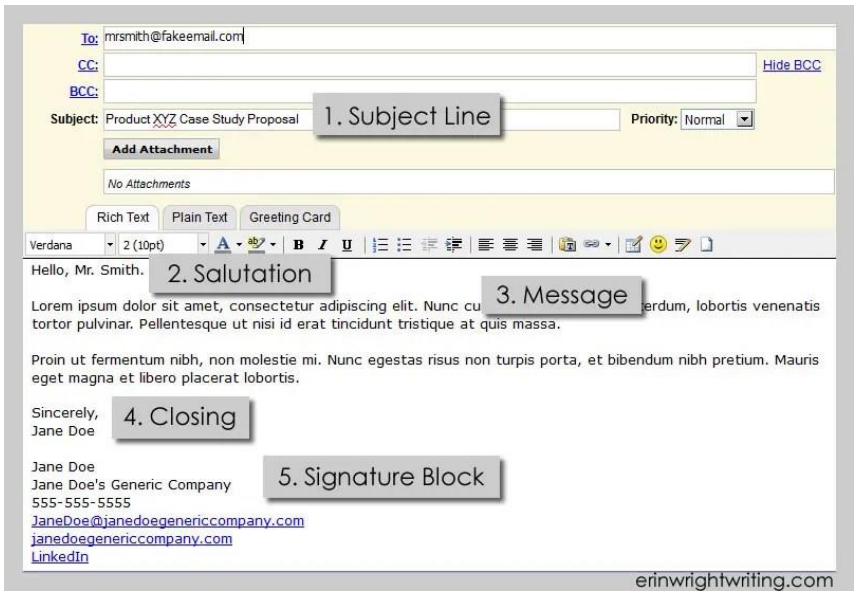


Figure: 2.13 Basic Mailing address.

✓ **Telegram:** Telegram is a cloud-based mobile and desktop messaging app with a focus on security and speed. You can use Telegram to send messages, photos, videos, and files of any type (doc, zip, mp3, etc.), as well as create groups for up to 200,000 people or channels for broadcasting to unlimited audiences



Figure: 2.14 Telegram messaging.

- ✓ **SMS:** stands for Short Message Service and is a text messaging service component of most telephone, Internet, and mobile device systems. SMS allows for short text messages to be sent from one mobile phone to another.



Figure: 2.15 SMS messaging.

- ✓ **WhatsApp:** is a free messaging app that allows you to send text messages, voice messages, make voice and video calls, share photos, documents, user location, and other media 1. It is



available on phones all over the world and has more than 2 billion users in over 180 countries.

Figure: 2.16 WhatsApp messaging.

2.4 Developing digital Agri-perineurial skill. Developing digital agri-entrepreneurial skills involves acquiring the knowledge, skills, and mindset needed to leverage digital technologies to start and grow successful agribusinesses. Here are some steps to develop digital agri-entrepreneurial skills:

- **Understand the Agriculture Industry**: Gain a deep understanding of the agriculture industry, including the latest trends, technologies, and market opportunities. This will help identify potential business opportunities and areas where digital technologies can be used to improve operations.
- **Develop Digital Skills**: Develop digital skills, including proficiency in social media, e-commerce platforms, and digital marketing.
- **Identify a Niche:** Identify a niche in the agriculture industry that aligns with your skills, interests, and market demand. This could include areas such as precision agriculture, farm management software, agricultural robotics, and e-commerce platforms for agricultural products.
- **Secure Funding:** Identify sources of funding to support the development and growth of the business, such as grants, loans, or investors. This will provide the resources needed to launch and scale the business.

2.5 Using digital technology communication tools. There are many digital communication tools that can be used for communication. Some of the most common ones include email, mobile phones, instant messaging apps like Telegram, SMS and WhatsApp. These tools can be used for both personal and business communication. For example, email is commonly used for sending messages and files instantly to others. Mobile phones enable verbal conversations to be conducted anywhere. Instant messaging apps like Telegram, SMS and WhatsApp are also



popular for sending messages and files instantly.

Figure: 2.17 Communication tools with users.

2.6 Using digital technologies, tools and techniques: Digital technologies, tools and techniques are used in various fields such as education, business and agriculture. Digital learning tools and technology support students in developing problem-solving skills, understanding emerging technologies, and self-motivation, which prepare them for future education and work. In business, digital technologies can help make our world fairer, more peaceful, and more just. In agriculture, digital technologies can be used for skill development of farmers. For example, digital agri-preneurial skill development programs can help farmers learn new



skills and techniques to improve their productivity.

Figure: 2.18 Flexible learning path using technology.

- **Video Chat** Video chat technology is any tool used to enable face-to-face interactions online. This includes popular video calling technology such as Zoom, Skype, and Google Hangouts, as well as tools built specifically for customer service.



Figure: 2.19 Video chat rooms.

- **Virtual Meeting** A virtual meeting is a form of communication that enables people in different physical locations to use their mobile or internet-connected devices to meet in the same virtual room. People use virtual meetings in many ways, including for connecting with family and friends, teletherapy, and collaborating with their distributed workforce.



Figure: 2.10 Virtual meeting.

- **E-learning** is the use of electronic media and information and communication technologies (ICT) in education. E-learning includes numerous types of media that deliver



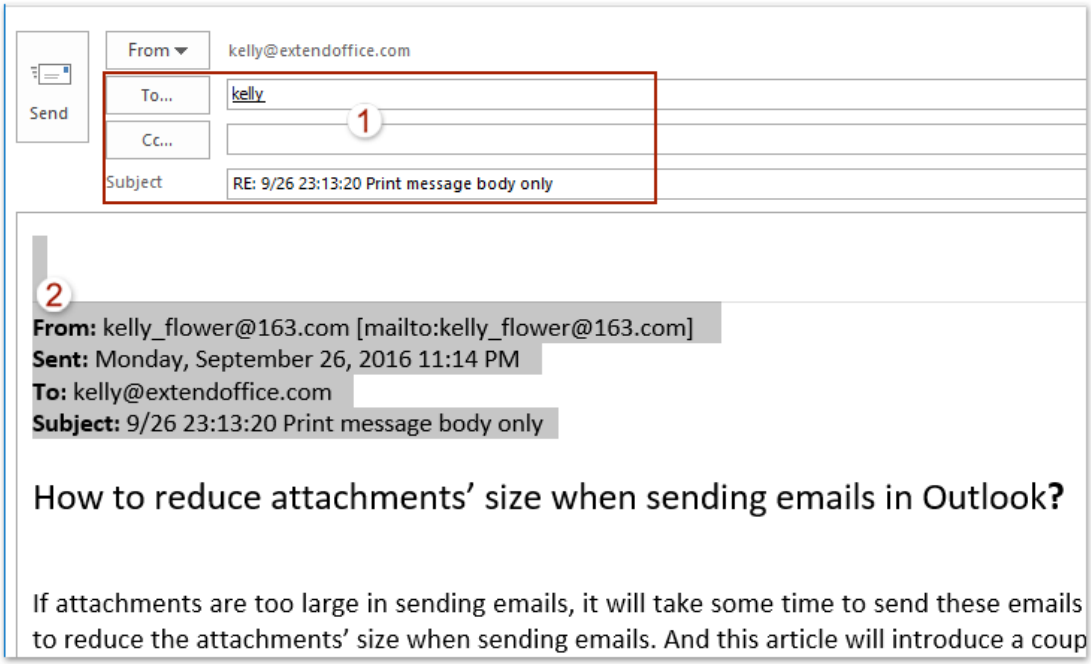
text, audio, images, animation, and streaming video. You can use e-learning platforms such as Coursera, Udemy, edX, Khan Academy and more to learn new skills online.

Figure: 2.11 E-learning.

- ✓ **E-Learning vs Distance Learning.** While the terms "e-learning" and "distance learning" are often used interchangeably, industry experts have identified some differences between these concepts. One of the key differences between e-learning and distance learning is location. In e-learning, learners and instructors can be together in one place while using digital tools to enhance the learning experience. Meanwhile, distance learning is more about using technology to bridge the distance between students and instructors. Through distance learning,
- ✓ **E-mail,** i.e., electronic mail, is a fast method of exchanging messages between the sender's and receiver's systems using the Internet. You can even send non-text files like images, videos, and audio files as attachments. One of the great things about it is that it's fast, cost-effective, and convenient.

- ✓ **To send an email,** you can use email clients such as Gmail, Outlook, Yahoo Mail and more. To send an email using Gmail, you can use the Gmail website to send email from a computer, or you can use the Gmail mobile app to send email from a smartphone or tablet.

To send an email using Outlook, choose New Email to start a new message. Enter a name or email address in the To, Cc, or Bcc field. In Subject, type the subject of the email



message.

Figure: 2.12 E-mail body.

- **How to create Gmail account?**

  Step 1. Write create Gmail account on the search bar.



Figure 2.13 google search bar

Step 2. Click on Create a Gmail account.

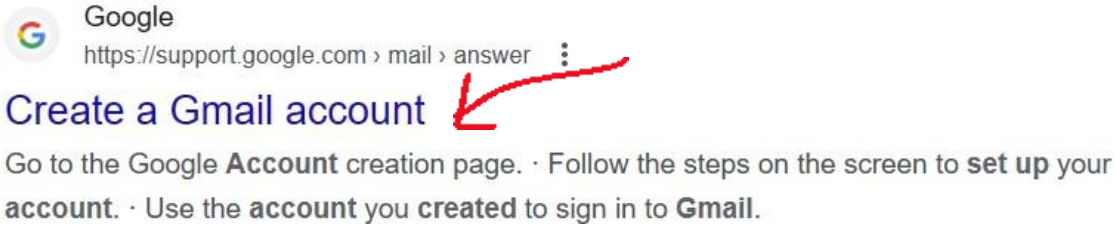
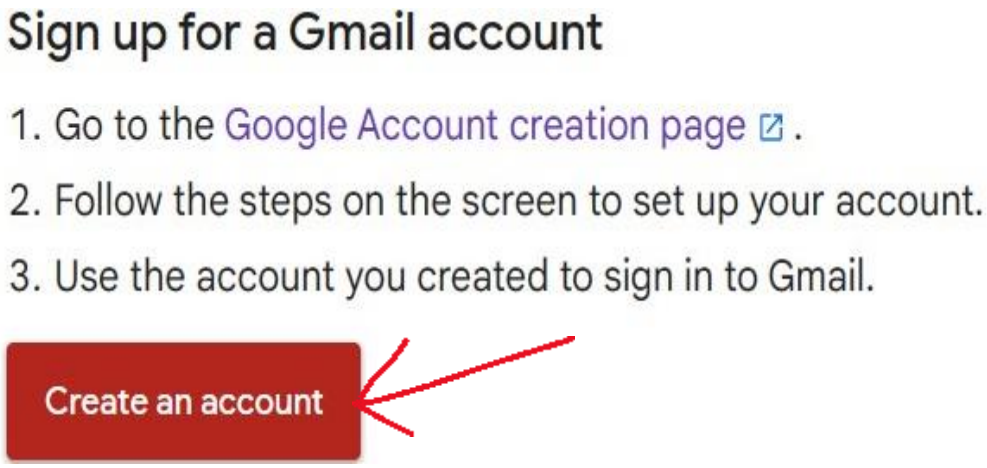


Figure: 2.14. Gmail account web link.



Step 3. Click on Create a coconut button.

Figure: 2.15 account button.

Step 4. Fill your name, user name and password in the text box then click on next button.

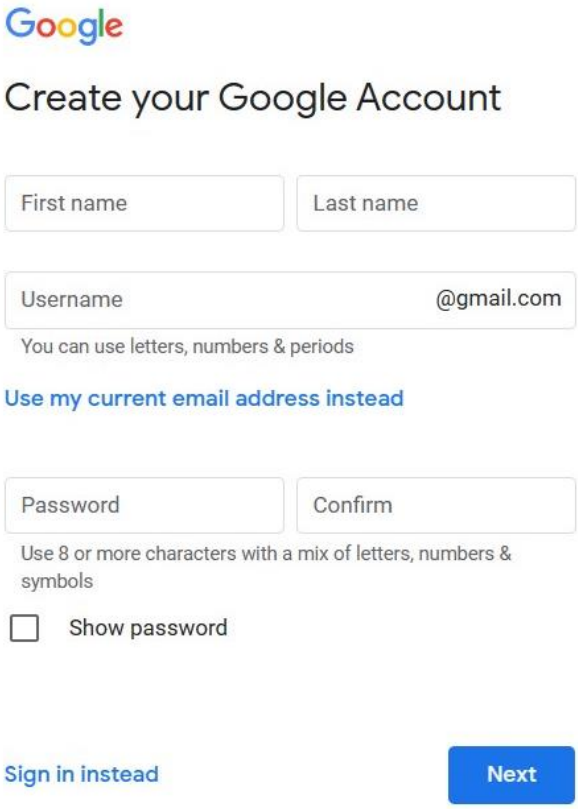


Figure:2.16 account form.

Step 5. Type your phone in the text box



Figure: 2.17 inserting phone page.

Step 5. Type or insert 6 digits of code after delivered by SMS

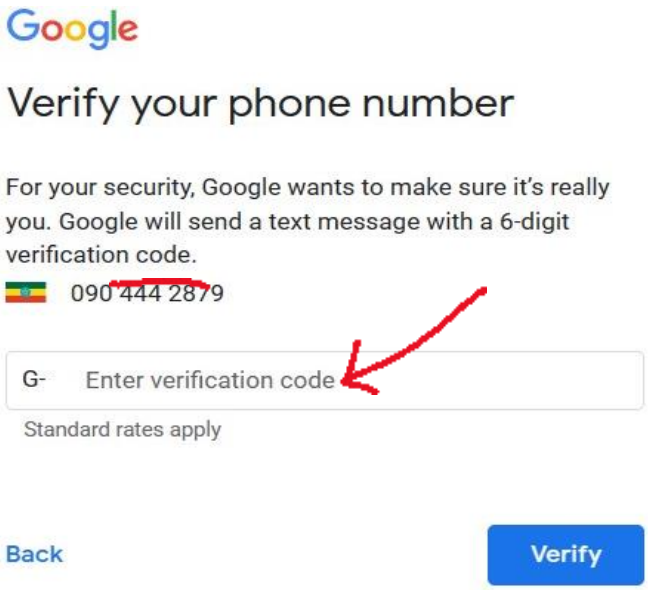


Figure: 2.27 verification page.

Step 6. Select your birthdate and gender then click on next button.

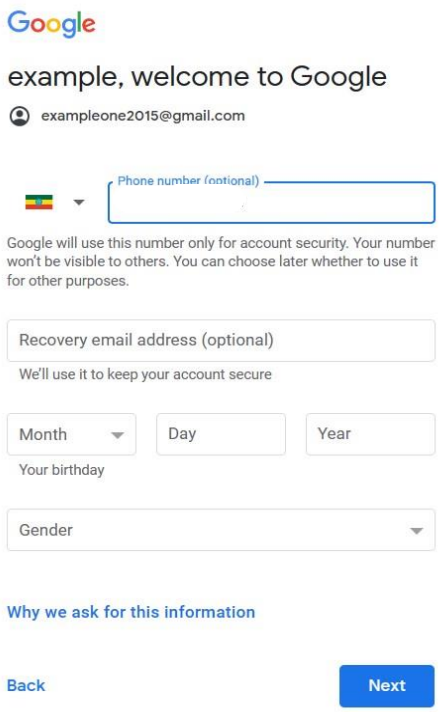


Figure: 2.18 Birthdate form.

Step 7. Click on Yes, I'm in button.

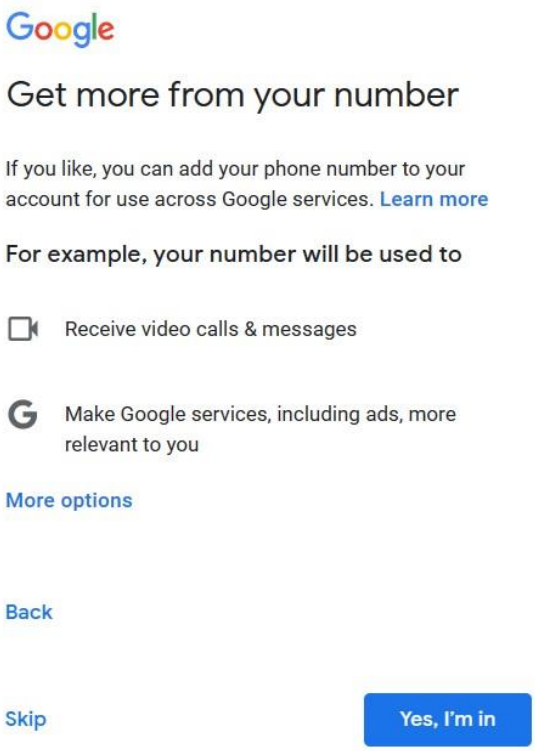
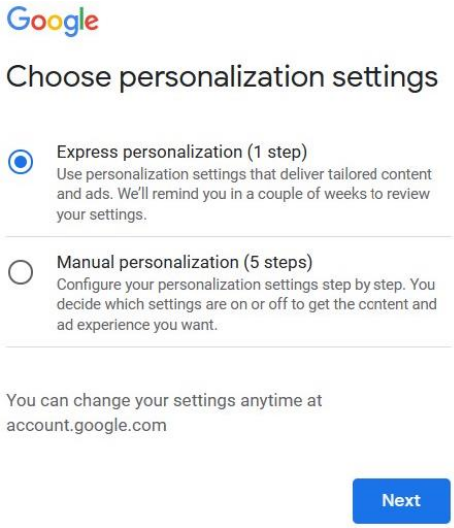


Figure: 2.19 futures option agreement.



Step 7. Select radio button on Express personalization (1 step)

Figure: 2.20 Personalize settings

Step 8. Click on confirm button.

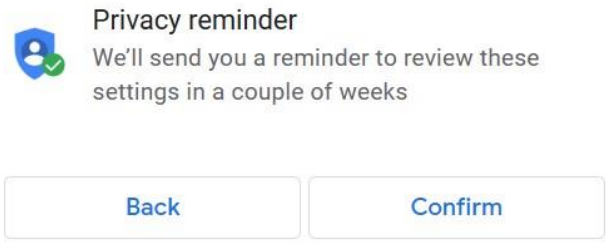
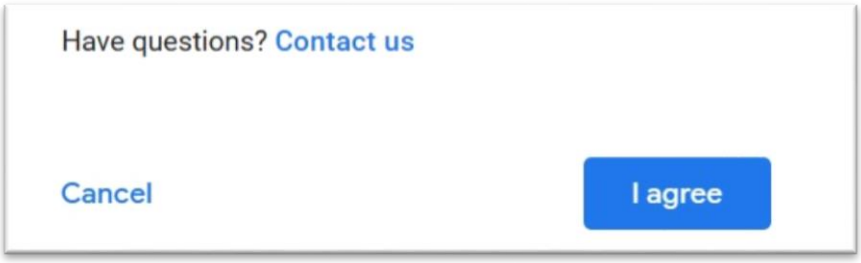


Figure: 2.21 Privacy Page.



Step 9. Click on I agree button.

Figure:2.22 agreement confirmation dialog.

Step 10. Finished Email Registration

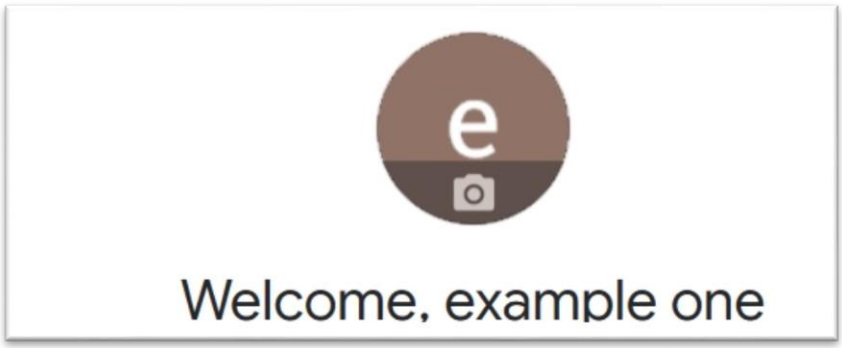


Figure:2.23 Final welcome page.

- **Video conference:** is a technology that allows users in different locations to hold face-to-face meetings without having to move to a single location together. This technology is particularly useful for business users who need to collaborate with colleagues or clients that are located in different parts of the world. Some popular video conferencing tools include Zoom, Skype, Google Meet, Microsoft Teams and more.



Figure: 2.24 **Video conferencing.** (https://youtu.be/2wuEOEFGSF4)

2.7 Promoting implementation of digital technologies

The implementation of digital technologies in various industries, including agriculture, has become increasingly important in recent years. As you may know, the use of digital technologies can improve efficiency, reduce costs, and increase yields. To promote the implementation of digital technologies in agriculture, there are several strategies that could be adopted:

- **Training:** Farmers and agribusinesses should receive training on how to use digital technologies effectively.

- **Investment:** Governments and private entities should invest in the development and dissemination of digital technologies.
- **Research and Development:** There needs to be research on the development of more efficient and affordable digital tools and platforms.
- **Collaboration:** Collaboration between farmers, researchers, and agribusinesses is crucial in developing and adopting digital technologies.
- **Incentives:** Governments could consider providing incentives to farmers to adopt digital technologies.

Self-Check 2	Written test

Name…… ID…… Date…….

Directions: Answer all the questions listed below. Examples may be necessary to aid some explanations/answers.

Test I: Write True or False

1. Electronic mail, is a fast method of exchanging messages between the sender's and receivers. (1point)
2. Telegram is a cloud-based mobile and desktop messaging app. (1point)
3. E-learning **NOT** includes numerous types of media that deliver text, audio, images, animation, and streaming video. (1point)

Test II: Fill in the black space (2 point each**)**

1. A form of communication that enables people in different physical locations_____.
2. Distance learning is learners and instructors can be together in one place while using digital tools to enhance the learning experience_____-.

Test III: Short Answer Questions (2 point each**)**

1. Write the main basic E-mail Body.
2. What is Server?
3. What are Digital programs?
4. What does mean **GIS**?
5. Write at least seven digital technology infrastructures.

