IGNITE GENESIS

SCHOOL · MATLI

DIGITAL FOUNDATIONS

COMPUTER STUDIES

GRADE 6

STUDENT TEXTBOOK

Igniting Knowledge, Engineering the Future

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Chapter 1:
Introduction to Computer Studies

Digital Foundations · Student Textbook



CHAPTER QUESTION

How do computers help us learn, work, communicate and solve problems?

In this chapter, you will discover what computers are, how people use them, and why computer skills are important in everyday life.

1.1 Learning objectives

LEARNING OBJECTIVES

By the end of this chapter, you should be able to:

- Define a computer in your own words.
- Explain the meaning of Computer Studies.
- Identify common types of computers and digital devices.
- Describe how computers are used in education, healthcare, business and everyday life.
- Explain the basic input–process–output model.
- Distinguish between the benefits and limitations of computers.
- Demonstrate responsible behavior when using computers.

1.2 What is a computer?

A computer is an electronic device that accepts data, processes it according to instructions, stores data or results, and produces useful information.

Computers can perform many different tasks. They can calculate marks, prepare documents, display pictures, play educational videos, store information and help people communicate.

For example, imagine that a teacher enters the marks of five students into a spreadsheet. The computer can calculate the total and average marks, organize the results and display them in a chart.

The computer performs these tasks by following instructions provided through software.



A computer system can include a monitor, keyboard, mouse, system unit and other connected devices.

IMPORTANT TERMS

- **Data:** Raw facts, such as numbers, words or measurements.
- **Processing:** Performing operations on data to produce a useful result.
- **Information:** Data that has been organized or processed to make it meaningful.
- **Instructions:** Commands that tell a computer what to do.
- **Software:** Programs and applications that tell a computer how to perform tasks.

Example: Turning data into information

Suppose a student receives the following marks:

Subject	Marks
English	75
Mathematics	85
Science	80

The marks are data. When the computer calculates the total of 240 and the average of 80, the results become useful information.

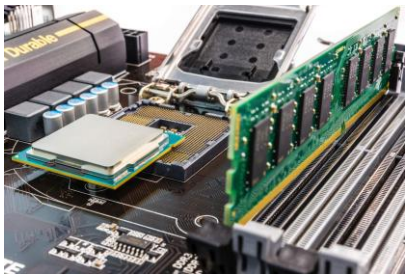
Remember: A computer does not understand a task in the same way a human does. It follows instructions supplied by software and processes data according to those instructions.

1.3 What is Computer Studies?

Computer Studies is the study of computers, their components, software, applications and the ways people use technology to solve problems.

It includes more than learning how to operate a computer. It also helps students understand how digital systems work, how programs are created and how technology can be used safely and responsibly.

Computer Studies includes the following areas:



1. Computer Hardware

Learning about the physical components of computers, such as keyboards, monitors, processors and storage devices.



2. Software and Applications

Learning how operating systems and applications help people complete tasks.



3. Programming and Problem-Solving

Learning to create instructions that make computers perform useful tasks.



4. Internet and Digital Communication

Learning how to find information, communicate online and use digital resources.



5. Digital Safety and Responsibility

Learning to protect information, respect others and use technology appropriately.

1.4 Types of computers and digital devices

Computers come in different sizes and designs. Some are designed for personal use, while others perform specialized tasks or serve thousands of users.



1. Desktop computer

A computer designed to be used at a desk. It commonly has a separate monitor, keyboard, mouse and system unit.

Example: *A computer used in a school computer laboratory.*



2. Laptop computer

A portable computer with a built-in screen, keyboard, pointing device and battery.

Example: *A student using a laptop to prepare a school assignment.*



3. Tablet computer

A portable device operated mainly through a touchscreen. Some tablets also support keyboards and styluses.

Example: *A student reading an electronic textbook.*



4. Smartphone

A mobile phone with computing capabilities, applications, internet access and a touchscreen.

Example: *Using a phone to attend an online lesson.*



5. Server computer

A computer that provides services, resources or information to other computers over a network.

Example: *A server storing files for many school users.*

Some devices, such as smartwatches, ATMs and digital cameras, also contain computing systems.