Note: Satisfactory rating – 17points Unsatisfactory - below 17 points

Operation Sheet 2 -

2.1 Create New Email Using Gmail account.

A. Tools and equipment required for create new e-mail account.

- Cell phone
- Computer
- Internet
- Data cable
- Power cable
- Power divider
- Any web browser

B. Techniques /procedures

Step-1

- Always have a clean and organized work area.
- Prepare tools and equipment.
- Connect computer with internet

LAP TEST-2	Performance Test

Name……. ID…….

Date…….

Time started: 2:30 Time finished: 3:30 local time

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 30 minutes. The project is expected from each student to do it.

Task 1. create a new e-mail

LG #48 LO #3 Recording and documenting

Instruction Sheet

This learning guide is developed to provide you the necessary information regarding the following content coverage and topics:

- Developing data collecting formats
- Identification and selection of data collection methodologies
- Literacy skills for data analysis and interpretation
- Use software applications (word processing, spread sheets, data base management
- Organizing, analyzing, interpreting, documenting and reporting collected data
- Organized, analyzed and interpreted data are documented and reported
- Collection of feedbacks

This guide will also assist you to attain the learning outcomes stated in the cover page. Specifically, upon completion of this learning guide, you will be able to:

- Develop data collecting format
- Identify and select data collection methodologies
- Analysis and interpret literacy skills
- Use office application, such as word processing, spread sheet, data base management
- Collect and organize document
- Report Organized, analyzed and interpreted data
- Collect feedback

Learning Instructions:

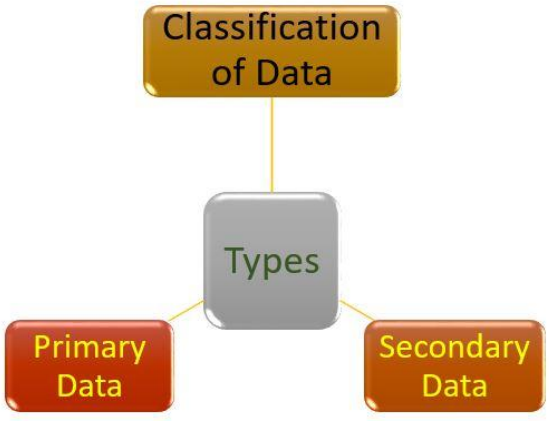
1. Read the specific objectives of this Learning Guide.
2. Follow the instructions described below.
3. Read the information written in the information Sheets
4. Accomplish the Self-checks
5. Perform Operation Sheets
6. Do the “LAP test”

Information Sheet 3

3.1 Developing data collecting formats

Data collecting formats development is an important aspect of research. Before you begin collecting data, you need to consider the aim of the research, the type of data that you will collect, the methods and procedures you will use to collect, store, and process the data. To collect high-quality data that is relevant to your purposes.

- **TYPES OF DATA** Before selecting a data collection method, the type of data that is required for the study should be determined. This section aims to provide a summary of possible data types to go through the different data collection methods and sources of data based on these categories. However, we need to understand what data is exactly? The embodied information in terms of figures or facts used to analyze for different calculations and finally gain a result to address the study question or hypothesis testing is known as data. Data can be categorized using different ways including quantitative and qualitative.
  - ✓ **Qualitative Data** is expressed in numbers and graphs and is analyzed through statistical methods. It can be used to find patterns and averages, make predictions, test causal relationships, and generalize results to wider populations.
  - ✓ **Qualitative data** is expressed in words and analyzed through interpretations and categorizations. (e.g., text, video, or audio) to understand concepts, opinions, or experiences.



DATA COLLECTION METHODS

Figure 3.1 classification of data diagram.

- **Primary data collection methods**: Primary data collection is based on the processes by which you gather data yourself for your purpose of study and no one has access to use this data until it is published and both qualitative and quantitative approaches are used for this purpose. The main primary data collection is discussed here, considering 14 different types are listed in figure 3.1. The most common types are initially explained including questionnaires, interviews, focus groups, observation, survey, case studies, and experimental methods in detail. Then, other methods are reviewed shortly.
- **Secondary data collection methods:** is the data gathered from published sources meaning that the data is already gathered by someone else for another reason and can be used for other purposes in a research as well. In all papers, the literature review section is based on secondary data sources. Thus, secondary data is an essential part of research that can help to get information from past studies as basis conduction for implementing a research or as the required background information.

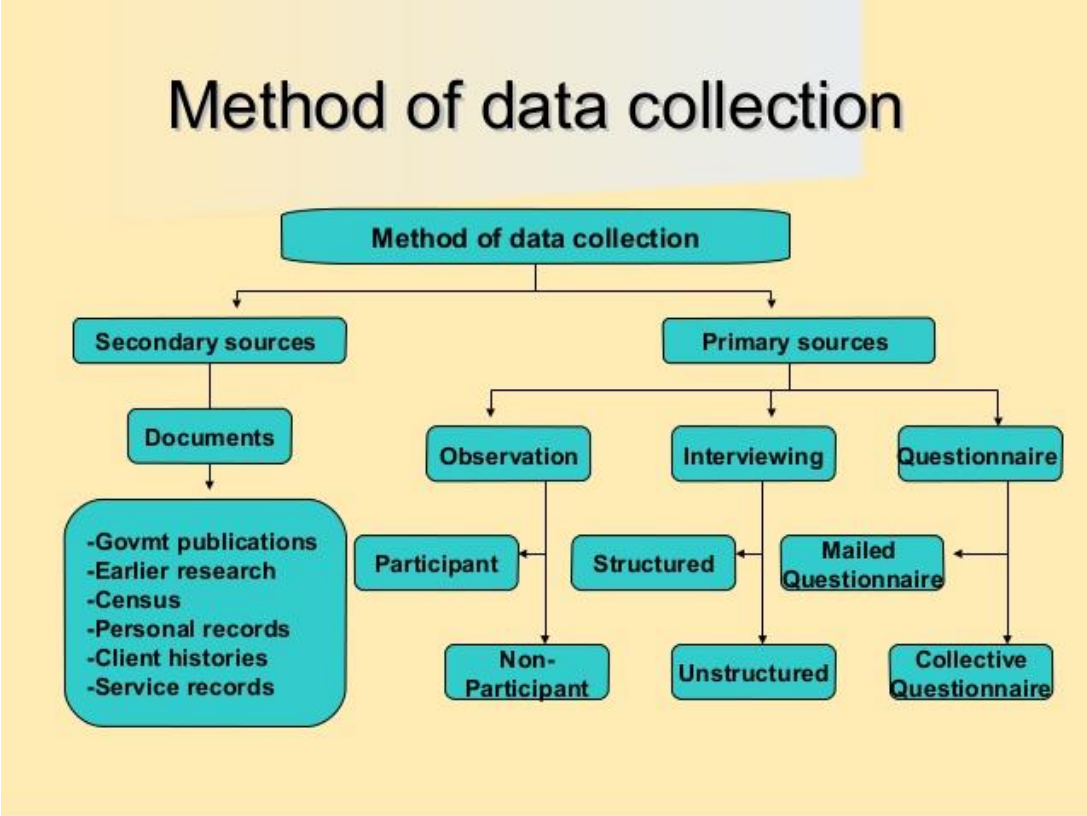
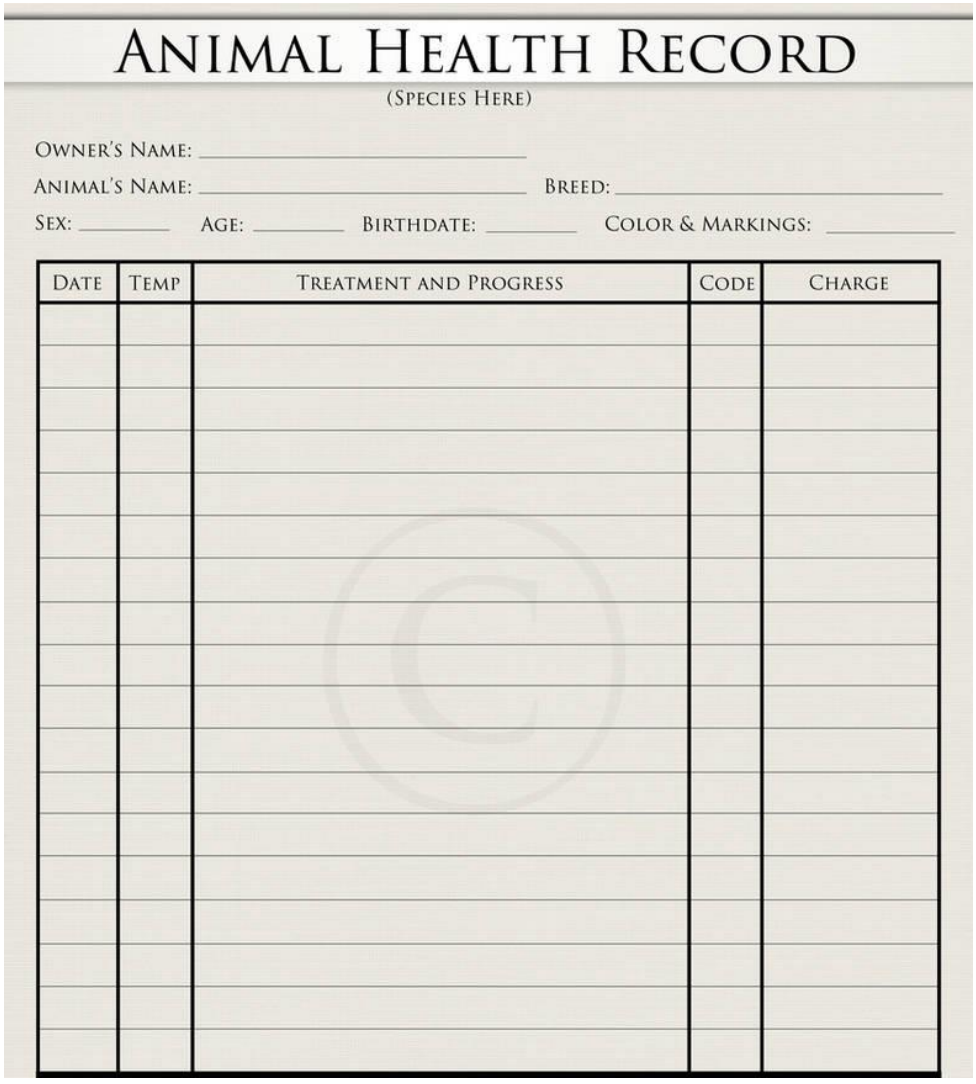


Figure 3.2 Data collection method.

- **Recording and documenting** are two terms that are often used interchangeably. However, there is a subtle difference between the two. Recording involves a process of gathering information and documenting in written, oral and visual forms what is noticed. When we record something, we are able to track progress and support further learning. On the other hand, documenting refers to the process of recording something in a way that it can be used as evidence. For example, a document is a piece of writing that contains information whereas a record is a document that can be used as evidence. Documentation as a set of instructional materials shouldn't be confused with documentation science, the study of the recording and retrieval of information.



ANIMAL HEALTH RECORD

(SPECIES HERE)

OWNER'S NAME: _____

ANIMAL'S NAME: _____ BREED: _____

SEX: _____ AGE: _____ BIRTHDATE: _____ COLOR & MARKINGS: _____

DATE	TEMP	TREATMENT AND PROGRESS	CODE	CHARGE

Figure 3.3 sample data recoding format.

3.2 Identification and selection of data collection methodologies

The identification and selection of data collection methodologies is an important aspect of research. Data collection methods are used to gather observations or measurements.

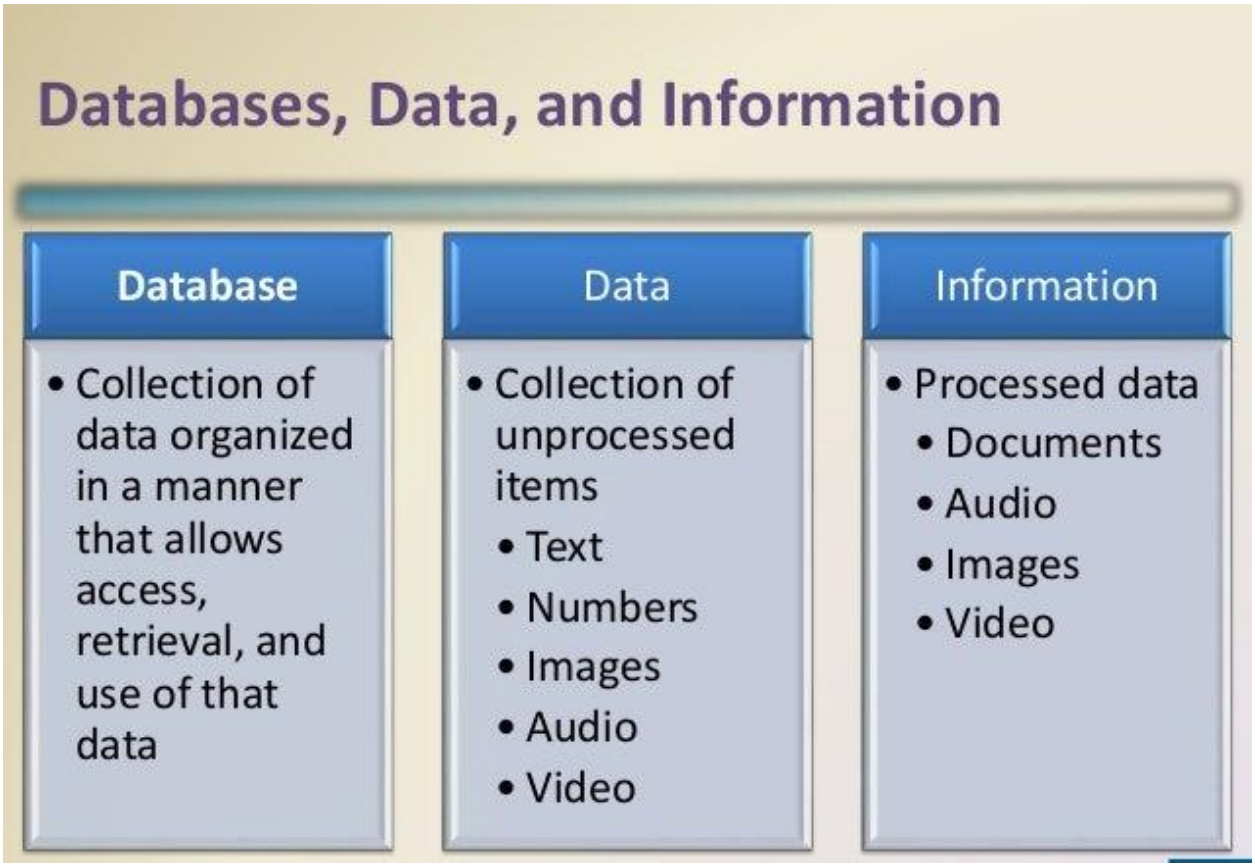


Figure: 3.4 sample data recoding format.

3.3 Literacy skills for data analysis and interpretation

Literacy skills for data analysis and interpretation refer to the ability to read, understand and interpret data. It involves the ability to identify patterns and trends in data, as well as the ability to draw conclusions and make decisions based on that data.

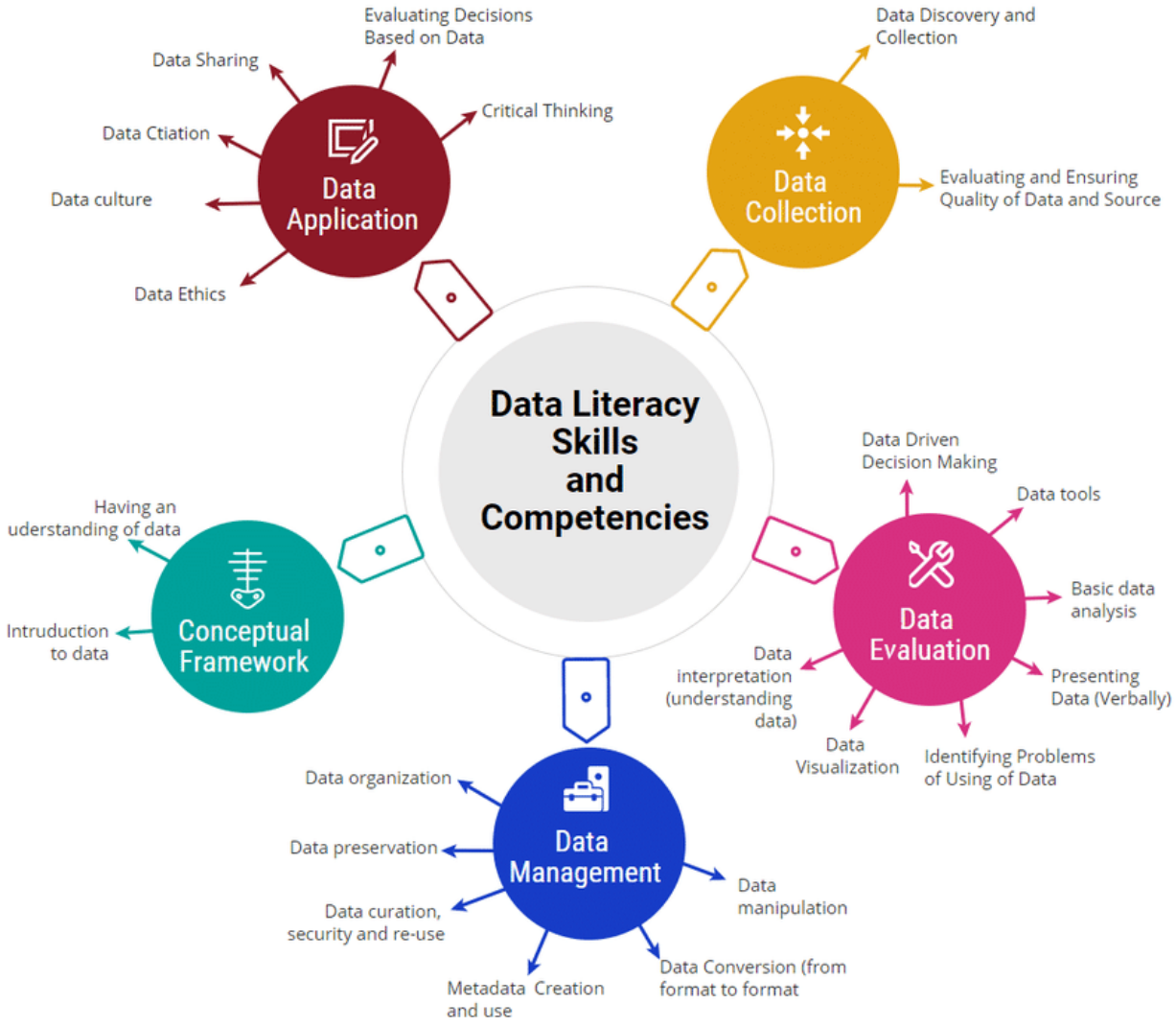


Figure 3.5 sample data recoding format.

3.4 Use software applications (word processing, spread sheets, data base management)

Microsoft Word is a word processor software application primarily used for creating documents in different formats. It is capable of helping users create a variety of different types of documents.

3.4.1 Getting Started in Microsoft Word 2010

You open Microsoft Word by clicking on the icon on your desktop (if you have one there) or in the



program bar. The icon for Microsoft Word 2010 looks like this:

Figure: 3.6 Microsoft word 2010 icon

- **Using the Status Bar**

The status bar provides at-a-glance information about the document. It is found at the bottom of the Word window.

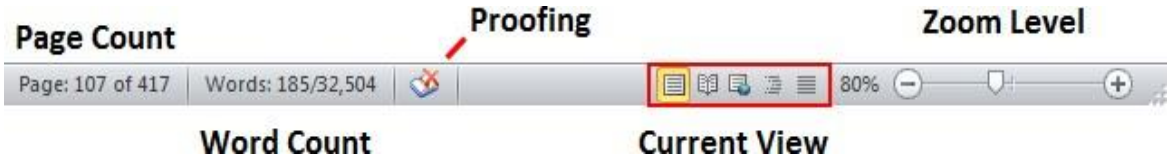
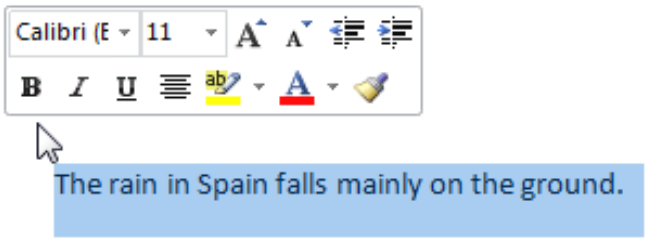


Figure 3.7 status bar

Page Count	Shows what page of the document is currently visible. Click this area to open the Go To dialog.
Word Count	Displays how many words are in the current document. Click this area to open the Word Count dialog, a detailed count of items in your document.
Proofing	This book icon indicates whether or not there are spelling errors in your document. Click the icon to do a spell check.
Current View	Use these buttons to change views. (We will discuss views later.)
Zoom Slider	Use this slider to zoom in or out of your document. (We will discuss how to use the slider and other zoom tools later.)

- **Using the Mini Toolbar**

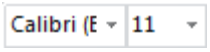
In the last section, we learned how to type and select text. You may have noticed the mini



toolbar pop up if you moved your mouse near the selected text:

Figure: 3.8 mini toolbar

This toolbar contains the most popular formatting commands from the Font group. You should find some of them familiar:



Change the font type and size.



Use these buttons to nudge font size up or down.



Indent or outdent text.



Bold text.



Italicize text.



Underline text.



Center text.



Highlight text. Click the pull-down arrow for highlight colors.



Change font color. Click the pull-down arrow for font colors.



Click to toggle the Format Painter. This lets you copy the text formatting from the selected text and "paint" it onto other text.

Applying formatting from the mini toolbar is the same as applying it from the Home tab: select text, move your mouse above the selected text, and the mini toolbar will appear. The mini toolbar also appears if you right-click selected text, which we look at in a moment.