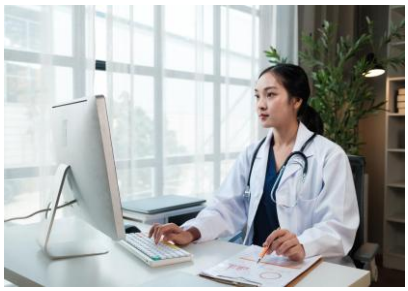
1.5 Uses of computers in everyday life

Computers help people work more efficiently, store information, communicate and solve problems.



Education

Teachers prepare lessons, maintain student records and calculate marks. Students research topics, create presentations and practise new skills.



Healthcare

Hospitals use computers to maintain patient records, schedule appointments and support medical examinations.



Business

Businesses use computers to manage sales, calculate bills, maintain accounts and communicate with customers.



Transport

Transport services use computers to manage bookings, display schedules and organize routes.



Communication

People use computers and digital devices for email, video calls, messaging and sharing information.

THINK AND DISCUSS

Imagine that Ignite Genesis School had to operate for one day without any computers.

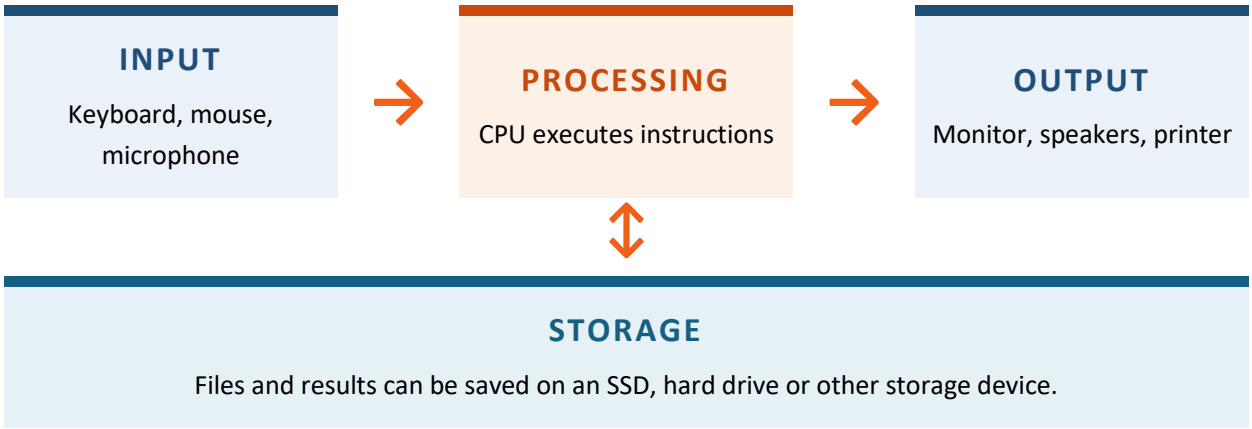
- How would teachers prepare and calculate student results?
- How would the school prepare examination papers?
- How would staff store and retrieve student records?
- Which tasks could continue without computers, and which would become more difficult?

Discuss your answers with a classmate.

1.6 How does a computer work?

A computer system can be understood through four basic stages:

1. **Input:** Data and instructions are entered into the computer.
2. **Processing:** The computer performs operations on the data.
3. **Output:** The computer presents the results.
4. **Storage:** Data and results can be saved for future use.



Storage is not simply a final stage: computers can save data before, during or after processing and retrieve it whenever needed.

Example: Calculating a student's average

Suppose a student enters three marks into Microsoft Excel: 70, 80 and 90.

Stage	What happens
Input	The student enters 70, 80 and 90
Processing	Excel calculates the average
Output	The result displayed is 80
Storage	The spreadsheet is saved for later use

This is an example of a computer turning input data into useful information.

1.7 Benefits and limitations of computers

Computers are powerful tools, but they also have limitations.

Benefits	Limitations
Perform calculations quickly	Can produce incorrect results when given incorrect data or instructions
Store large amounts of information	Data can be lost if it is not backed up
Help people communicate over long distances	Communication may expose users to scams or privacy risks
Automate repetitive tasks	Depend on electricity or a working power source
Support learning and creativity	Excessive or inappropriate use can affect wellbeing
Help people solve complex problems	Still require appropriate instructions, design and human oversight

Remember: Computers can work very quickly and accurately, but accuracy depends on correct data, suitable instructions and properly functioning systems.

1.8 Responsible use of computers

Every student at Ignite Genesis School should follow these basic rules:

- Handle computers, keyboards and other equipment carefully.
- Use computers only for authorized learning activities during lessons.
- Keep passwords private and never share personal information with strangers online.
- Respect other people’s files, privacy and digital work.
- Do not download or install software without permission.
- Report damaged equipment, suspicious messages or unsafe online activity to a teacher.
- Save work regularly and use clear file names.
- Take breaks when necessary and maintain good posture.

Digital responsibility is part of computer literacy. Knowing how to use a computer also means knowing how to use it safely and respectfully.

1.9 Classroom activities

Activity A — Identify digital devices

Time: 5 minutes · Work individually or in pairs

Identify five digital devices you have seen at home, school or in public places. Record their names and one use for each.

Device	One use
Example: Laptop	*Preparing assignments*
1.	
2.	
3.	
4.	
5.	

Activity B — Trace the computer process

Time: 5 minutes

A teacher enters student marks into a spreadsheet, calculates their average and saves the file.

Identify the input, processing, output and storage in this example.

Activity C — Your first digital workspace

Time: 10 minutes · Computer lab

1. Start the computer and sign in using the account provided by your teacher.
2. Open File Explorer in Windows.
3. Create a folder named Grade6_ComputerStudies.
4. Inside it, create another folder named Chapter1.
5. Open Microsoft Word and create a document titled My First Computer Lesson.
6. Write three sentences about how computers help students.
7. Save the document in your Chapter1 folder as My_First_Lesson.docx.
8. Reopen the file to confirm that it has been saved correctly.

Success criteria: The folder structure is correct, the document contains three relevant sentences, and the file is saved with the correct name and location.

1.10 Review questions

A. Multiple-choice questions

Choose the correct answer.

1. What is a computer?

- **A.** A device used only for typing
- **B.** An electronic device that processes data according to instructions
- **C.** A machine that works without instructions
- **D.** A device used only to access the internet

2. Which of the following is an example of output?

- **A.** Typing using a keyboard
- **B.** Clicking a mouse
- **C.** Viewing a result on the monitor
- **D.** Entering numbers into a spreadsheet

3. Which application is primarily used to create spreadsheets?

- **A.** Microsoft Word
- **B.** Microsoft Excel
- **C.** Microsoft PowerPoint
- **D.** File Explorer

4. Which device is designed primarily for portable computing?

- **A.** Desktop computer
- **B.** Laptop computer
- **C.** Desktop monitor
- **D.** Printer

5. What should you do if you receive a suspicious message asking for your password?

- **A.** Reply with your password
- **B.** Forward it to all classmates
- **C.** Ignore or report it through the appropriate channel
- **D.** Click every link in the message

B. Short-answer questions

Write your answers in your notebook.

1. Define a computer.
2. What is the difference between data and information?
3. Name four types of computers or digital devices.
4. Explain the four basic stages of computer operation.
5. Give three examples of how computers are used in education.
6. Write three benefits and two limitations of computers.
7. Explain why students should protect their passwords.
8. What is the difference between hardware and software?

C. Think critically

1. Can a computer produce an incorrect result even when it is working properly? Explain with an example.
2. Why is saving a file important?
3. Should students believe everything they read on the internet? Give two reasons for your answer.

1.11 Homework

Task 1 — Computers around us

Identify five places where computers are used. For each place, describe what the computer helps people do.

Task 2 — Data and information

Create a table showing marks for three imaginary students in two subjects. Calculate each student's total marks using a calculator or Microsoft Excel.

Task 3 — Digital responsibility

Write five rules that students should follow when using computers at school.

Task 4 — Vocabulary

Learn the meanings of these eight terms:

Computer, data, information, processing, input, output, hardware and software.

Chapter 1 completion checklist

Students should be able to tick each item when they can perform it independently.