Given below are the different Microsoft word shortcut keys:

Ctrl + A: This shortcut is used to select all contents of the word document.

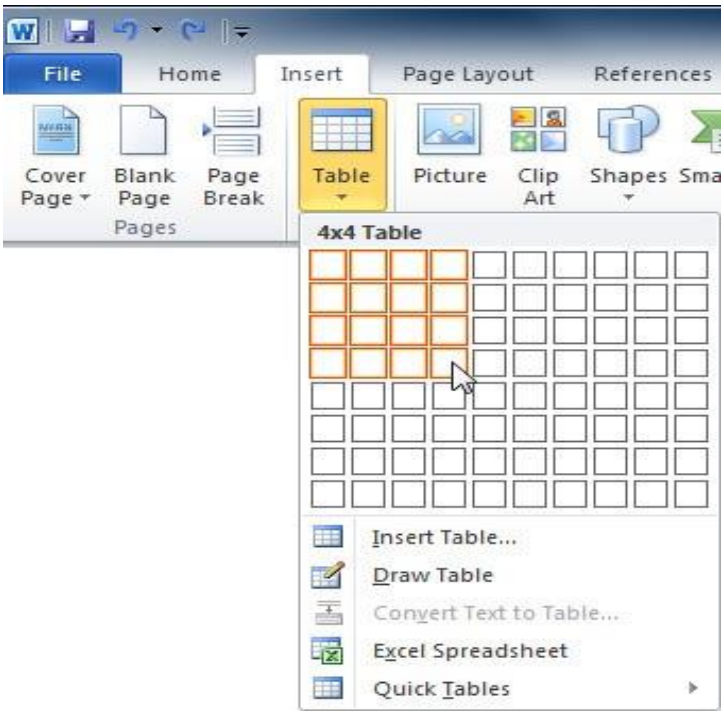
Ctrl + C: This shortcut is used to copy the text selected by the user.

Ctrl + V: This shortcut is used to paste the copied text.

Ctrl + X: It is used to cut the selected text.

Ctrl + Y: It is used to redo the last task performed.

- **Inserting Tables:** Tables are an excellent way to organize information in your documents. In this lesson, we'll learn how to add tables in a few different ways. We'll also learn about the two contextual tabs that appear when working with a table. Finally, we'll learn how to add an Excel spreadsheet to a document. To add a table to your document, click Insert – Table. Then,



drag out the dimensions of the table on the grid and click

Figure: 3.9 mini toolbar

- **Anatomy of a Table:** A table has rows (which go horizontally), columns (which go vertically), and cells (each small box). Here's an example:

	Week 1	Week 2	Week 3
North	$15,676	$13,290	$14,866
South	$46,973	$42,099	$38,909
Central	$25,000	$15,223	$32,096
TOTALS	$87,649.00	$70,612.00	$85,871.00

Table: 1 sample information 4 colu by 5 row

This table summarizes sales data. The top row shows us the time ranges. The first column contains the sales areas. Then, the actual sales data is in the majority of the cells. The table will appear in the document, ready to add text:

Area One			

Table: 2 appear black table

If your table is larger than the grid shown in the menu (or if you're having trouble clicking and dragging), click the Insert Table command:

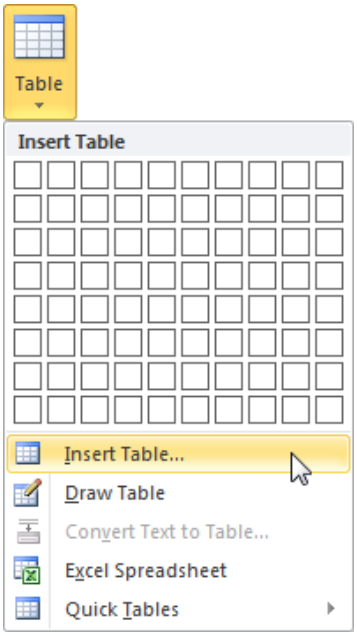


Figure: 3.10 insert use clicking icon

Then, you will see the Insert Table dialog, where you can enter the number of columns and rows that you want in your table, and set the desired AutoFit behavior. Click OK when you are ready:

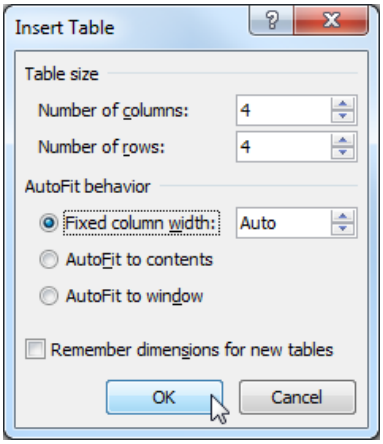


Figure: 3.11 inset dialog box

The table will appear just as before.

- **Drawing Tables**

Another way to create a table is to click the Draw Table command in the Table menu:

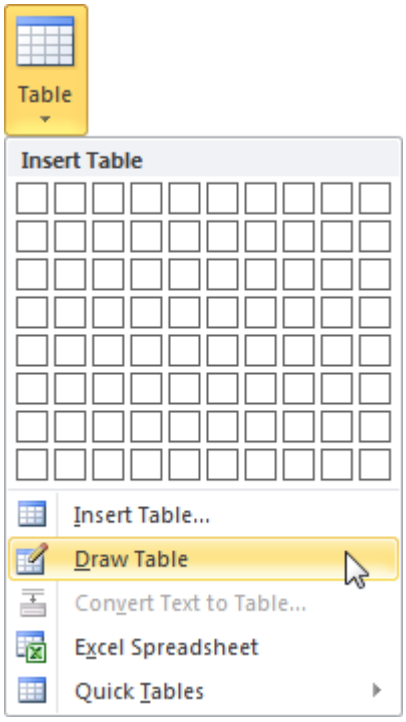


Figure: 3.12 drawing selection icon

Your cursor will turn into a pencil. You can then click and drag to create the table outline:



Figure: 3.13 drawn table

You will then need to add rows and columns manually, which we will look at in the next lesson.

- **About the Tables Tools Tabs**

You may have noticed two new tabs appear when we inserted a table:



Figure: 3.14 design and layout tab

This topic is just an introduction to the commands on these two tabs. We'll explore how to use the major commands during this section.

The first tab is **Design** (pictured above). Let's take a look at its features.

- **Table Style Options**

This group provides checkboxes to toggle various types of table formatting on and off.

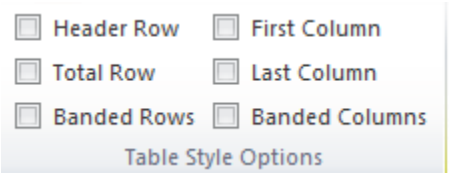


Figure: 3.15 group of table style

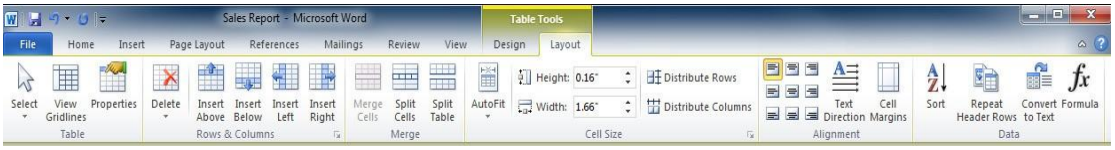


Figure: 3.16 table layout

Formula

Calculate the current cell based on a formula, like adding all the cells above it together.

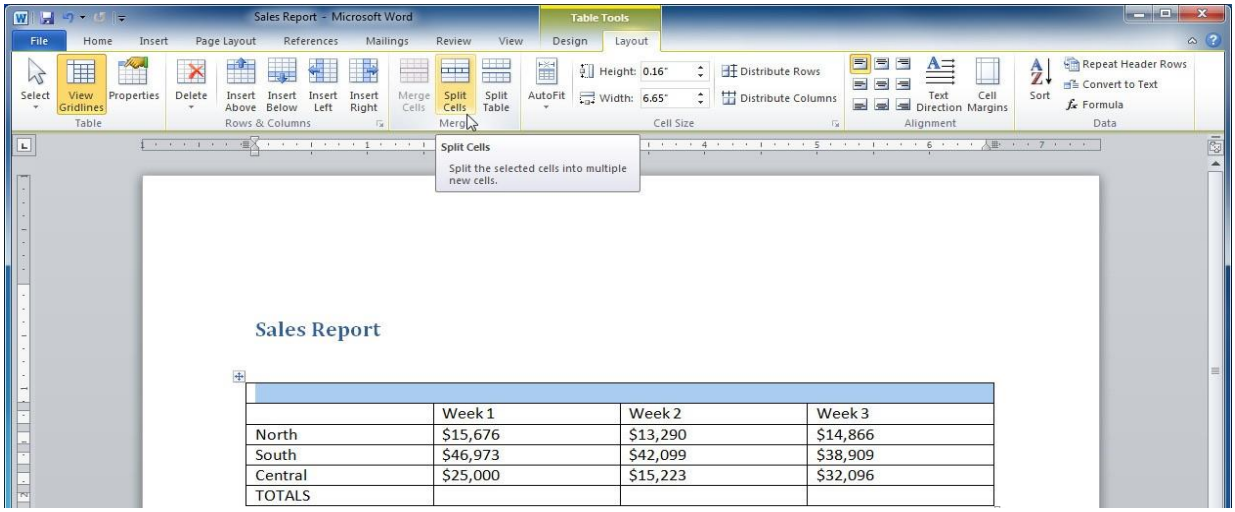


Figure: 3.17 split cell

- **Splitting a Table**

Word also provides a tool to split a table into two parts. First, place your cursor in the row that you want to be first in the new table. Then, click the Split Table command on the Table Tools – Layout tab:

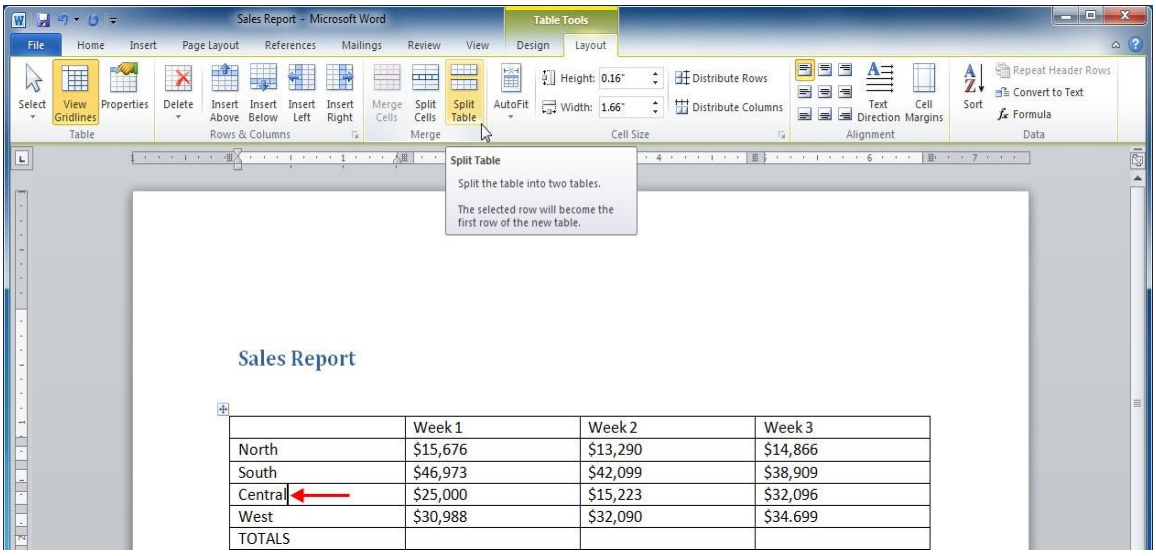


Figure: 3.18 select before split table

You will now have two tables:

	Week 1	Week 2	Week 3
North	$15,676	$13,290	$14,866
South	$46,973	$42,099	$38,909

Central	$25,000	$15,223	$32,096
West	$30,988	$32,090	$34.699
TOTALS			

Table 3 from one to two table

To re-join them, just delete the space between them.

- **Using the Format Painter**

You know that Word can copy and paste text, with or without effects. But Word can also copy just the text formatting within or between documents. First, select the text that has the formatting that you want to duplicate elsewhere:

Next, click the Format Painter icon on the Home tab, or use the Ctrl + Shift + C shortcut. Your cursor will turn into a paintbrush:

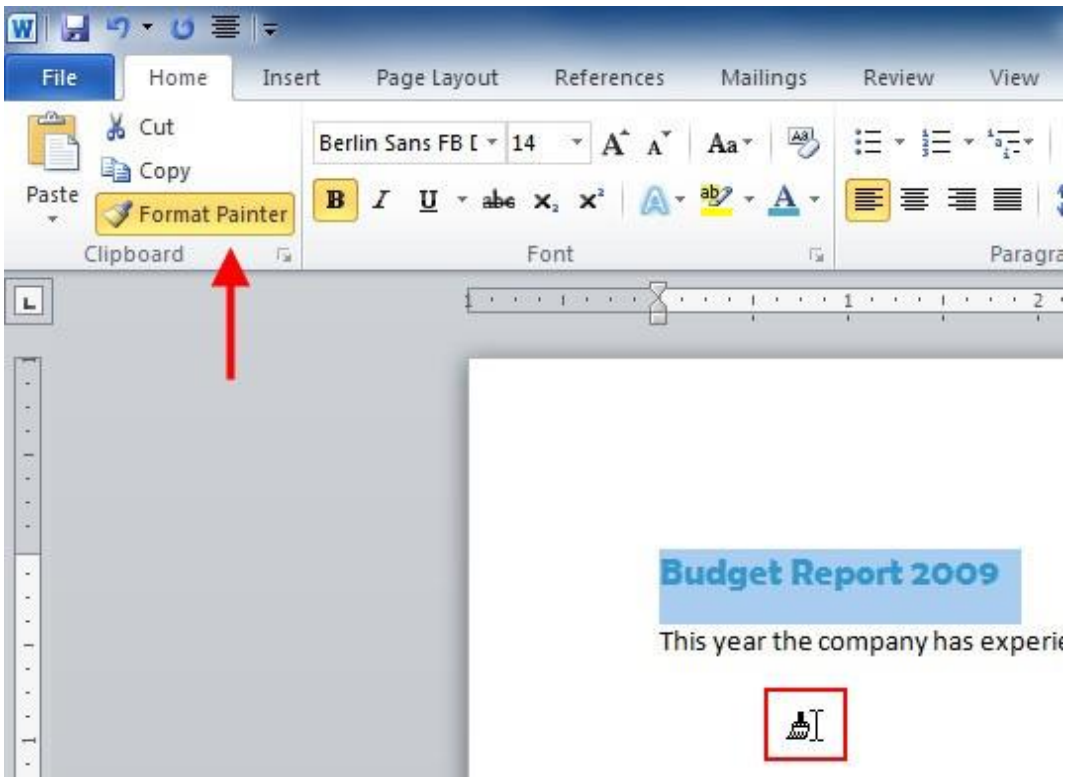


Figure: 3.19 format painter icon

Now select the text you want to format. The new text will take the format of the old text:



The Format Painter command will then become deselected. To apply the same formatting to multiple items, double-click the Format Painter and then click and drag over as many items as you want. When you are done formatting, click the Format Painter icon again to turn it off.

Remember that formats are not stored on the clipboard, and you can only copy formatting for one set of text at a time.

The Format Painter captures all kinds of formats, including:

I. Paragraph formatting (spacing, alignment, indents)

II. Font formatting (effects, spacing, font type, size, color, animation, and highlighting)

III. Borders, fills, shading, and patterns

IV. Bullets and numbering

V. Columns

- **Creating Basic Headers and Footers**

Headers and footers are groups of information set apart from the body of your document. Headers are located at the top of a page and footers are set at the bottom. They can make your document more user-friendly, and make it look polished and professional.

Headers and footers are easy to create and edit. There are a lot of options you can customize, so we're going to spend this entire section just on headers and footers. We're going to start by learning how to create, edit, and remove a header or footer.

- ✓ **Using a Preset Header or Footer:** Headers are a type of Building Block, and Word 2010 contains a number of pre- formatted headers available for use. This means that you can create a professional- looking header or footer with just a few clicks. To start, click Insert Header or Footer. Click the type of header or footer that you want to add and it will automatically be inserted into the document:

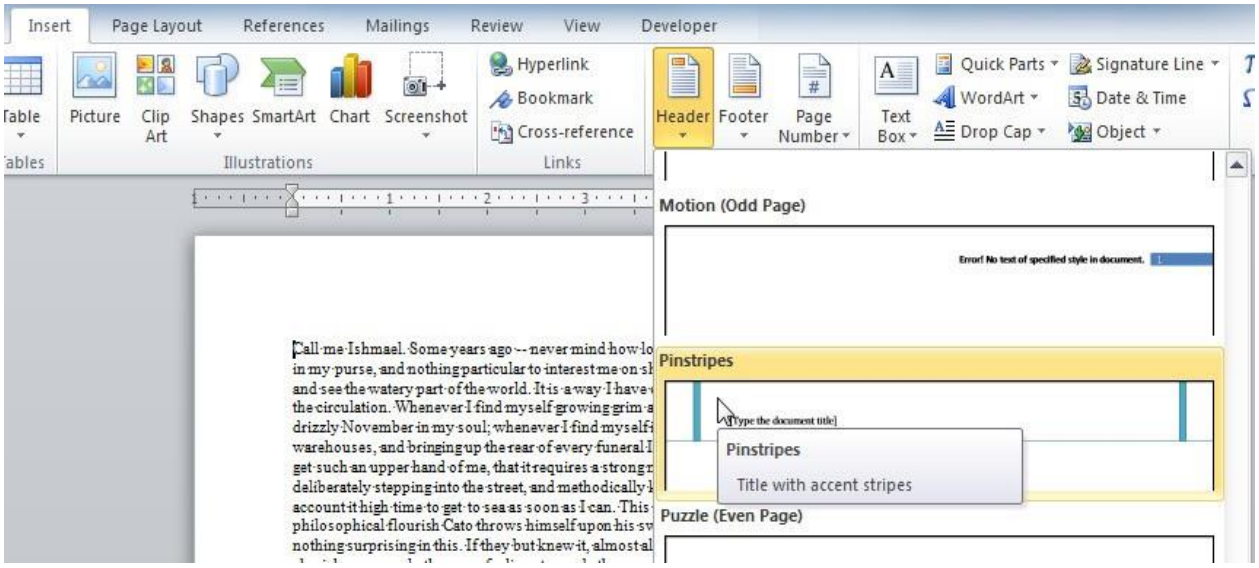


Figure: 3.20 header and footer icon location

Once you click a header or footer you like, that header/footer will be inserted and replicated on every page, unless specialized section breaks have been used. All you need to do is add text where indicated. You can also format header/footer text just like you would any other text contained in your document:

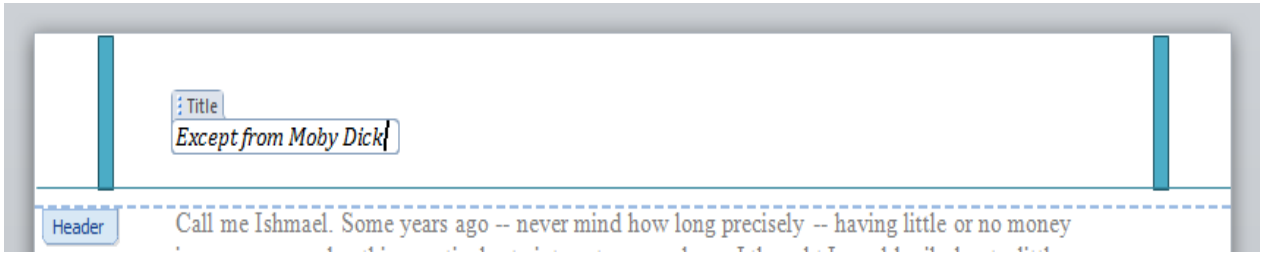


Figure: 3.21 header and footer writing place.

When you have finished creating your header and/or footer, click the Close button on the Header & Footer Tools – Design tab:



Figure: 3.22 close button of header and footer

When this tab is closed, text and objects in the header and footer will appear faded, meaning they are not editable at this time. If you print or export the document, all headers and footers will be displayed normally:

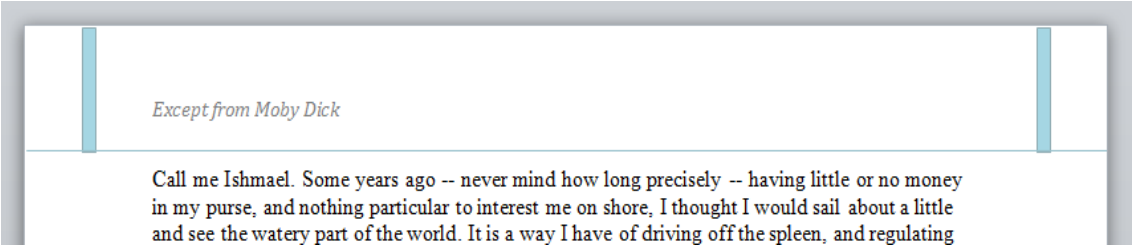


Figure: 3.23 paragraph in header and footer

- ✓ **Editing a Header or a Footer**

All you have to do to edit a header/footer is double-click inside the header/footer area. This will re-open the Header & Footer Tools – Design tab. Once you have made your changes, close this contextual tab or double-click somewhere in the main portion of the document to return to normal editing view.

- ✓ **Adding a Header or Footer to the Gallery**

If you want to create your own header or make changes to one of the preset headers/footers, do so by double-clicking at the top or bottom of the page to create your header or make any changes you want. Once you are satisfied with this customized header/footer, you can save it by clicking Header (or Footer) □ Save Selection to Header (or Footer) Gallery:

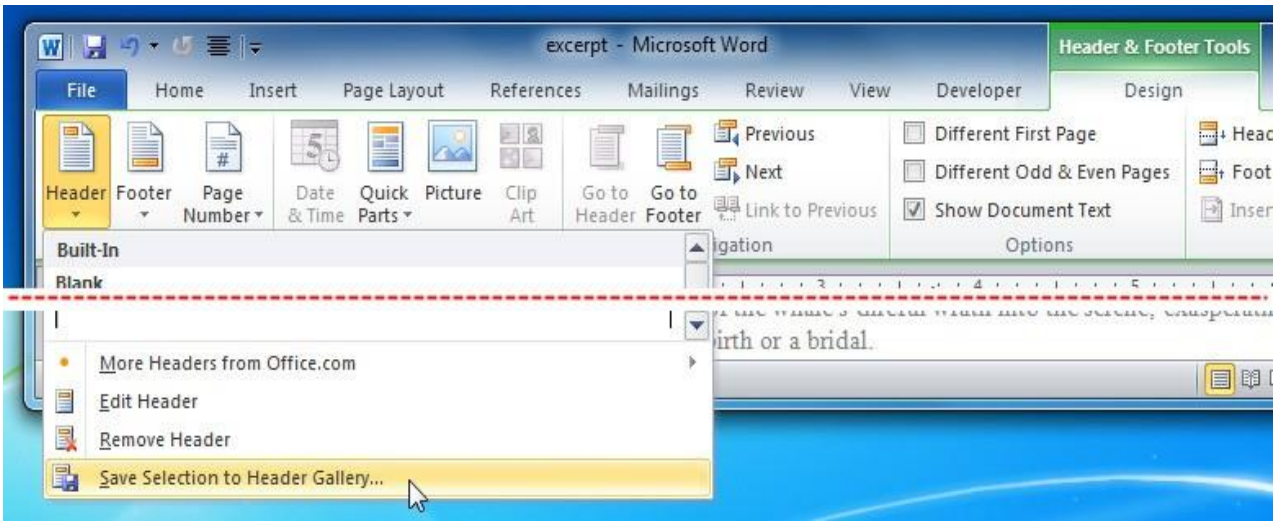


Figure: 3.24 save selection to header and gallery

Enter the details for this Building Block and click OK:

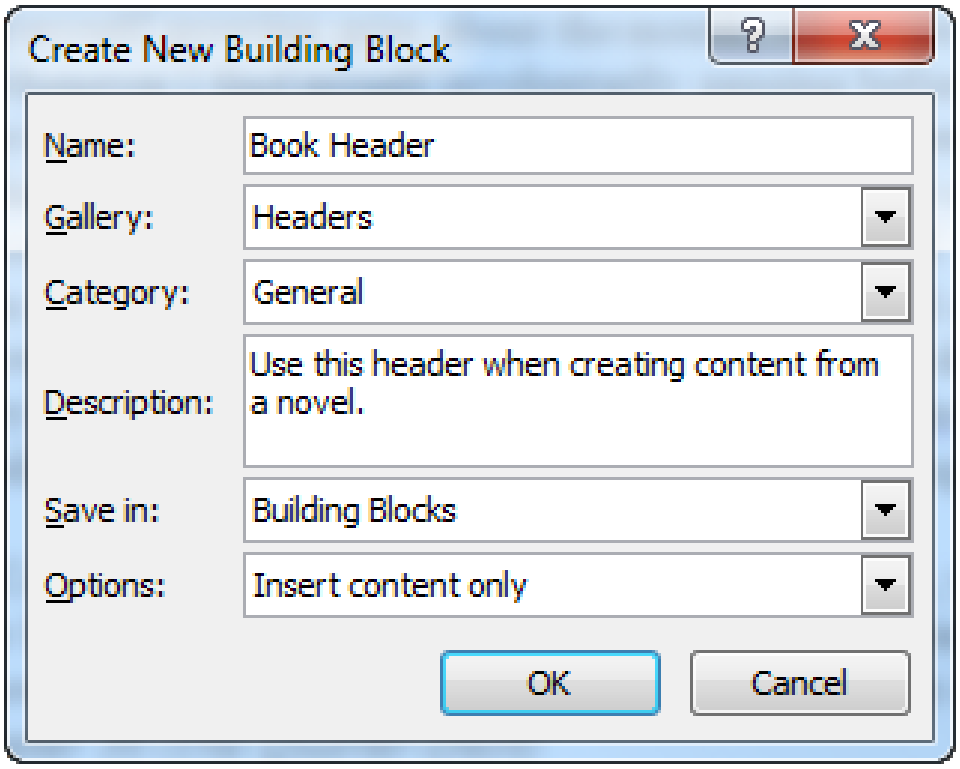


Figure: 3.25 New building block

- ✓ **Navigating Through Headers and Footers**

We will focus on the details in the Header & Footer Tools – Design tab in the next lesson. However, now that you know how to create a header/footer, let's take a quick look at the Navigation group.

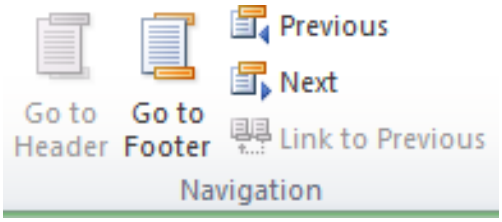


Figure: 3.26 navigate header and footer

The Go to Header/Go to Footer commands toggle the view between the header and footer.

If you have included section breaks in your document, use the Previous and Next commands to navigate between different sections of your document. (For more information on sections, see Lesson 2.4.) We will explore the Link to Previous command later in this section.

- ✓ **Removing a Header or Footer:** To remove a header or footer, you can do one of two things. If the header/footer is just text, double-click in the header/footer region and delete the text. If there are more complex elements, it's easiest to use the specialized command. First, double-click the header or footer that you want to remove to place your cursor in that field. Click Header (or Footer) Remove Header (or Remove Footer):

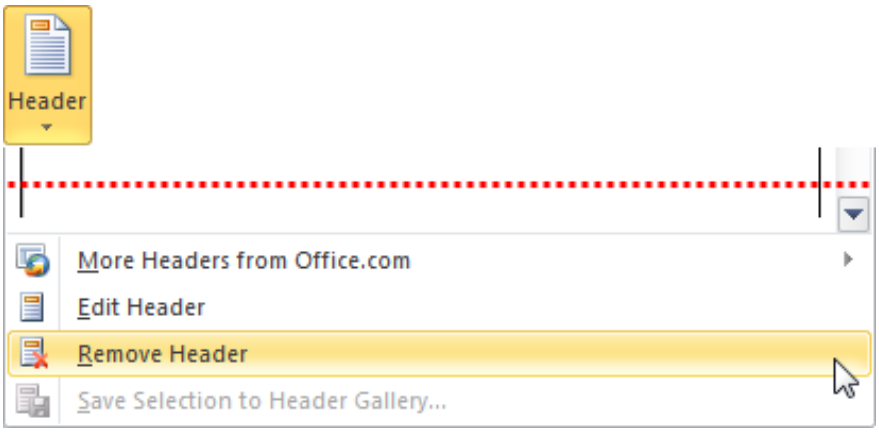


Figure: 3.27 remove header place.

- **Apply paragraph formatting**

paragraph is created by entering text and then pressing the Enter key. A paragraph can contain one word, one sentence, or multiple sentences.

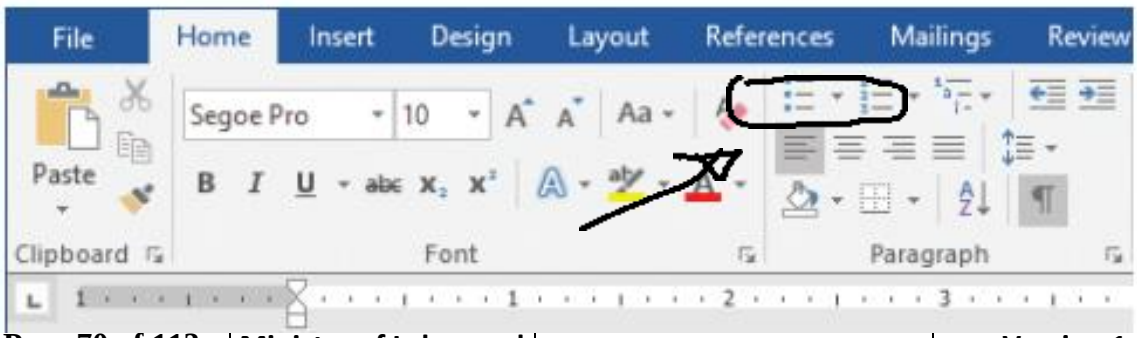


Figure: 3.28 Text alignment

Configure alignment: the alignment settings control the horizontal position of the paragraph text between the page margins. There are four alignment options:

- **Align Left:** This is the default paragraph alignment. It sets the left end of each line of the paragraph at the left page margin or left indent. It results in a straight left edge and a ragged right edge
- **Align Right:** This sets the right end of each line of the paragraph at the right page margin or right indent. It results in a straight right edge and a ragged left edge.
- **Center:** This centers each line of the paragraph between the left and right page margins or indents. It results in ragged left and right edges.
- **Justify:** This alignment adjusts the spacing between words so that the left end of each line of the paragraph is at the left page margin or indent and the right end of each line of the paragraph (other than the last line) is at the right margin or indent. It results in straight left and right edges

.

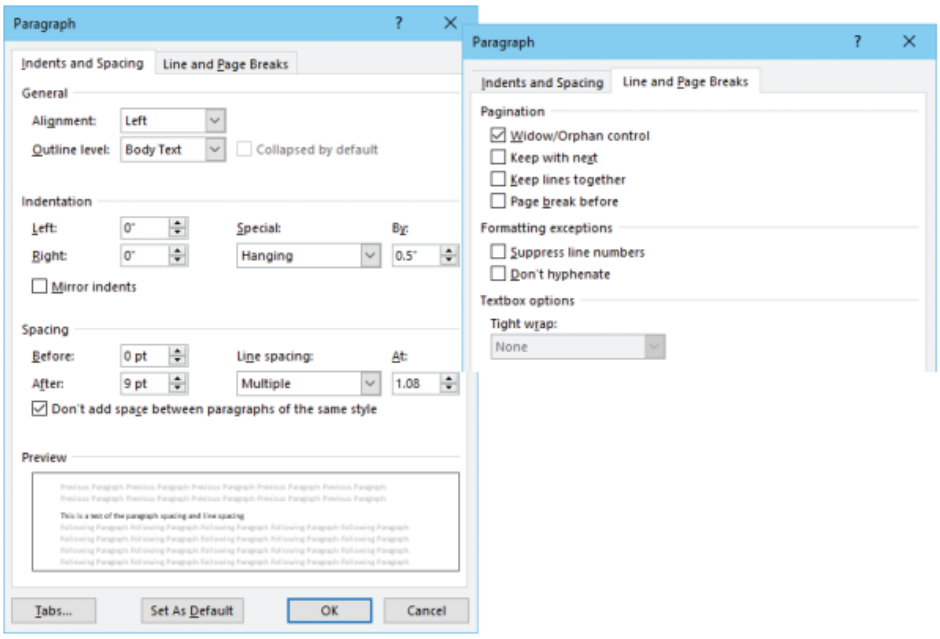


Figure: 3.29 The Paragraph dialog box.

The icons on the alignment buttons on the ribbon depict the effect of each alignment option.

To open the Paragraph dialog box

- Do either of the following:
  a) On the Home tab or the Layout tab, in the Paragraph group, click the Paragraph dialog box launcher.
  b) On the Home tab, in the Paragraph group, click the Line and Paragraph Spacing button, and then click Line Spacing Options.
- To set paragraph alignment
  a) Position the cursor anywhere in the paragraph, or select all the paragraphs you want to adjust.
  b) 2. Do either of the following:
- On the Home tab, in the Paragraph group, click the Align Left, Center, Align Right, or Justify button.
- Open the Paragraph dialog box. On the Indents and Spacing tab, in the General area, click Left, Centered, Right, or Justified in the Alignment list.

3.4.2 The Excel Workbook

A workbook is an Excel file that contains one or more worksheets (referred to as spreadsheets). Excel will assign a file name to the workbook, such as **Book1**, **Book2**, **Book3**, and so on, depending on how many new workbooks are opened. Take some time to familiarize yourself with this screen. Your screen may be slightly different based on the version you're using.

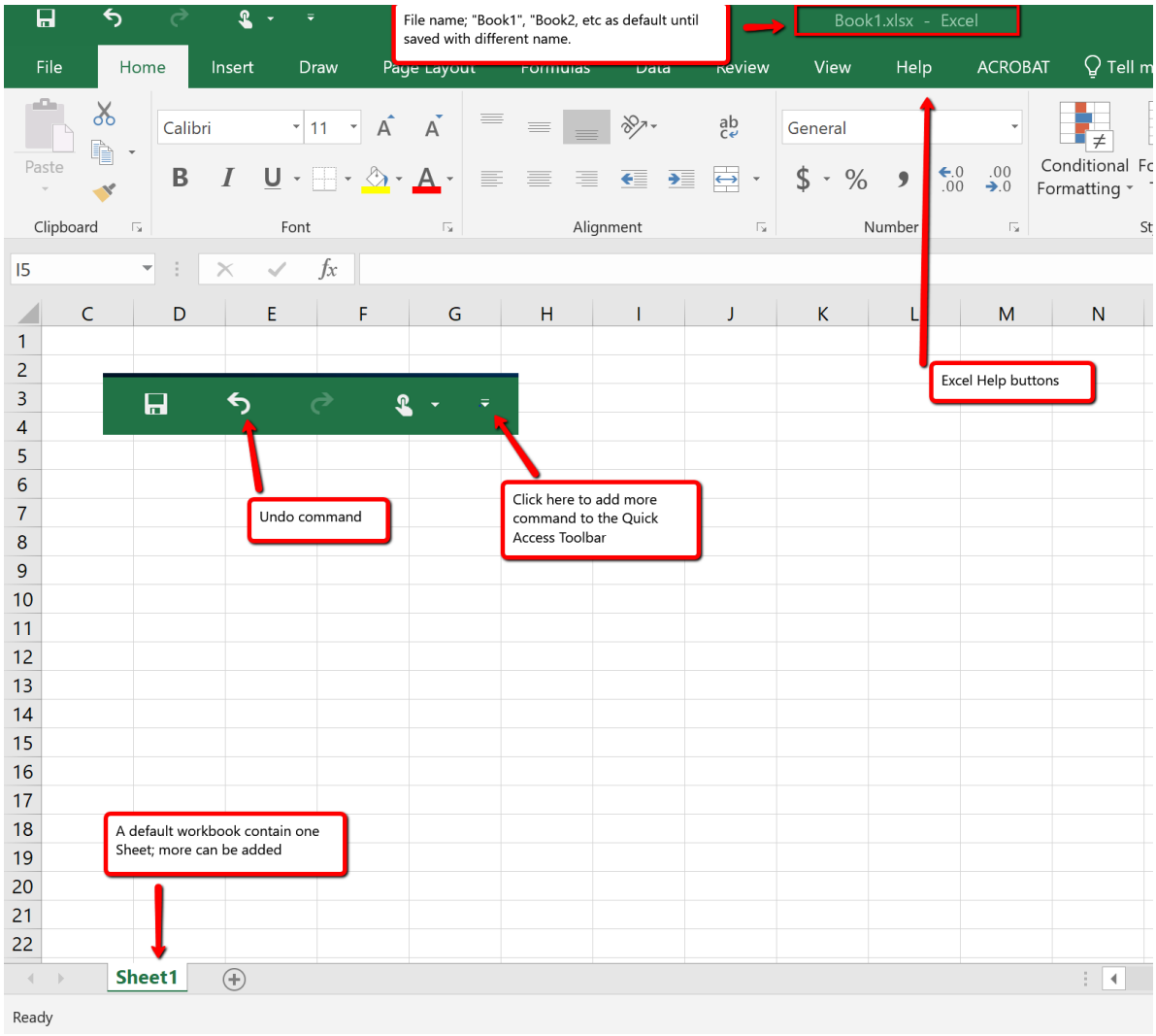


Figure: 3.30 Blank Workbook

- **Quick access toolbar and right-click menu**

The Quick Access Toolbar is found at the upper left side of the Excel screen above the Ribbon, as shown in. This area provides access to the most frequently used commands, such as Save and Undo. You also can customize the Quick Access Toolbar by adding commands that you use on a regular basis. By placing these commands in the Quick Access Toolbar, you do not have to navigate through the Ribbon to find them. To customize the Quick Access Toolbar, click the

down arrow as shown. This will open a menu of commands that you can add to the Quick Access Toolbar. If you do not see the command, you are looking for on the list, select the More Commands option.

- **Ribbon:** The ribbon is the primary replacement for menus and toolbars and provides the main command interface in Access. One of the main advantages of the ribbon is that it consolidates, in one place, those tasks or entry points that used to require menus, toolbars, task panes, and other UI components to display. In addition to the Ribbon and Quick Access Toolbar, you can also access many commands by right clicking anywhere on the worksheet.

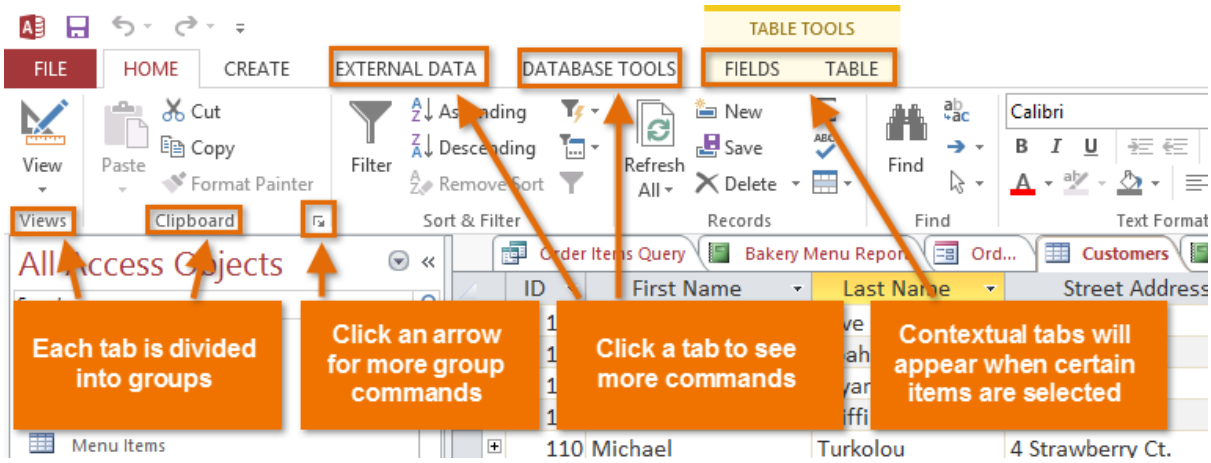


Figure: 3.31ribbon in Microsoft Excel

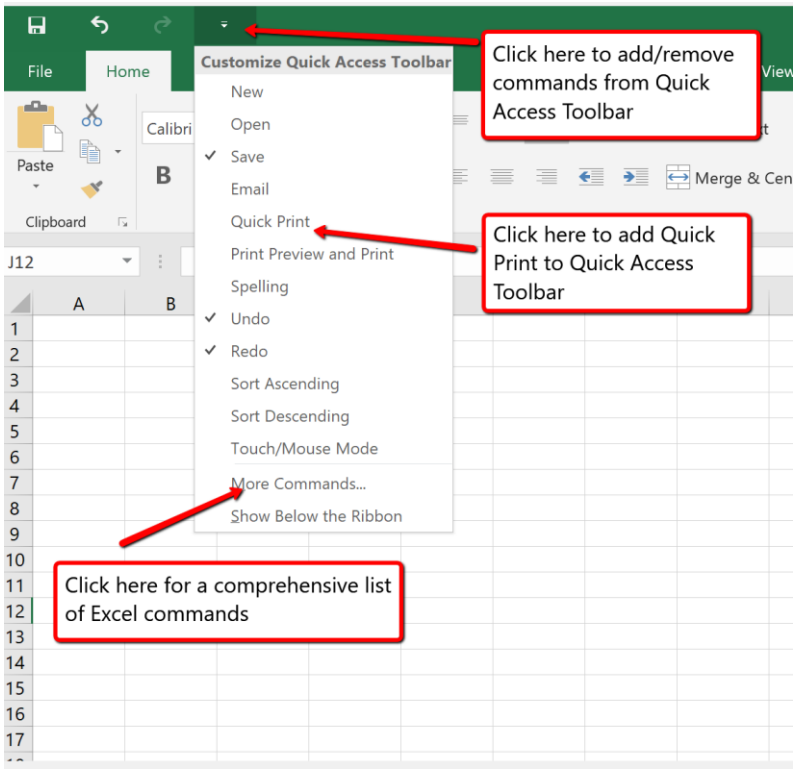


Figure: 3.32 Customizing the Quick Access Toolbar

- **Entering Data:** You will begin building the workbook shown in by manually entering data into the work- sheet. The following steps explain how the column headings in Row 2 are typed into the work- sheet:
    1. Click cell location A2 on the worksheet.
    2. Type the word **Month**.
    3. Press the right arrow key. This will enter the word into cell A2 and activate the next cell to the right.
    4. Type **Unit Sales** and press the right arrow key.
    5. Repeat step 4 for the words **Average Price** and then again for **sales dollars**.

It shows how your worksheet should appear after you have typed the column headings into Row 2. Notice that the word Price in cell location C2 is not visible. This is because the column is too narrow to fit the entry you typed. We will examine formatting techniques to correct this problem in the next section.