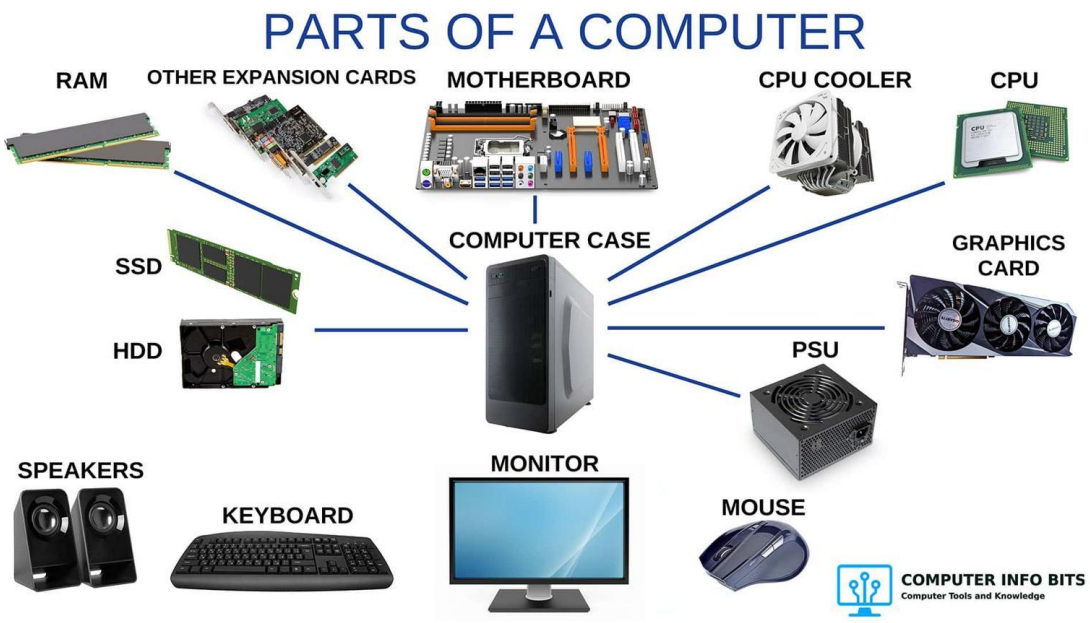
MY LEARNING PROGRESS

- ☐ I can define a computer and explain Computer Studies.
- ☐ I can identify common types of computers and their uses.
- ☐ I can explain input, processing, output and storage.
- ☐ I can describe benefits and limitations of computers.
- ☐ I can explain basic rules for safe and responsible computer use.
- ☐ I can create a folder and save a Word document in the correct location.

End of Chapter 1

Chapter 2:
Understanding Computer Hardware

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CHAPTER QUESTION

What are the physical parts of a computer, and how do they work together?

In Chapter 1, we learned what computers are and how people use them. In this chapter, we will explore the physical components that make a computer work.

2.1 Learning objectives

LEARNING OBJECTIVES

By the end of this chapter, you should be able to:

- Define computer hardware and distinguish it from software.
- Identify the major components of a desktop computer.
- Classify devices as input, output, processing or storage devices.
- Explain the functions of the CPU, RAM, motherboard and storage devices.
- Distinguish between RAM and permanent storage.
- Describe how hardware components work together.
- Demonstrate safe handling of computer equipment.

2.2 What is computer hardware?

Computer hardware refers to the physical parts of a computer that can be seen and touched.

Examples include a keyboard, mouse, monitor, processor, motherboard, RAM, SSD and printer.

Hardware alone cannot perform useful tasks without instructions. Software provides the instructions that tell the hardware what to do.

For example, when you type a sentence in Microsoft Word:

- The keyboard sends your keystrokes to the computer.
- The processor and other components help process the input.
- Microsoft Word displays the sentence on the monitor.
- The computer can save the document to a storage device.

Hardware and software work together to complete the task.

2.3 Main parts of a desktop computer

A typical desktop computer setup may include the following components.





1. Monitor

The monitor displays text, pictures, videos and other information produced by the computer. It is an output device.



2. Keyboard

The keyboard allows users to enter letters, numbers, symbols and commands. It is an input device.



3. Mouse

A mouse controls the pointer on the screen. Users can click, select, drag and open items with it. It is an input device.



4. System unit

The system unit houses important internal components, such as the motherboard, processor, memory and storage. In many desktop computers, this is the tower-shaped case.

> **Important:** The system unit and the CPU are not the same thing. The system unit is the case containing several components; the CPU is the processor installed inside it.

Laptops usually contain the screen, keyboard, pointing device and internal components in a single portable unit.

2.4 Input devices

An input device allows a user or another source to send data or instructions to a computer.



Keyboard

Enters text, numbers and commands. It is commonly used for typing assignments and entering data.



Mouse

Controls the pointer and helps users select and manipulate items on the screen.



Scanner

Converts a paper document or photograph into a digital image.



Webcam

Captures images and video that can be sent to a computer.



Microphone

Captures sound, such as a student's voice during an online lesson.

Other input devices include touchscreens, barcode readers, game controllers and digital cameras.

2.5 Output devices

An output device presents information from a computer in a form that people can see, hear or otherwise use.



Monitor

Displays documents, images, videos and program results.



Printer

Produces a physical copy of digital information on paper.



Speakers

Produce sound, such as music, alerts and audio from educational videos.



Projector

Displays computer images on a large screen or wall for a classroom audience.

Some devices perform both input and output functions. For example, a touchscreen displays information and detects a user's touch.

2.6 The CPU: The processor

The Central Processing Unit (CPU) is the main processor of a computer. It executes instructions and performs calculations and logical operations.



The CPU works with memory and other components to carry out programs.

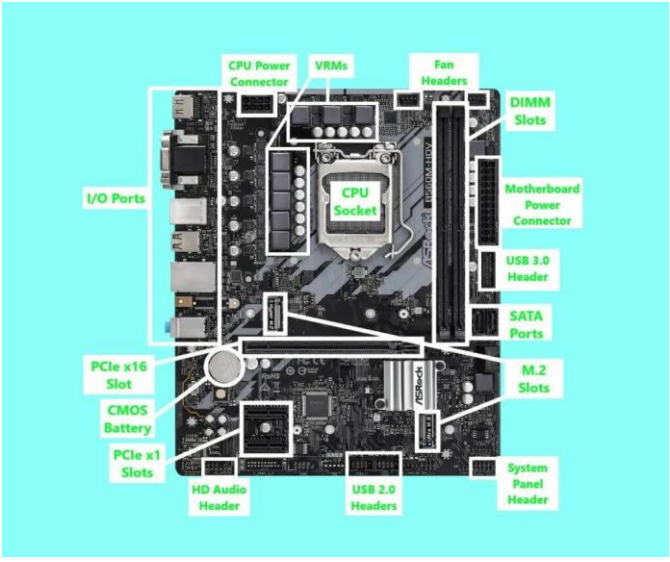
For example, when you calculate the sum of two numbers in Microsoft Excel, the CPU executes the instructions needed to perform the calculation.

A processor's performance depends on several factors, including its design, number of cores, clock speed and the type of task being performed. A higher clock speed alone does not always mean that one processor is faster than another.

> **Remember:** The CPU is an important part of a computer, but it does not work alone. It depends on memory, storage and other hardware components.

2.7 The motherboard

The motherboard is the main circuit board inside a computer. It connects many of the computer's important components and allows them to communicate.



The motherboard provides connections for components such as:

- CPU
- RAM
- Storage devices
- Expansion cards
- USB and other external connections

Without suitable connections between components, a computer could not operate as a complete system.

2.8 RAM: Temporary working memory

RAM stands for Random Access Memory. It is the computer's working memory, where data and instructions needed by currently running programs can be kept for quick access.



Imagine that you are working on a large assignment in Microsoft Word while a web browser is also open. The computer uses RAM to hold information needed by these running applications.

RAM is generally volatile memory, meaning its contents are lost when power is switched off.

More RAM can help a computer handle more applications or larger workloads, although performance also depends on the processor, storage and software.