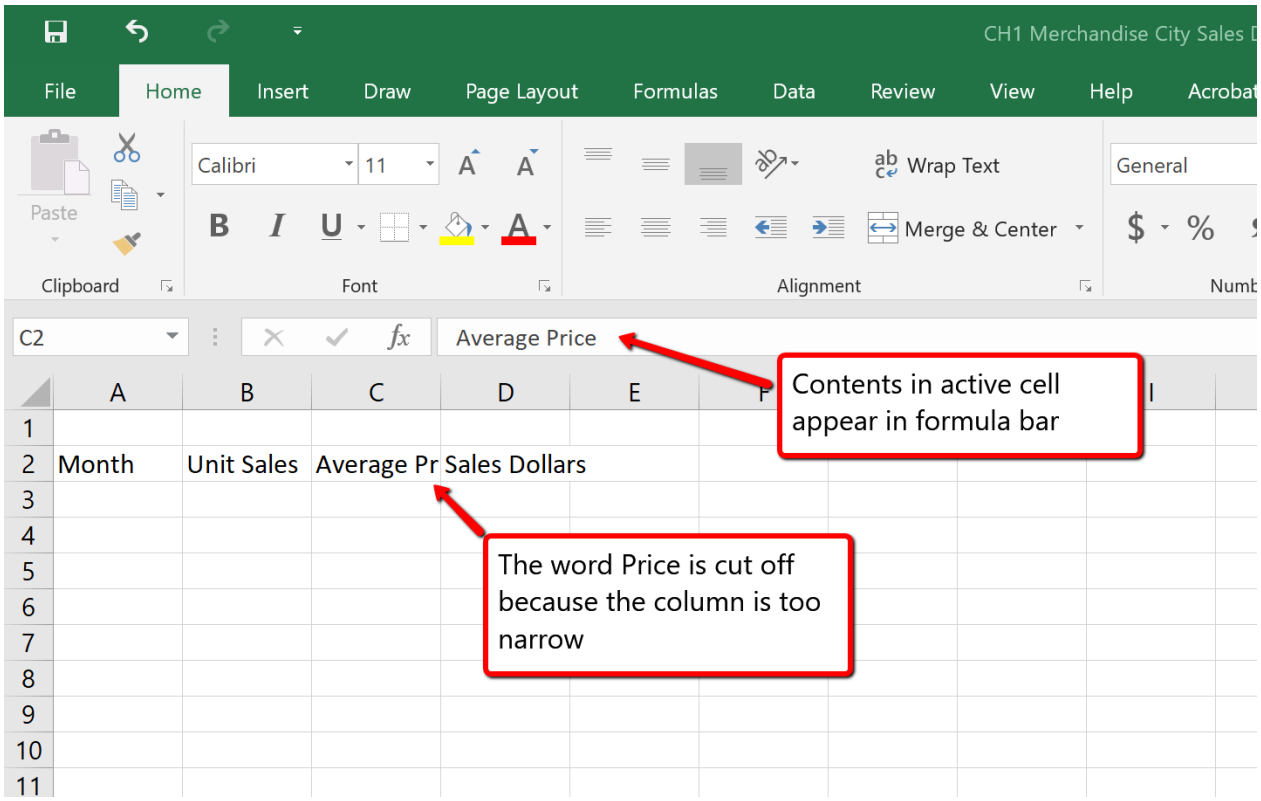


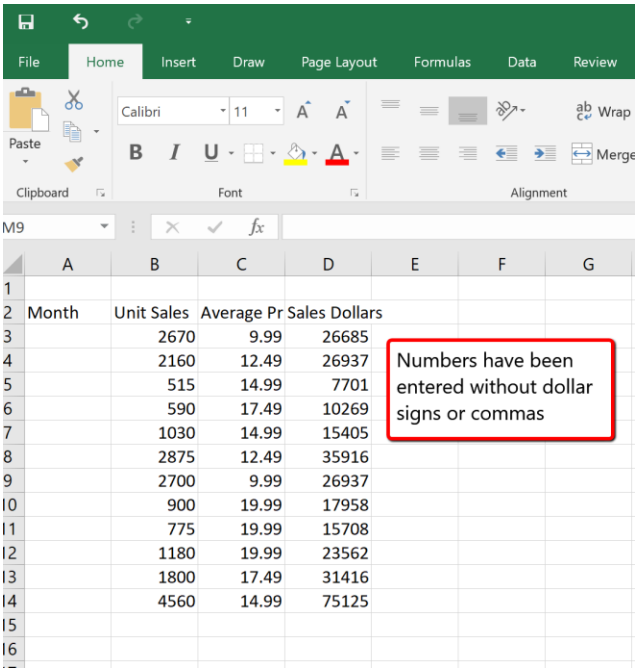
Figure: 3.34Entering Column Headings into a Worksheet

1. Click cell B3.
2. Type the number **2670** and press the ENTER key. After you press the ENTER key, cell B4 will be activated. Using the ENTER key is an efficient way to enter data vertically down a column.
3. Enter the following numbers in cells B4 through B14:

   2160, 515, 590, 1030, 2875, 2700, 900, 775, 1180, 1800, and 4560.
4. Click cell C3.
5. Type the number 9.99 and press the ENTER key.
6. Enter the following numbers in cells C4 through

   C14: 12.49, 14.99, 17.49, 14.99, 12.49, 9.99, 19.99, 19.99, 19.99, 17.49, and 14.99.
7. Click cell D3.
8. Type the number 26685 and press the ENTER key.
9. Enter the following numbers in cells D4 through

   D14: 26937, 7701, 10269, 15405, 35916, 26937, 17958, 15708, 23562, 31416, and 75125.



	A	B	C	D	E	F	G
1							
2	Month	Unit Sales	Average Pr	Sales Dollars			
3		2670	9.99	26685			
4		2160	12.49	26937			
5		515	14.99	7701			
6		590	17.49	10269			
7		1030	14.99	15405			
8		2875	12.49	35916			
9		2700	9.99	26937			
10		900	19.99	17958			
11		775	19.99	15708			
12		1180	19.99	23562			
13		1800	17.49	31416			
14		4560	14.99	75125			
15							
16							

Figure: 3.35 input data

- **Editing Data:** The Auto Fill feature is a valuable tool when manually entering data into a worksheet. This feature has many uses, but it is most beneficial when you are entering data in a defined sequence, such as the numbers 2, 4, 6, 8, and so on, or nonnumeric data such as the days of the week or months of the year. The following steps demonstrate how Auto Fill can be used to enter the months of the year in Column A:

    1. Click cell A3 in the Sheet1 worksheet.
    2. Type the word January and press the ENTER key.
    3. Click cell A3 again.
    4. Move the mouse pointer to the lower right corner of cell A3. You will see a small square in this corner of the cell; this is called the Fill Handle When the mouse pointer gets close to the Fill Handle, the white block plus sign will turn into a black plus (+) sign.

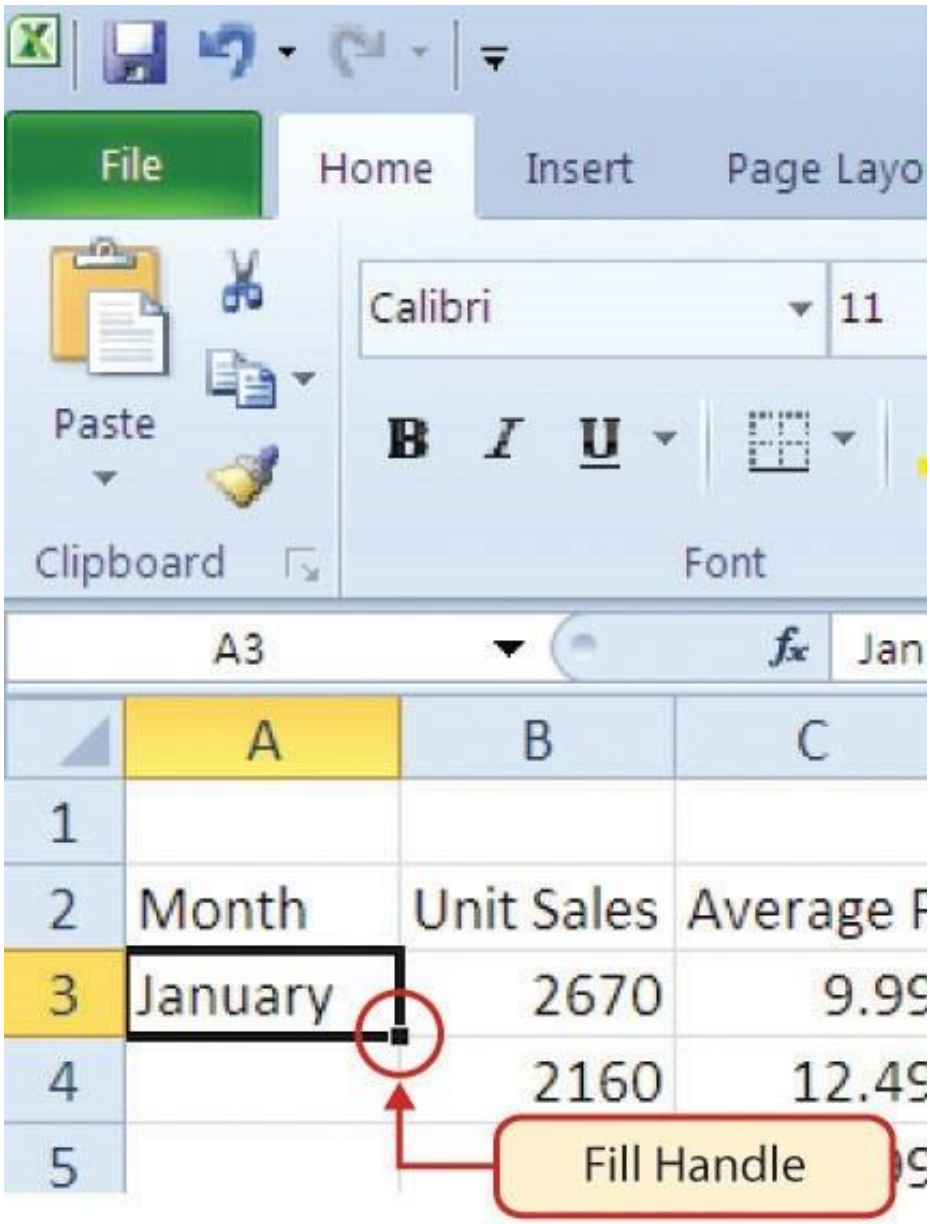


Figure: 3.36 fill handle

Left click and drag the Fill Handle to cell A14. Notice that the Auto Fill tip box indicates what month will be placed into each cell. Release the mouse button when the tip box reads "December."

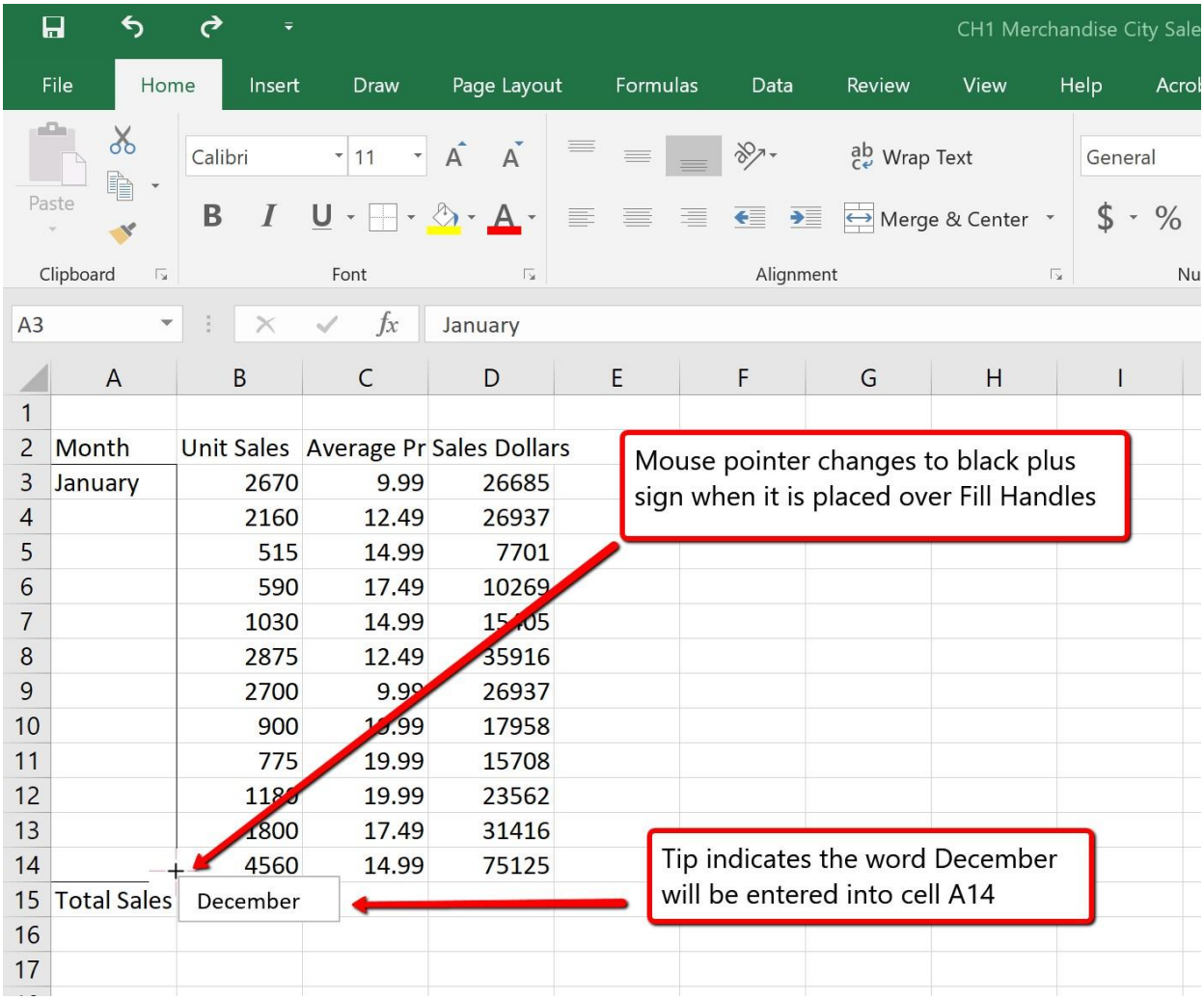


Figure: 3.37 using auto fill to enter the months of the year

Once you release the left mouse button, all twelve months of the year should appear in the cell range A3:A14.

- **AUTOSUM**

You will see at the bottom of Figure 1.42 that Row 15 is intended to show the totals for the data in this worksheet. Applying mathematical computations to a range of cells is accomplished through functions in Excel. Chapter 2 will review mathematical formulas and functions in detail. However, the following steps will demonstrate how you can quickly sum the values in a column of data using the AutoSum command:

1. Click cell B15 in the Sheet1 worksheet.
2. Click the Formulas tab of the Ribbon.
3. Click the down arrow below the AutoSum button in the Function library group of commands.

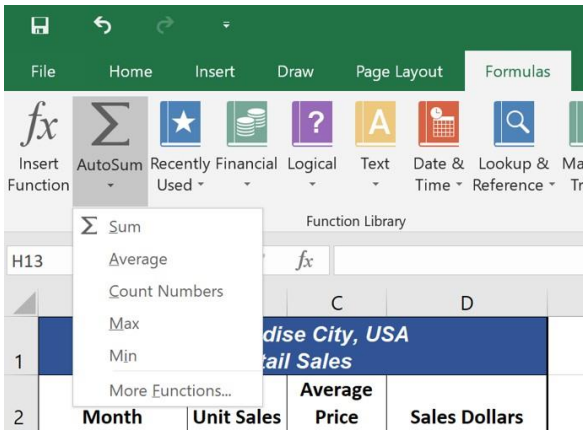


Figure: 3.38 using auto fill to enter the months of the year

4. Click the Sum option from the AutoSum drop down menu. The first click will display a flashing marquee around the range. Click the check mark next to the Formula bar to complete the function.
5. Excel will provide a total for the values in the Unit Sales column.
6. Click cell D15. It would not make sense to total the averages in column C so C15 will be left blank.
7. Repeat steps 3 through 5 to sum the values in the Sales Dollars column
8. Click cell C15 to explore other AutoSum selections. Select the COUNT function from the list; Excel will return “12” for the number of months (rows). Excel will also display indica- tors of a green arrow in the corner of C15 and an exclamation point in yellow. These indicate that the function in this cell varies from the other functions in row 15. They can be ignored and do not print.
9. Click cell C15 again; this time selecting the MAX option from the list. Excel will display $19.99. This reflects the Maximum Average Price in column C.
10. Click cell C15 and delete the contents in this cell.
11. Figure: 3.40 using auto fill to enter the months of the year

- **Sum average ranks formula excel**

You can use the SUM and AVERAGE functions in Excel to calculate the sum and average of a range of cells. Here's how you can use these functions:

✓ To calculate the sum of a range of cells, you can use the SUM function. For example, if you want to calculate the sum of cells **A1 to A10**, you can use the formula **=SUM (A1:A10).**

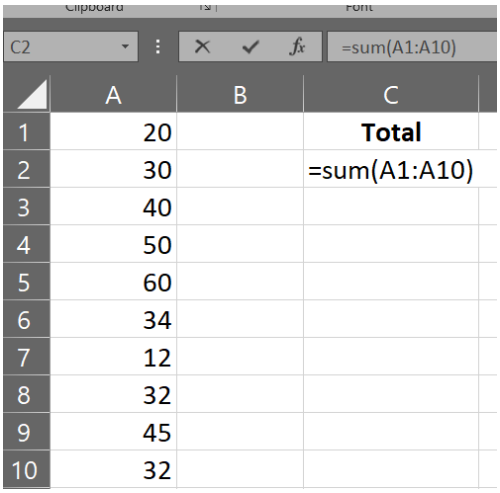


Figure: 3.39 Totals added to the sheet1 worksheet

✓ To calculate the average of a range of cells, you can use the AVERAGE function. For example, if you want to calculate the average of cells **A1 to A10**, you can use the formula **=AVERAGE(A1:A10).**

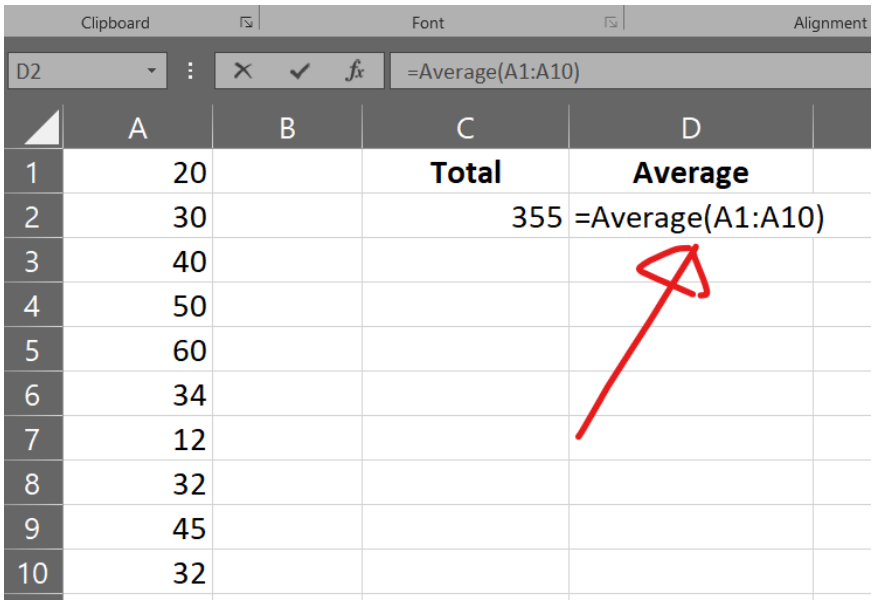


Figure: 3.40 average calculation

✓ If you want to rank a list of numbers and return their average rank when there are ties, you can use the **RANK.AVG** function. For example, if you have a list of numbers in cells **A1 to A10** and you want to rank them and return their average rank when there are ties, you can use the formula **=RANK.AVG(A1,A1:A10).**

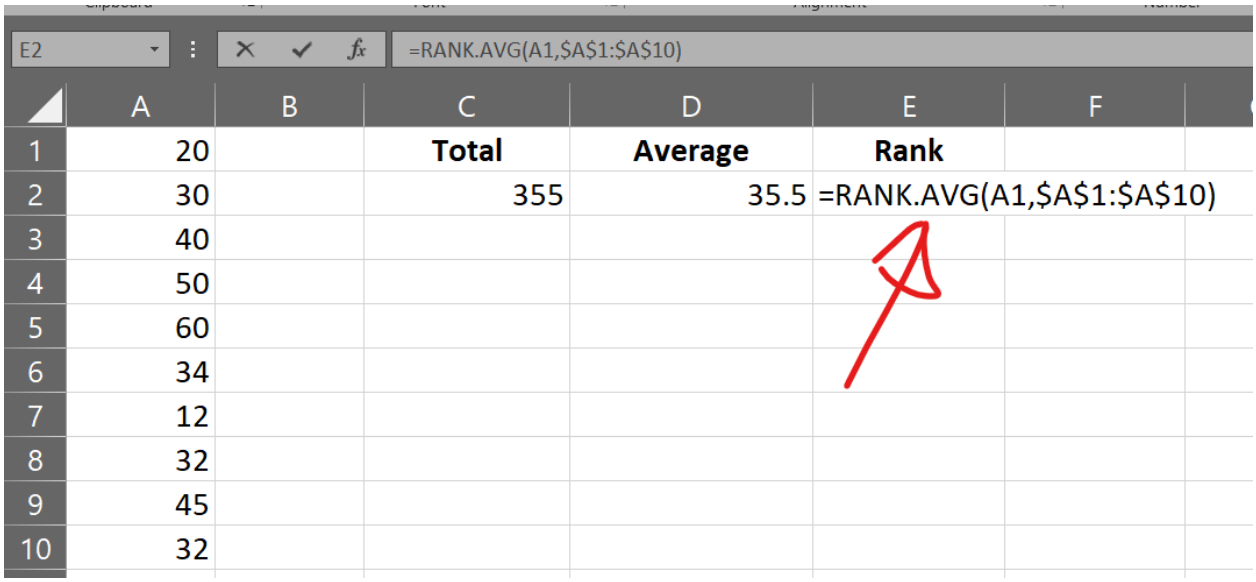


Figure: 3.40 rank formula

You can use the `MIN` and `MAX` functions in Excel to calculate the minimum and maximum values in a range of cells. Here's how you can use these functions:

- To calculate the minimum value in a range of cells, you can use the `MIN` function. For example, if you want to calculate the minimum value of cells A1 to A10, you can use the formula `=MIN(A1:A10)`.
- To calculate the maximum value in a range of cells, you can use the `MAX` function. For example, if you want to calculate the maximum value of cells A1 to A10, you can use the formula `=MAX(A1:A10)`.