RAM versus storage

RAM	Storage (SSD or HDD)
Holds data for active tasks	Keeps files and applications for later use
Usually loses its contents when power is off	Retains saved data without power
Designed for quick access during processing	Designed for persistent data storage
Example: 8 GB RAM	Example: 256 GB SSD

A computer with 8 GB RAM and a 256 GB SSD has two different resources: 8 GB of working memory and 256 GB of storage capacity.

2.9 Storage devices

Storage devices retain data, programs and files so that they can be accessed later.



1. Solid-State Drive (SSD)

An SSD stores data using flash memory. It has no moving mechanical parts and is commonly used for fast computer startup and application loading.



2. Hard Disk Drive (HDD)

An HDD stores data on magnetic disks. It is commonly used for storing operating systems, applications and files.



3. USB flash drive

A portable storage device that connects through a USB port and can transfer files between compatible devices.



4. Memory card

A small storage device often used in cameras and other electronic devices.

Files can also be stored remotely using cloud storage services. Cloud storage depends on remote computers and usually requires an internet connection to access online files.

> **Good practice:** Keep important schoolwork in an organized folder and maintain a backup. A file saved in only one location may be lost if that device fails.

2.10 Other important internal components

A computer contains additional components that help it operate.

- **Power supply:** Converts incoming electrical power into suitable power for internal components in a desktop computer.
- **Cooling system:** Fans or other cooling components help prevent overheating.
- **Graphics processing unit (GPU):** Processes graphics and images. It may be integrated into the CPU or installed as a separate component.
- **Network adapter:** Allows a computer to connect to a network through Wi-Fi or a wired connection.
- **Ports and connectors:** Provide connections for external devices, such as USB keyboards, mice, printers and storage drives.

Not every computer contains these components in the same form. For example, laptops use compact internal designs, and some graphics and network functions are built into other components.

2.11 How hardware components work together

Consider what happens when you open a saved assignment in Microsoft Word.

1	**Input**	You click the saved document.
2	**Storage**	The computer reads the saved file from the SSD or HDD.
3	**Processing and memory**	The processor executes instructions while RAM holds information needed by the application.
4	**Output**	The document appears on the monitor.

This example shows that the computer works as a system. Different components perform different functions, but they cooperate to complete a task.

2.12 Taking care of computer hardware

Computer hardware can be damaged by careless handling, dust, liquids, heat and electrical problems.

Follow these rules in the Ignite Genesis School computer lab:

1. Keep food and drinks away from computers.
2. Handle keyboards, mice, cables and USB devices gently.
3. Never pull a cable by its wire.
4. Keep ventilation openings clear.
5. Do not open a computer case or disconnect internal components without teacher authorization.
6. Report unusual sounds, overheating, damaged cables or other problems.
7. Shut down computers using the approved procedure.
8. Keep hands clean and follow the teacher's instructions when sharing equipment.

2.13 Classroom activities

Activity A — Classify the devices

Classify each device as an input device, output device, storage device or processing component.

Device	Your classification
Keyboard	
Monitor	
Microphone	
Printer	
CPU	
SSD	
Webcam	
Speakers	

Activity B — RAM or storage?

Decide whether each statement describes RAM or storage.

1. Keeps saved files when the computer is switched off.
2. Holds data needed by currently running applications.
3. A computer has 8 GB of this resource.
4. A computer has a 256 GB SSD for this purpose.

Activity C — Hardware investigation

Computer lab · 10 minutes

1. Observe a school laptop or desktop computer without opening its case.
2. Identify the screen, keyboard, pointing device and available ports.
3. Locate any visible storage or memory labels on the device or its system information, if the teacher permits.
4. Record the device’s brand and model, if visible.
5. Identify three input or output devices connected to or built into it.
6. Explain why you should not open the computer case without permission.