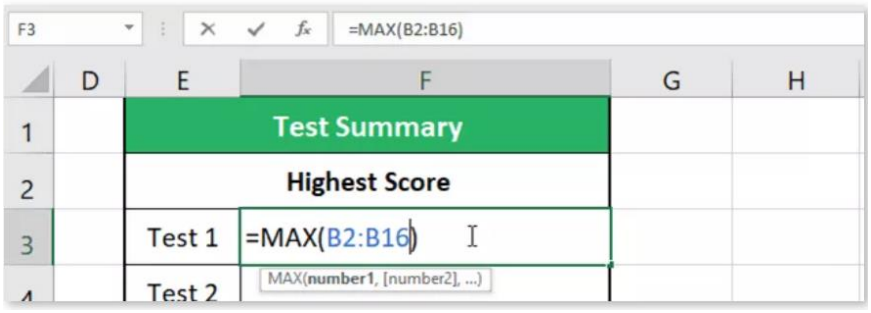


Figure: 3.41 maximum formula dialog box

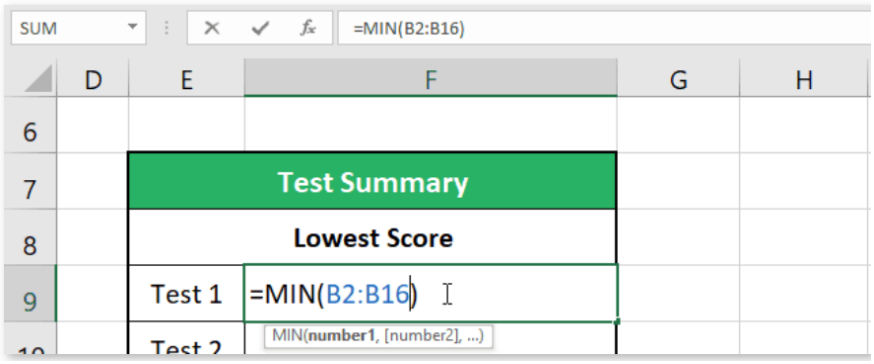


Figure: 3.42 minimum formula dialog box

- ✓ **Charts**: A simple chart in Excel can say more than a sheet full of numbers. As you'll see, creating charts is very easy.

Create a Chart

To create a line chart, execute the following steps.

	A	B	C	D	E
1	Month	Bears	Dolphins	Whales	
2	Jan	8	150	80	
3	Feb	54	77	54	
4	Mar	93	32	100	
5	Apr	116	11	76	
6	May	137	6	93	
7	Jun	184	1	72	
8					

1. Select the range A1:D7.

Figure: 3.43 select data in the table

2. On the Insert tab, in the Charts group, click the Line symbol.



Figure: 3.44 select chart stayle

3. Click Line with Markers.

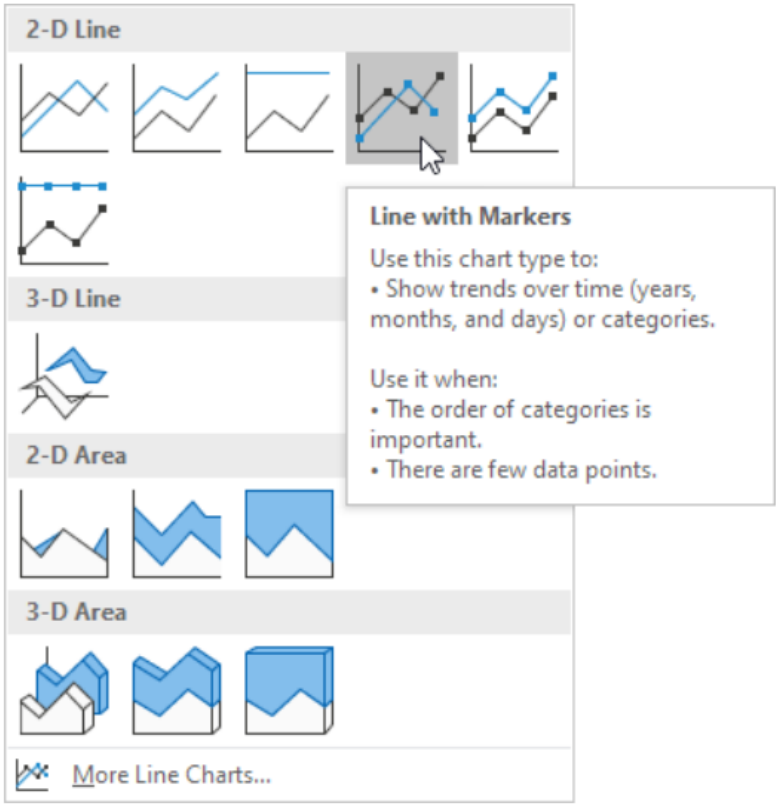


Figure: 3.45 select line with markers

Result:

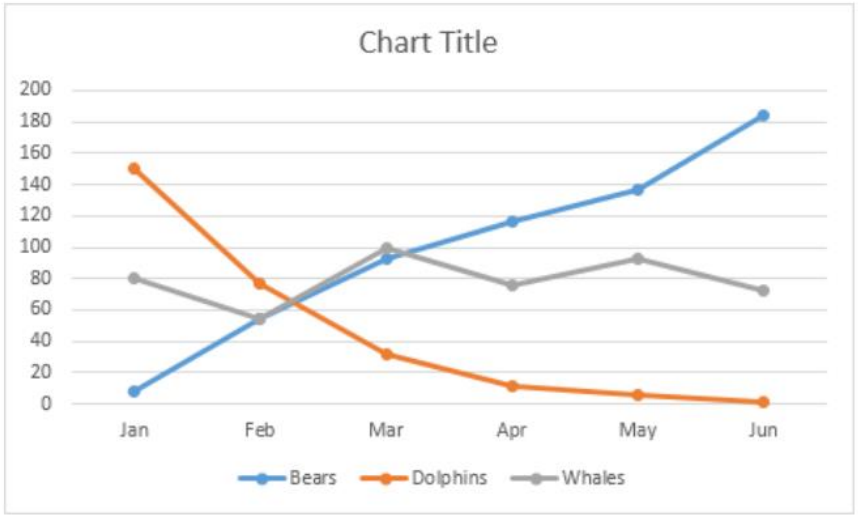


Figure: 3.46 appear line with marker chart style

3.4.3 Introducing Microsoft Access

Microsoft Access 2010 is a powerful relational database program that includes hundreds of tools you can use to quickly start tracking, sharing, and reporting information, even if you are new to database development. Users have access to a large library of professionally designed templates; wizards that automatically create tables, forms, queries, and reports; and extensive local and online help resources.

- **Quick Access Toolbar**

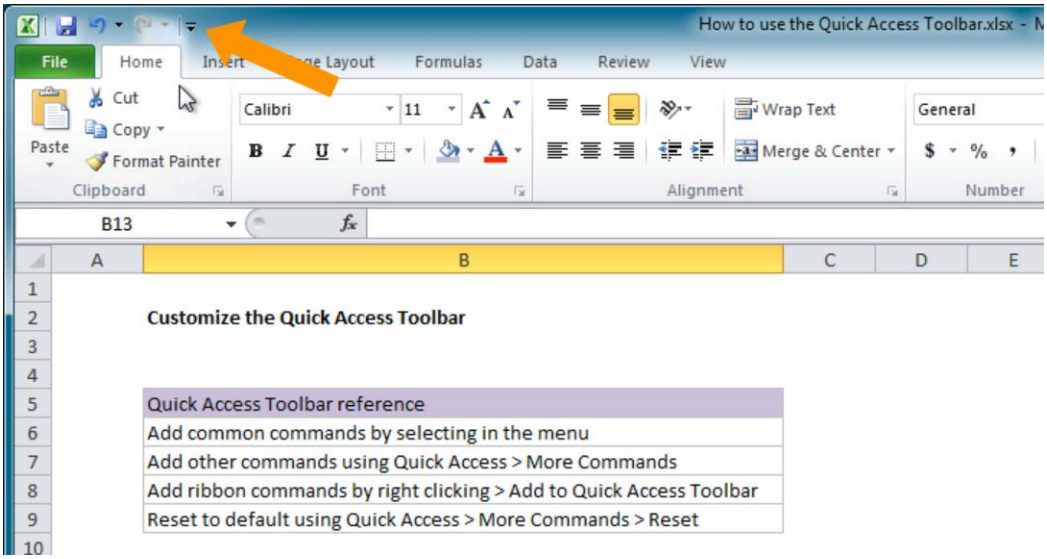


Figure: 3.47 customize the quick access tool bar

To hide the ribbon in Microsoft Access you must create an empty ribbon and set the Access Options to point to the empty ribbon. To create the ribbon, you must add an entry to a system table called **USysRibbons** (which does not exist by default).

- **Create a new table in a new database**

1. Click File > New, and then select Blank desktop database.
2. In the **File Name** box, type a file name for the new database.
3. To browse to a different location and save the database, click the folder icon.
4. Click **Create**.

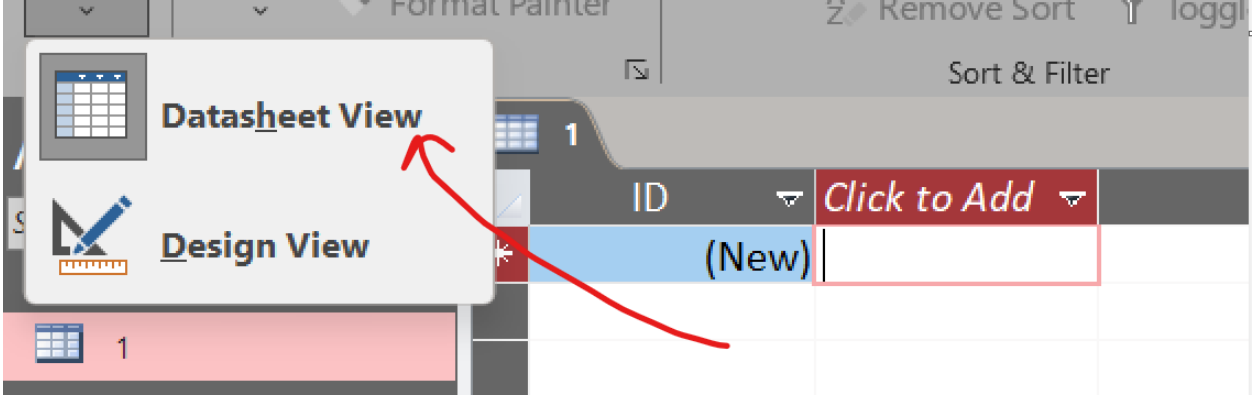
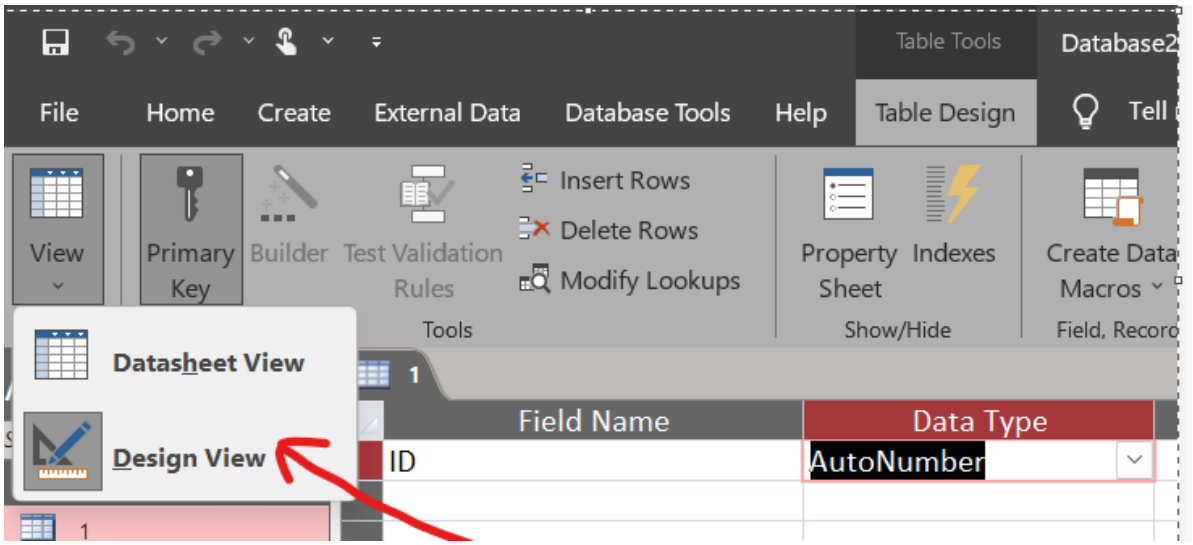


Figure: 3.48 datasheet view

The new database opens, and a new table named Table1 is created and opens in Datasheet view.



In Microsoft Access, **Database view** is the default view that displays the objects in a database such as tables, queries, forms, and reports. You can use this view to add, modify, or delete objects. On the other hand, **Design view** is used to create or modify the structure of an object such as a table or query. In Design view, you can add or remove fields, set field properties, and create relationships between tables

Figure: 3.49 design view

- **Understanding Fields and Their Data Types**

Field - an element of a table that contains a specific item of information, such as a last name.

Field's Data Type - determines what kind of data the field can store.

Format	Use to display
Short Text	Alphanumeric data (names, titles, etc.) - up to 255 characters
Long Text	Large amounts of alphanumeric data: sentences and paragraphs – 64,000 characters
Number	Numeric data
Date/Time	Dates and times
Currency	Monetary values
AutoNumber	Unique value generated by Access for each new record
Yes/No	Yes and No values and fields that contain only one of two values
OLE Object	Pictures, graphs, or other ActiveX objects from another Windows-based application
Hyperlink	A link address to a document or file on the Internet
Attachment	You can attach files such as pictures, documents, spreadsheets, or charts; each Attachment field can contain an unlimited number of attachments per record, up to the storage limit of the size of a database file.
Calculated	You can create an expression that uses data from one or more fields. You can designate different result data types from the expression.
Lookup Wizard	Displays either a list of values that is retrieved from a table or query, or a set of values that you specified when you created the field. The Lookup Wizard starts and you can create a Lookup field. The data type of a Lookup field is either text or number, depending on the choices that you make in the wizard.

Table: field's data type

- ✓ **Add Fields to the Table**

Click Table Design from the Ribbon (ensuring that the Ribbon is on the Create tab).

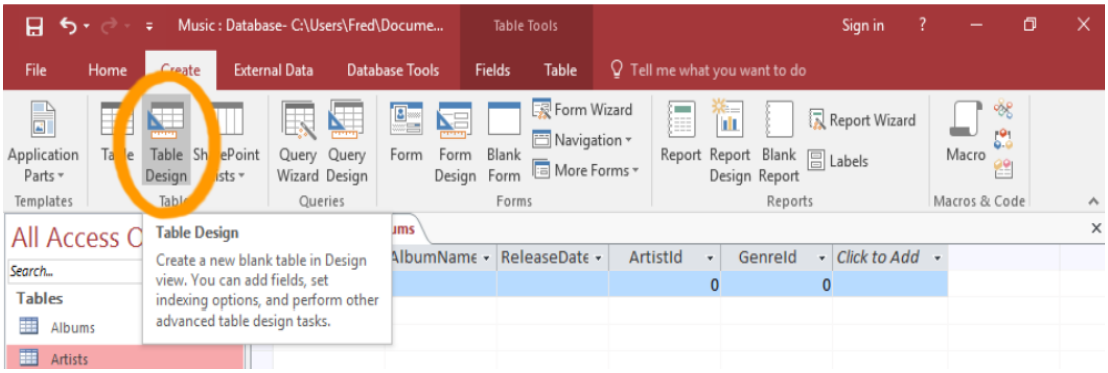


Figure: 3.50 table design icon

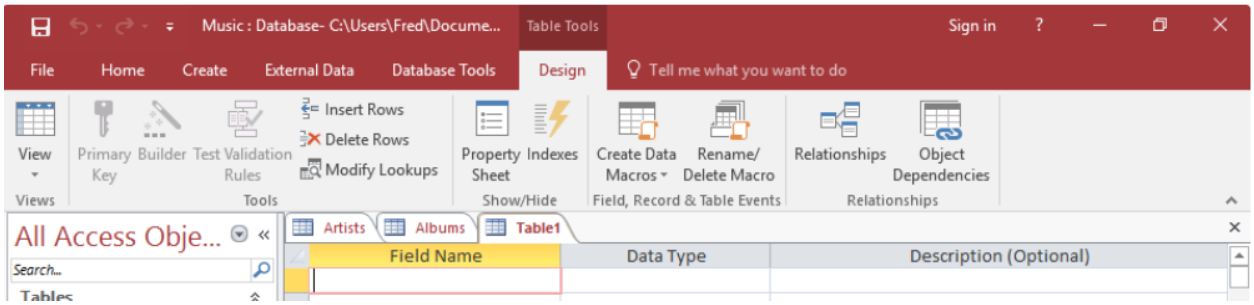


Figure: 3.51 black table (Table1)

A blank table called Table1 will be displayed in Design View.

- ✓ **Add Fields to the Table**: Now we will enter each field and select their data type. In the first cell under Field Name add a field called GenreId. Select Auto number as its data type. Under that field, create a new one called Genre and select Short Text for its data type.

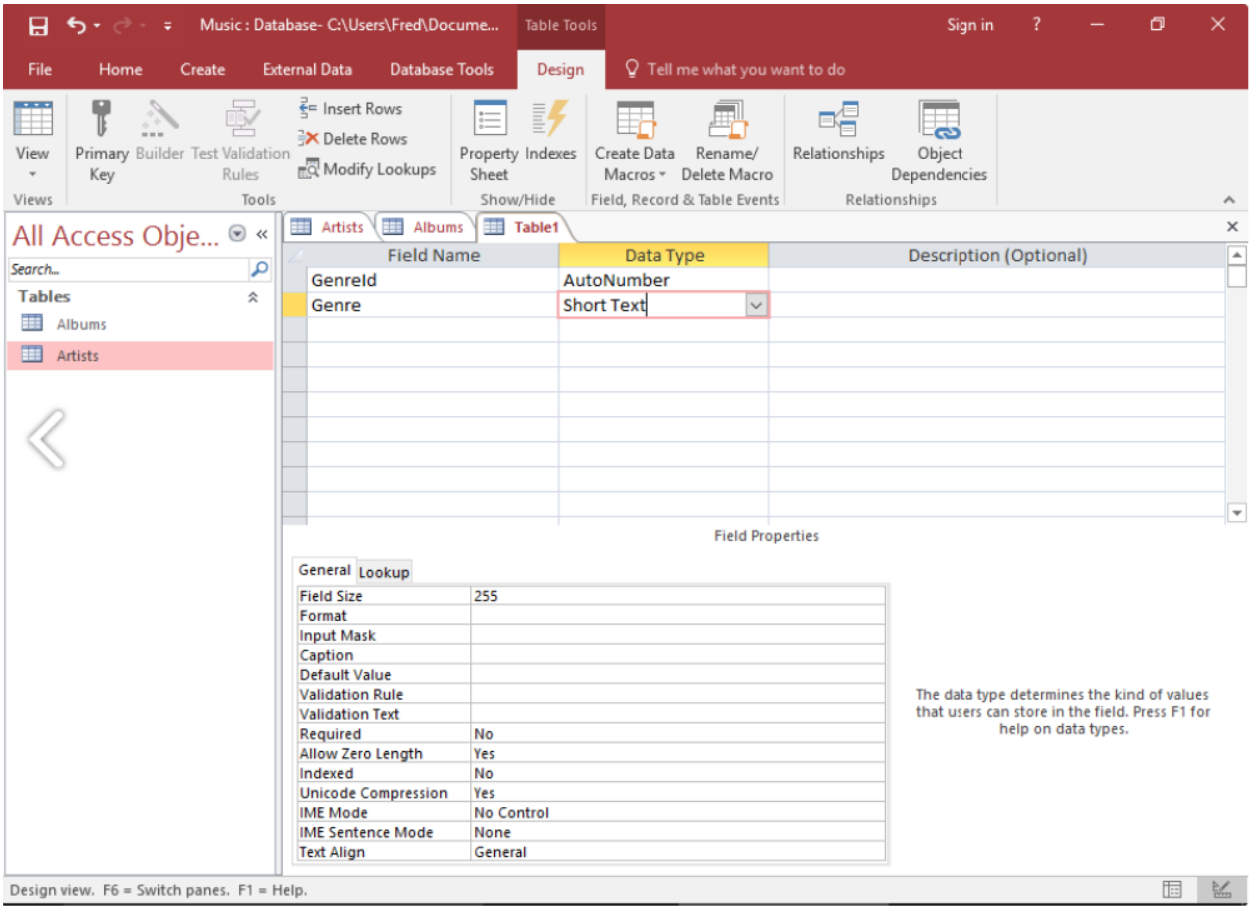


Figure: 3.52 field properties

- ✓ **Change the Genre Field Properties**: Ensuring the Genre field is selected (by clicking on it), look at the bottom Field Properties frame. Double-click somewhere in the Required row, so that the value now reads Yes. Now, double-click in the Allow Zero Length field so that it changes to No. We have just made the Genre field a required field — all records must have a value in this field, and it can't just contain a blank string.

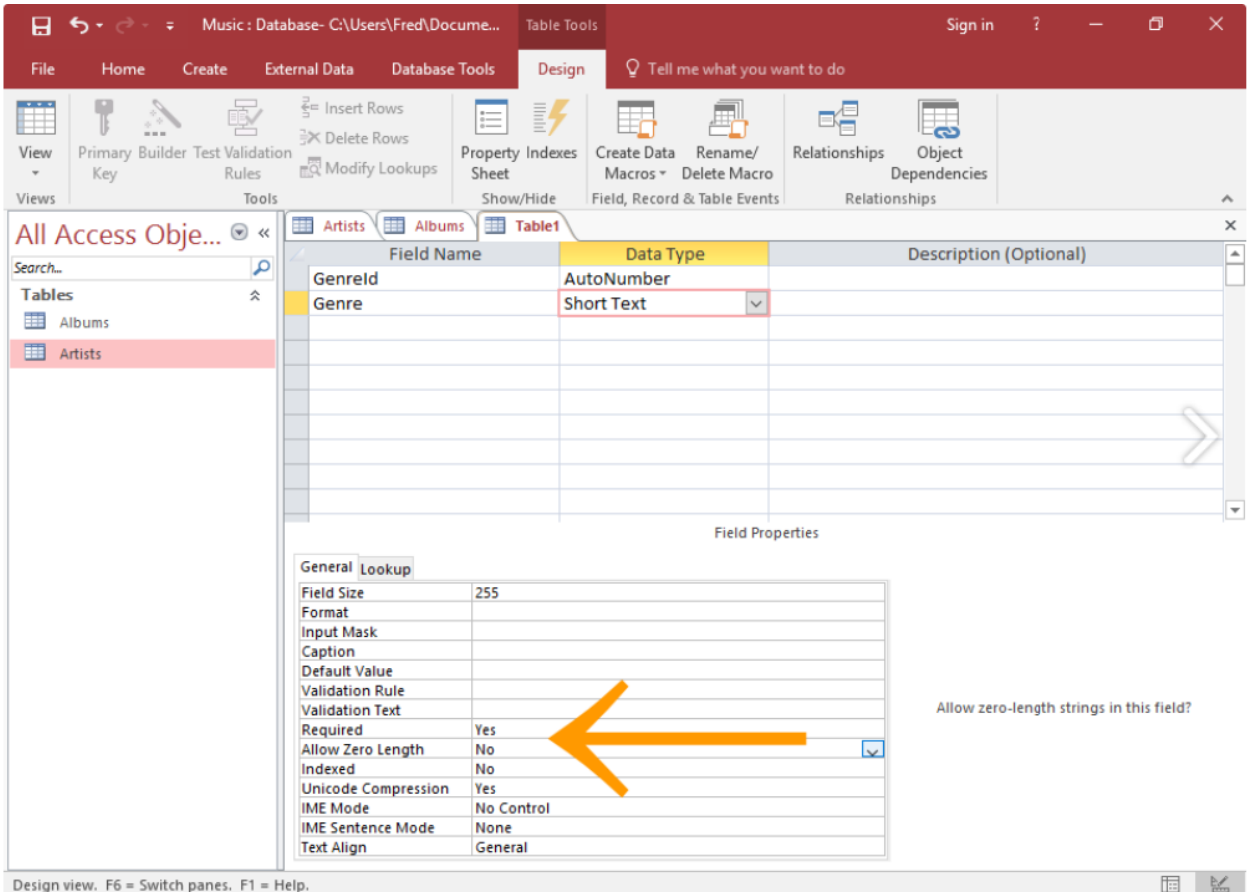
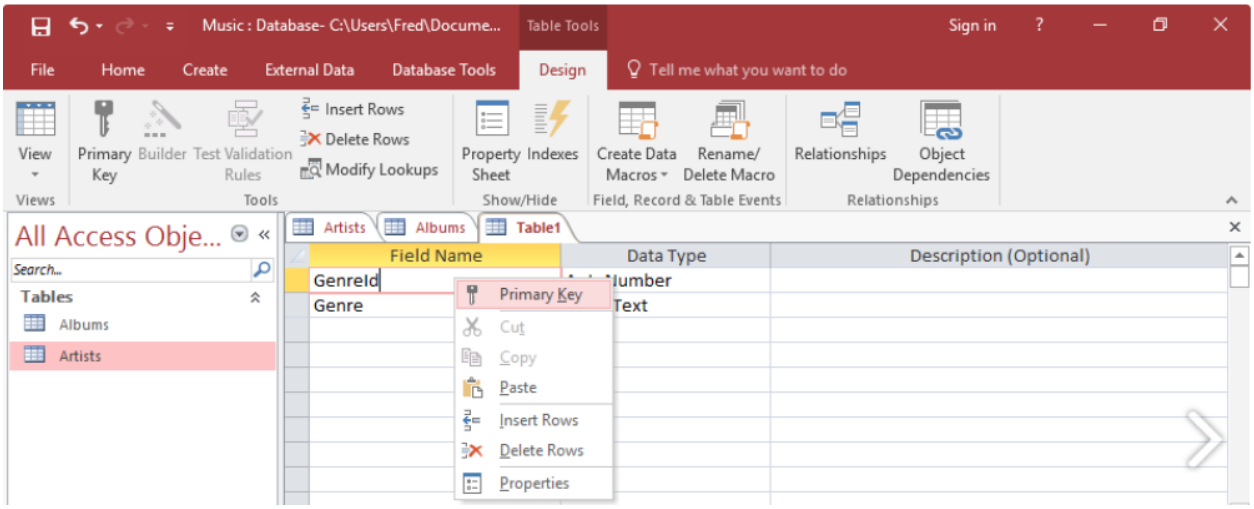


Figure: 3.53 general tap properties

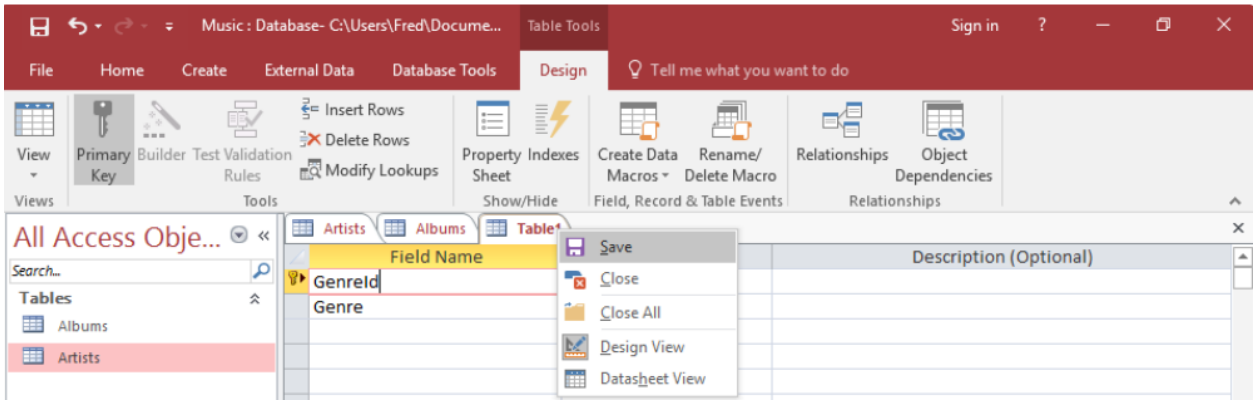
✓ **Set a Primary Key:** Right-click on the GenreId field and select Primary Key from the drop-down list. This makes the field a primary key field. Once you've done this, you'll



see a little key icon to the left of GenreId.

Figure: 3.54 primary key in the field name

✓ **Save the Table:** Right-click on the Table1 tab and select Save from the drop down list. Call the table Genres and click OK.



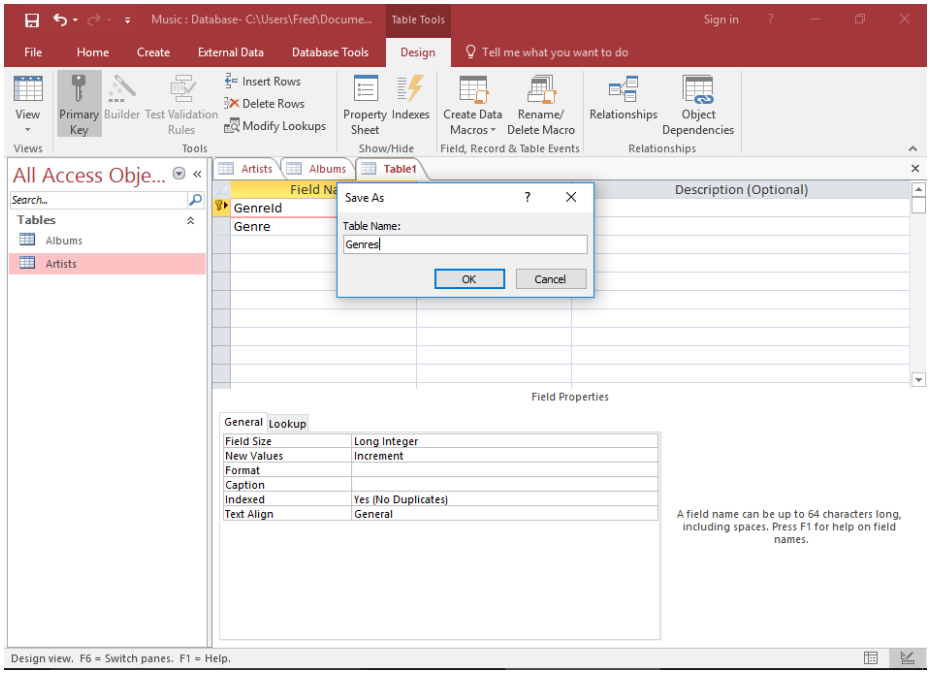
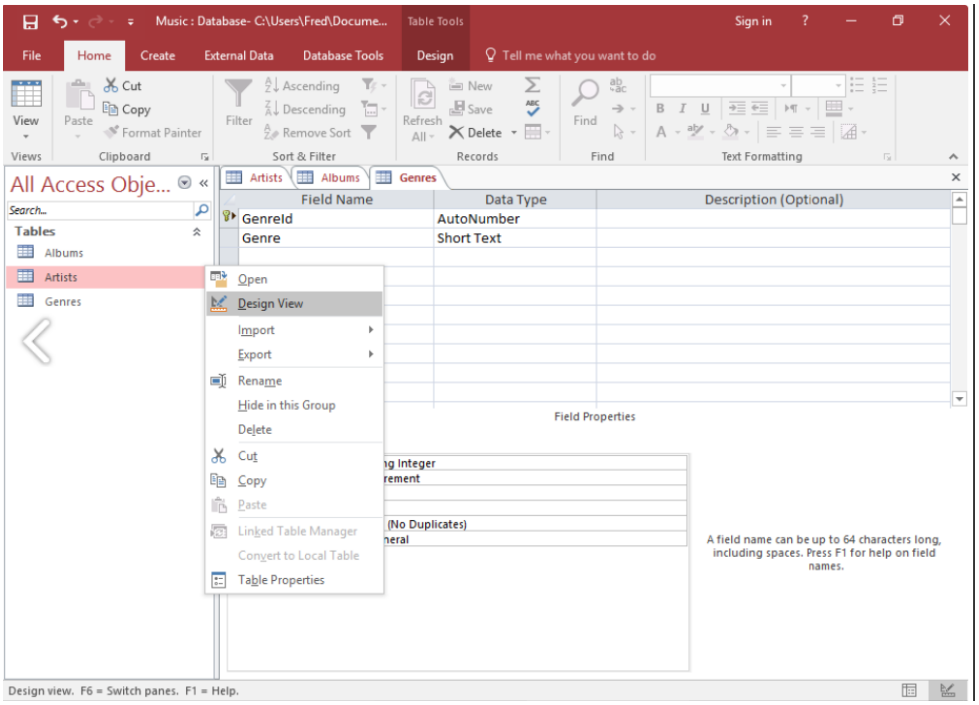


Figure: 3.55 save primary key

- **Set the Field Properties for an Existing Table**: You can also use Design View to edit any existing table. Whether the table was created in Design View or Datasheet View doesn't matter. Any table can be edited in Design View. Now we will change some field properties to the table we created previously.

- ✓ Open the Albums table in Design View: Right-click the Albums table in the left menu and select Design View from the contextual menu. This will open the table in Design View.

- ✓ Modify the AlbumName Field: Set the AlbumName field to be a required field.Also set Allow Zero Length to No.



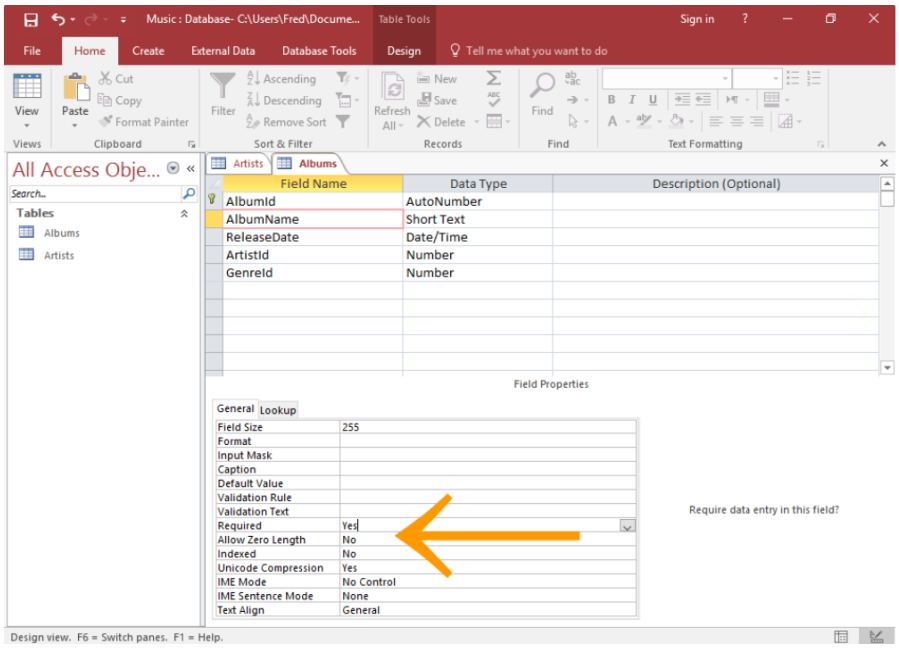


Figure: 3.56 some field properties

✓ Modify the ArtistId Field: Set the ArtistId field to be a required field.

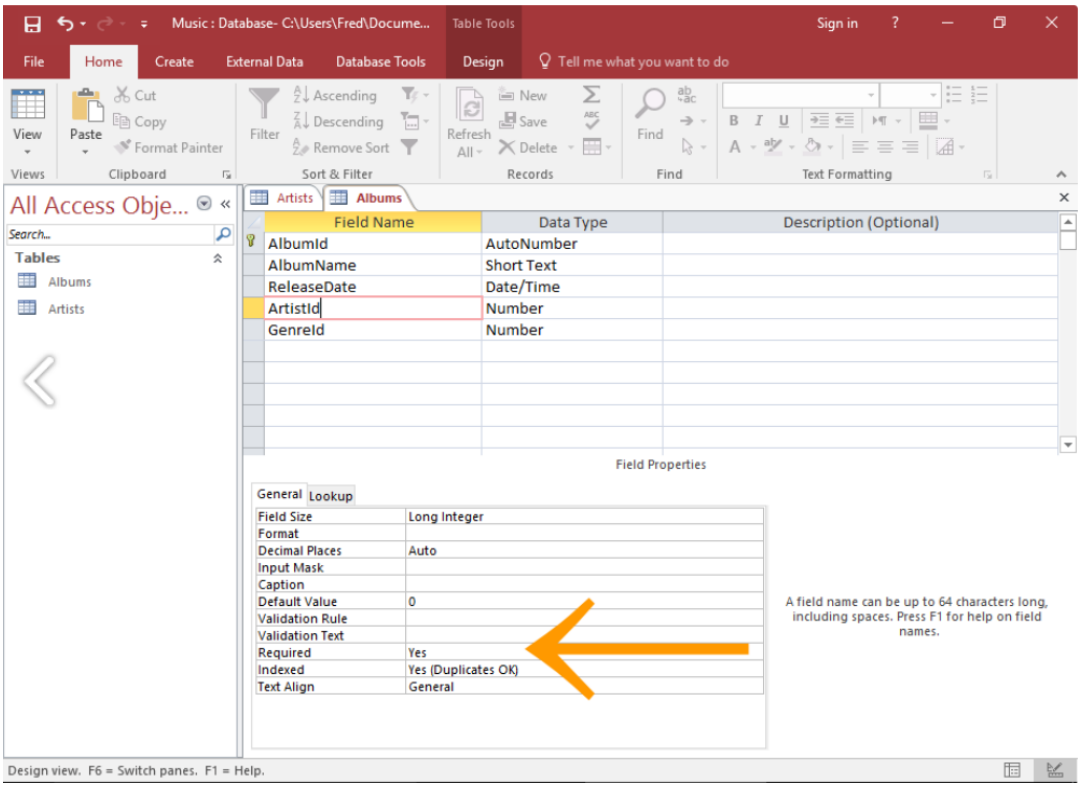
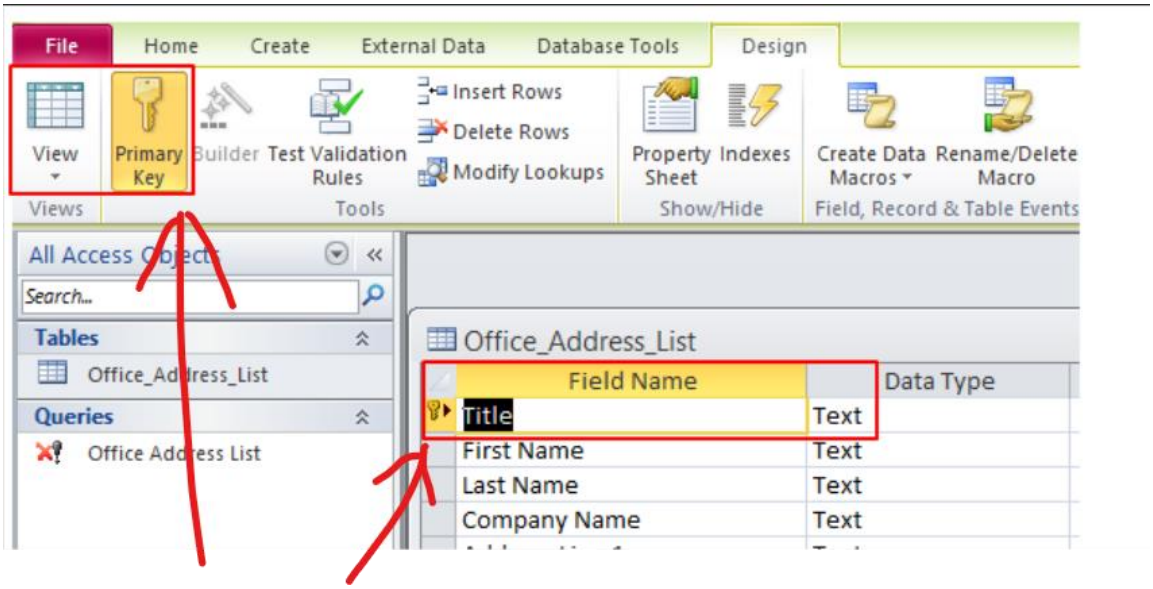


Figure: 3.57 Albums table in Design View

- **To set a primary key in Access, you can follow these steps**

1. Open the table in Design View.
2. Select the field or fields that you want to use as the primary key.
3. On the Design tab, in the Tools group, click Primary Key. You can also change an existing primary key by removing the existing primary key using the instructions in the section Remove the primary key and then setting the primary key using the instructions in the section Set the primary key



.

Figure: 3.58 procedure to set primary key

- **Table Relationships:** One of the goals of good database design is to remove data redundancy (duplicate data). To achieve that goal, you divide your data into many subject-based tables so that each fact is represented only once.
  - ✓ **Relationships** work by matching data in key columns, usually columns that have the same name in both tables. In most cases, the relationship connects the primary key, or the unique identifier column for each row, from one table to a field in another table.

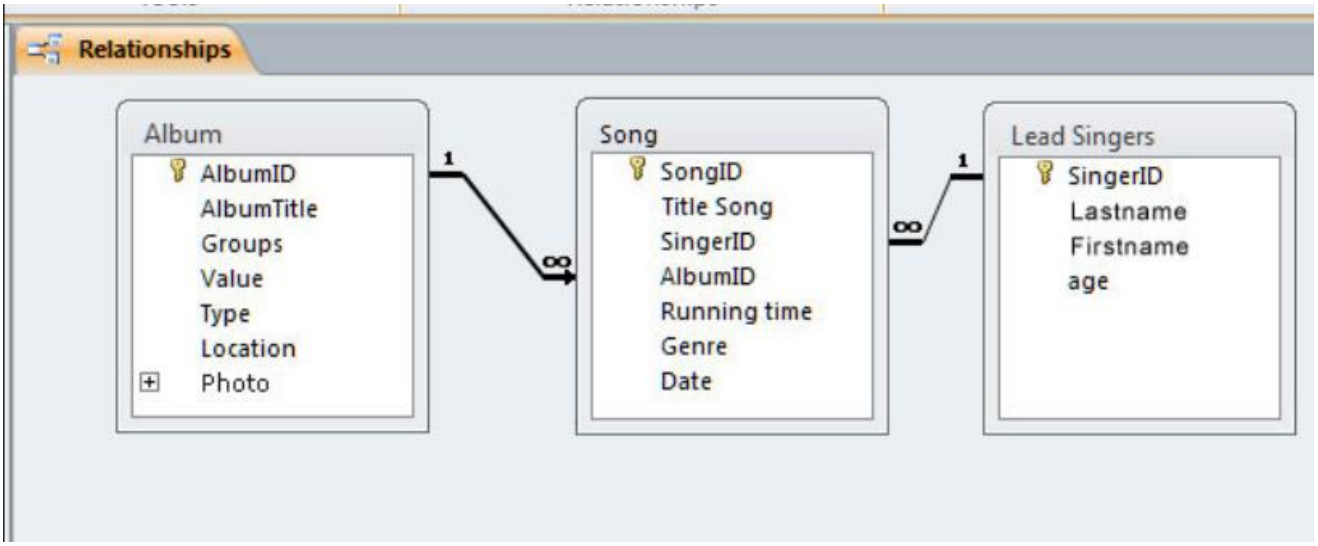
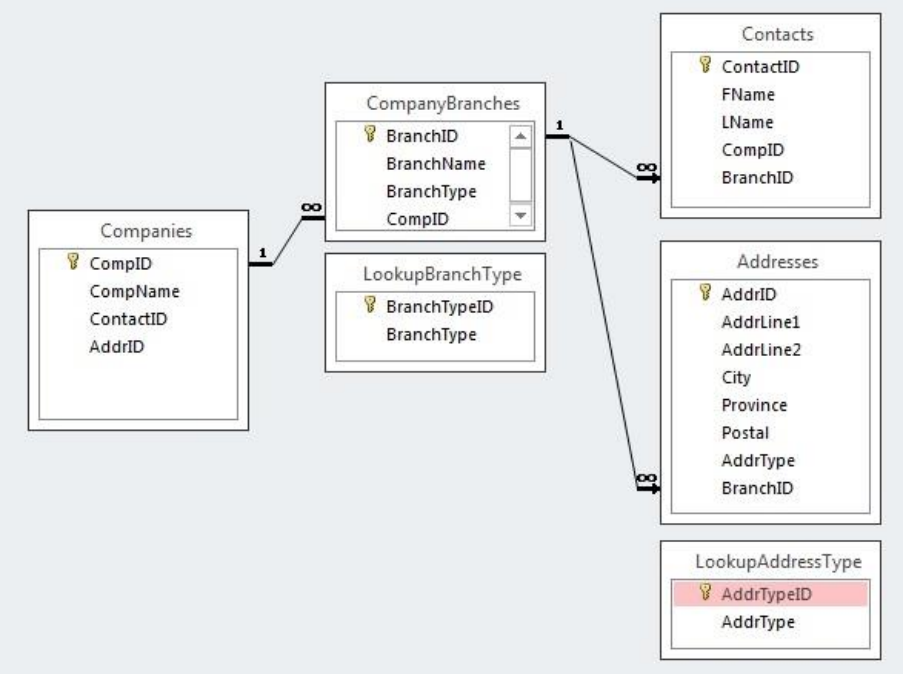


Figure: 3.59 table to table relationship

- **Types of table relationships:** There are three types of table relationships in Access.

I. **one-to-many relationship:** In Access, a one-to-many relationship is a type of relationship between two tables in which one record in the first table can have many



related records in the second table.

Figure: 3.60 one-to-many relationship

II. **many-to-many relationship:** a many-to-many relationship is a relationship between two tables in which a row from the first table can have many matching rows in the second table and vice versa. To represent a many-to-many relationship, you must create a third table, often called a junction table, that breaks down the many-to-many relationship into two one-to-many relationships.

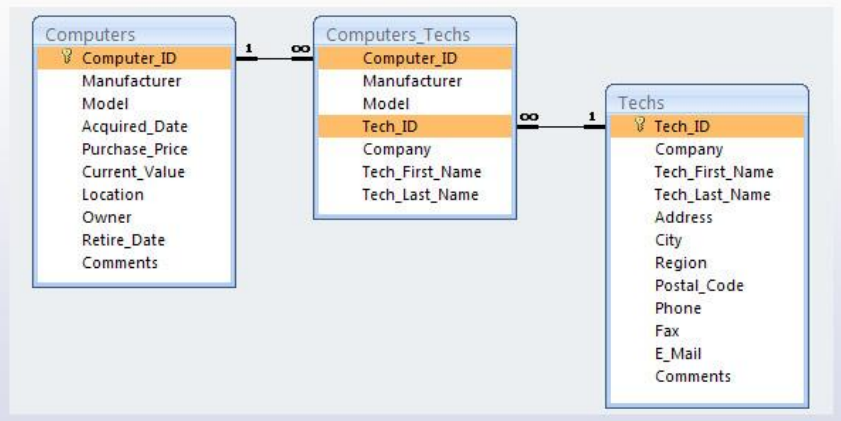


Figure: 3.61 many-many relationship

III. one-to-one relationship: In a one-to-one relationship, each record in the first table can have only one matching record in the second table, and each record in the second table can have only one matching record in the first table. This relationship is not common because, most often, the information related in this way is stored in the same table. You might use a one-to-one relationship to divide a table with many fields, to isolate part of a table for security reasons, or to store information that applies only to a subset of the main table. When you do identify such a relationship, both tables must share a common field.

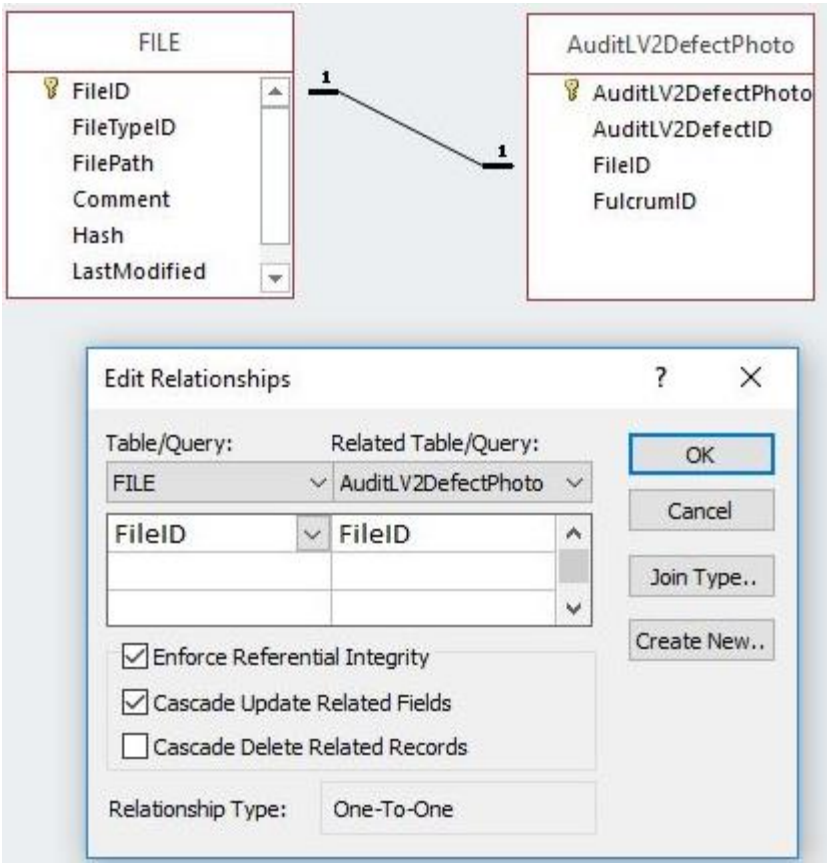


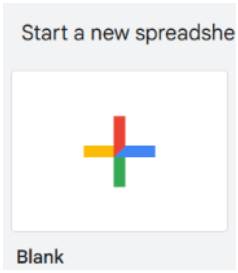
Figure: 3.62 one-to-one relationship

3.4.4 Google Sheet: Google Sheets is a free, web-based spreadsheet program offered by Google as part of its complete office suite—Google Drive—to compete with Microsoft Office. It allows users to create, update and modify spreadsheets and share the data online in real-time.

To open a new Google Sheet, you can follow these steps:

Step 1: Create a spreadsheet

1. Open the Sheets home screen at sheets.google.com



2. Click New +. This will create and open your new spreadsheet.

Figure: 3.63 Plus sign on google sheet

You can also create new spreadsheets from the URL sheets.google.com/create.



Figure: 3.64 google sheet icon

3.4.5 **Google Drive:** is a cloud-based storage solution that allows users to store files online and access them from anywhere. It is part of Google Workspace (formerly known as G Suite) and offers



users 15 GB of free storage space. Users can also purchase additional storage space if needed.

Figure: 3.65 google drive icon

steps to store data in Google Drive:

1. Open Google Drive.

2. Click on the "New" button in the top left corner of the screen.
3. Select the type of file you want to upload (e.g., document, spreadsheet, presentation, etc.).
4. Choose the file you want to upload from your computer.
5. Click on the "Open" button.
6. Wait for the file to upload.
7. Once the file has uploaded, you can access it from anywhere by logging into your Google account and opening Google Drive

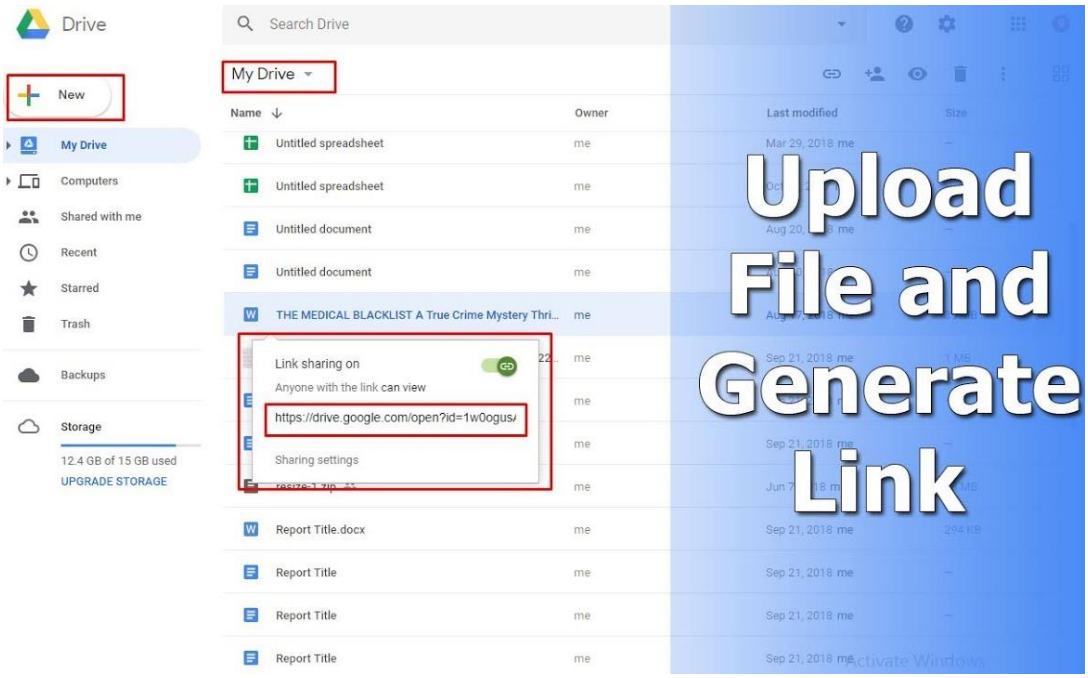


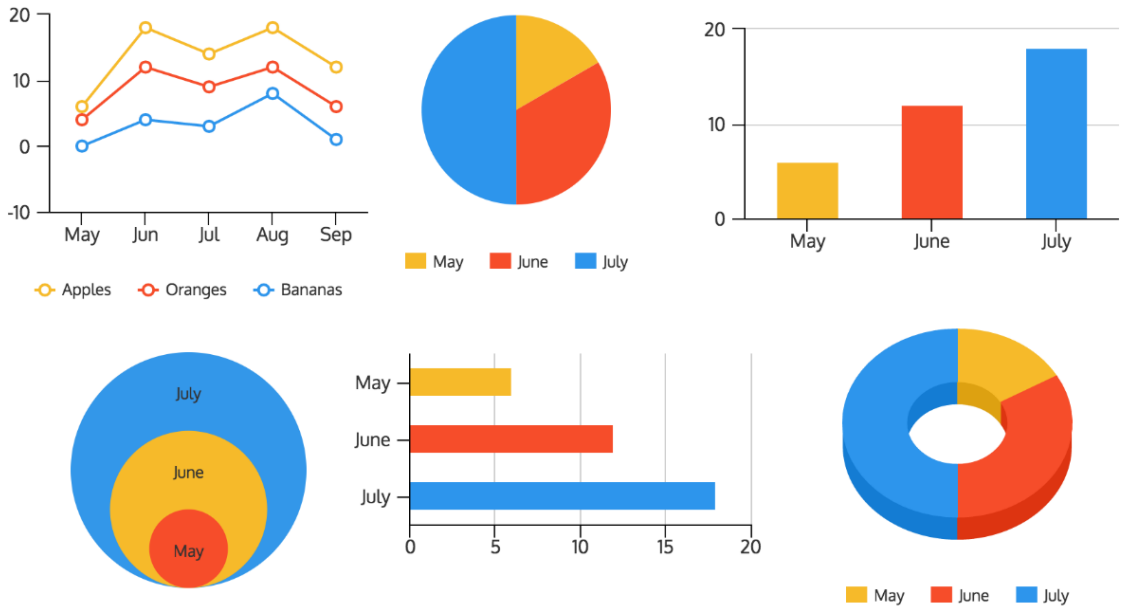
Figure: 3.66 google drive upload procedure.

3.5 Organizing, analyzing, interpreting, documenting and reporting collected data

Organizing, analyzing, interpreting, documenting, and reporting collected data are all important steps in the data analysis process. These steps are typically part of a larger framework for data analysis, which includes planning, collecting, processing, analyzing, interpreting, and reporting data.

- **Planning:** The process of determining the objectives and goals of a project or task, and developing a strategy to achieve them. Planning involves identifying the resources required, setting timelines, and establishing milestones to track progress.

- **Collecting**: The process of gathering data or information from various sources. This can involve conducting surveys, interviews, or experiments, or gathering data from existing sources such as databases or historical records.
- **Processing**: The process of organizing and manipulating data or information to make it more useful or understandable. This can involve cleaning and formatting data, performing



calculations or statistical analyses, or transforming data into visualizations or other forms of output.

Figure: 3.67 visualized report.

- **Analyzing**: The process of examining data or information to identify patterns, relationships, and insights. This can involve applying statistical methods or other analytical techniques to the data, and interpreting the results to draw conclusions or make predictions.
- **Interpreting**: The process of making sense of the results of an analysis or investigation, and drawing conclusions or making recommendations based on those results. This involves synthesizing the findings and considering their implications in the broader context of the project or task.
- **Reporting**: The process of communicating the results of a project or investigation to stakeholders or other interested parties. This can involve creating written reports,

presentations, or other forms of output that summarize the findings and conclusions of the analysis, and provide recommendations for future action.

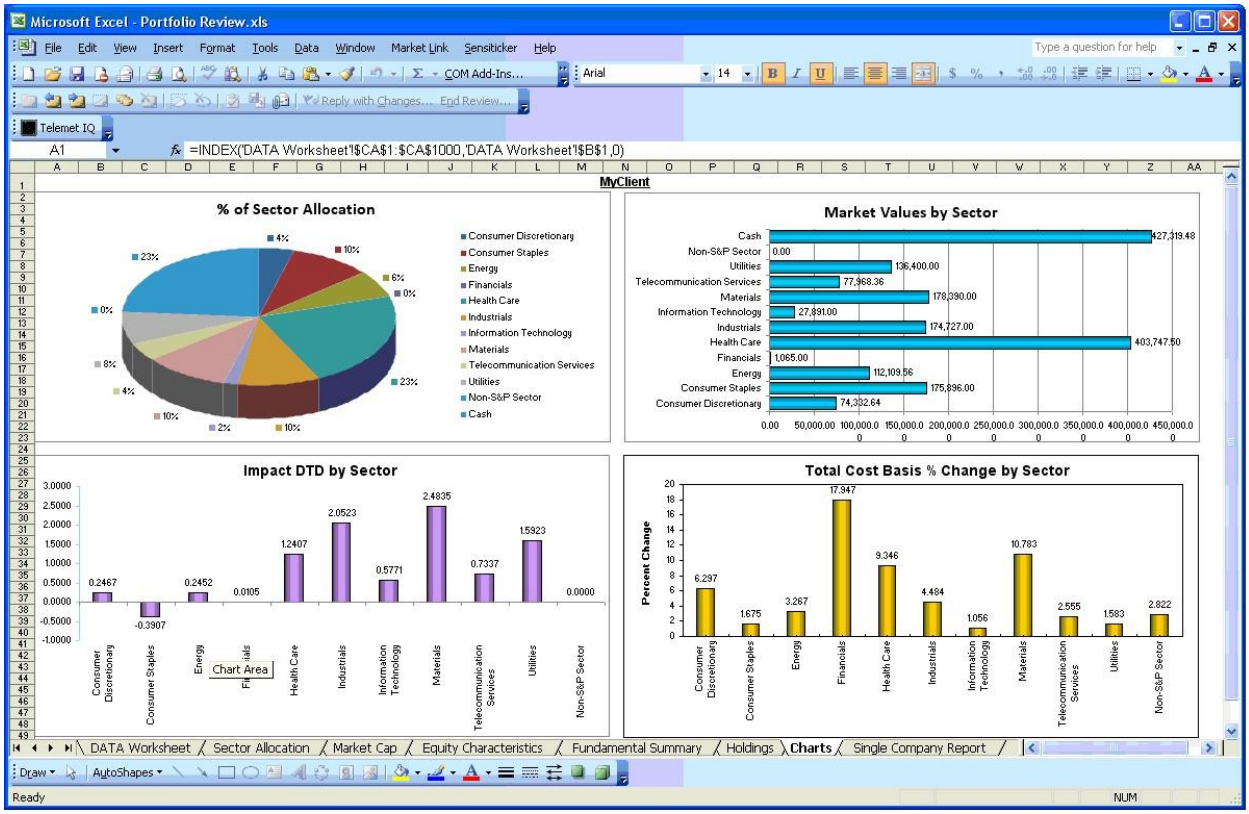


Figure: 3.68 visualized report in Microsoft Excel.

3.6 Organized, analyzed and interpreted data are documented and reported

Documenting and reporting the results of data analysis is an important part of the process, as it helps to communicate the findings to stakeholders and other interested parties. The documentation and reporting process typically involves the following steps:

- **Summarizing the data:** The first step is to summarize the data in a clear and concise manner. This can involve creating tables, charts, or other visualizations to represent the data.

- **Analyzing the data**: Once the data has been summarized, the next step is to analyze it to identify patterns, trends, or other insights. This may involve applying statistical methods or other analytical techniques to the data.
- **Interpreting the results**: After the data has been analyzed, the next step is to interpret the results to draw conclusions or make recommendations. This involves synthesizing the findings and considering their implications in the broader context of the project or task.

- **Reporting the results**: Finally, the results of the data analysis should be reported in a clear and concise manner. This can involve creating written reports, presentations, or other forms of output that summarize the findings and conclusions of the analysis, and



provide recommendations for future action.

Figure: 3.69 visualized report.

3.7 Collection of feedbacks.

Collection of feedbacks is the process of collecting information directly from users/customers about their reactions to a product, service, or website experience.



Figure: 3.70 visualized report.

What is user feedback? User feedback is the direct collection of feedback and opinions from the people using your product, website, or service. It's a customer-centric method to gather actionable insights from your users and get their unfiltered opinions—because what better way to find out what people think of your business than to simply ask them?

7 powerful customer feedback tools

a) **Podium** to centralize and manage reviews from online listings
b) **Hotjar** to get granular product experience (PX) insights
c) **Parlor**.io to gather and prioritize feedback across tools and teams
d) **Reevoo** to collect authentic customer feedback through questionnaires and forms
e) **Sprinklr** to create customer communities and feedback forums
f) **Qualtrics** to capture customer feedback across social media
g) **Intercom** for instant messaging and live chat

Self-Check 3	Written Test

Directions: Answer all the questions listed below.

Part 1: Write True or False (1pt each)

1. You access database objects using the Navigation Pane.
2. To add a new record to a table, you can simply click in the new record row and enter the data.
3. You can view records in a form; however, you cannot change them in any way effective housekeeping is not an ongoing operation.
4. Excel or Google Sheets are the traditional tool for examining data.
5. Business Intelligence (BI) tool is used by companies that need to collect and analyze large data sets to spot trends, patterns, and insights.

Part 2. Choose the best answer

1. What is the keyboard shortcut to paste information? (2pts each)
   A. Ctrl + V

B. Ctrl + C
C. Ctrl + P
D. Ctrl + X

2. _____ is used to create or modify the structure of an object such as a table or query. (3 points)
   A. Design view
   B. Database view
   C. Primary Key.
   D. All
3. _____ displays how many words are in the current document.
   A. Page Count
   B. Proofing
   C. Word Count
   D. Current View
1. _____is a cloud-based storage solution that allows users to store files online and access them from anywhere.
   A. Google Drive
   B. Google sheet
   C. Excel
   D. Access

Part 3: Short Answer Questions (2pt each)

1. What are draw borders group in Microsoft word?
2. What is the difference between Access and Excel?
3. Define Ribbon.
4. What do Excel and Google have in common?
5. Write some critical aspects of your physical environment.
6. What are Look for patterns and trends in the data?
7. Mention the ways to create a data visualization in Excel?
8. Write the ways of collecting information.

Note: Satisfactory rating – 29points **Unsatisfactory - below 29 points**

Operation Sheet 3 -

3.1 Create and Design Admission Form

A. Tools and equipments

- Commuter
- Microsoft Excel Application
- Data cable
- Power cable
- Power divider

B. Techniques /procedure

- Always have a clean and organized work area.
- Prepare tools and equipment.

LAP Test-3	Performance Test

Name……. ID……..

Date…….

Time started: _____ Time finished: _____

Instructions: Given necessary templates, tools and materials you are required to perform the following tasks within 1 **hour**. The project is expected from each student to do it.

Task 1. Do it.

ALAGE TVET COLEGE INVOICE				
Kuteba village 45, Alemayehu Girma, 1" Floor Room No-100 091367_ _ _ _		Bill Number: Alage/201/09-10 Delivery No: Alage/301		Date:21/05/2023 Date: 18/05/2023
SL.NO.	**PARTICULAR**	**Quantity**	**RATE**	**TOTAL**
1	Battery BL=6c	10	1800	
2	Nokia N-73M	12	11500	
		GROSS AMOUNT		
		VAT@15%		
		AVERAGE		

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The experts who developed the learning guide

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