2.14 Review questions

A. Multiple-choice questions

1. Which component executes computer instructions?

- **A.** Monitor
- **B.** CPU
- **C.** Keyboard
- **D.** Printer

2. Which of the following is an input device?

- **A.** Speakers
- **B.** Monitor
- **C.** Keyboard
- **D.** Projector

3. Which component is the computer's main circuit board?

- **A.** Motherboard
- **B.** SSD
- **C.** Mouse
- **D.** Printer

4. What is the primary purpose of RAM?

- **A.** Printing documents
- **B.** Displaying images
- **C.** Holding data needed by running programs
- **D.** Producing sound

5. Which storage device uses flash memory and has no moving mechanical parts?

- **A.** HDD
- **B.** SSD
- **C.** Monitor
- **D.** CPU

6. Which statement about hardware and software is correct?

- **A.** Hardware and software are exactly the same.
- **B.** Hardware consists of physical components, while software consists of programs and instructions.
- **C.** Software can operate without any hardware.
- **D.** A monitor is software.

B. Short-answer questions

1. Define computer hardware and give four examples.
2. Explain the difference between the system unit and the CPU.
3. What is the purpose of a motherboard?
4. Explain the difference between RAM and an SSD.
5. Give three examples of input devices and three examples of output devices.
6. What is the function of a power supply?
7. Explain how hardware and software work together when opening a document.
8. Write five rules for caring for computer hardware.

C. Think critically

1. Why might a computer become slower when too many applications are running and available RAM is limited?
2. A student saves an assignment on an SSD. Why might the student still need a backup?
3. A touchscreen displays information and responds to touches. Why can it be classified as both an input and an output device?

2.15 Homework

Task 1 — Draw and label a computer

Draw a desktop computer setup and label the monitor, keyboard, mouse and system unit.

Task 2 — Hardware table

Create a table containing ten hardware components. For each component, write its name, category and function.

Task 3 — RAM and storage

Explain RAM and storage using an everyday analogy. For example, compare RAM to a workspace and storage to a filing cabinet.

Task 4 — Hardware care poster

Create a one-page poster in Microsoft Word titled Protect Our Computer Lab Equipment. Include at least six rules and suitable illustrations or icons.

Chapter 2 completion checklist

MY LEARNING PROGRESS

- ☐ I can define hardware and distinguish it from software.
- ☐ I can identify input and output devices.
- ☐ I can explain the functions of the CPU and motherboard.
- ☐ I can distinguish between RAM and storage.
- ☐ I can describe how components work together.
- ☐ I can explain how to care for computer equipment.

End of Chapter 2

Chapter 3: Understanding Software and Operating Systems

Digital Foundations · Student Textbook

LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain the difference between hardware and software.
- Identify system software and application software.
- Describe the purpose and functions of an operating system.
- Recognize the main parts of the Windows desktop.
- Use basic Windows features such as Start, Search, taskbar, and Settings.
- Open applications and save simple documents.
- Identify common file types and extensions.
- Follow safe and responsible computer-use practices.

3.1 What Is Software?

Software is a set of instructions or programs that tells a computer what to do. Software helps us perform tasks such as writing documents, drawing pictures, solving calculations, playing educational videos, and browsing the internet.

A computer needs both hardware and software to perform useful work.

For example, when you type an assignment, the keyboard receives your input, the computer processes it, and a word-processing application displays your work on the screen.



Examples of software

- **Windows** — an operating system.
- **Microsoft Word** — a word-processing application.
- **Microsoft Excel** — a spreadsheet application.
- **Microsoft PowerPoint** — a presentation application.
- **Paint** — a drawing application.
- **Calculator** — an application for calculations.

Software can be installed on a computer or, in some cases, accessed through a web browser.

3.2 Hardware and Software

Hardware refers to the physical parts of a computer that we can touch. Software refers to the programs and instructions that make the computer perform tasks.



Hardware

Physical components of a computer.

Examples: *monitor, keyboard, mouse, printer.*



Software

Programs and instructions used by a computer.

Examples: *Windows, Word, Excel, Paint.*

Hardware versus software

Hardware	Software
Physical parts of a computer.	Programs and instructions.
Can usually be touched.	Cannot be physically touched like a device.
Examples: keyboard and monitor.	Examples: Windows and Word.
May need software to perform particular tasks.	Runs using hardware and other supporting software.

How do hardware and software work together?

Consider writing a school assignment.

1	**Input — Keyboard**	You type words into the computer.
2	**Processing — Computer**	The computer processes your instructions.
3	**Output — Screen**	Your words appear in the document.

The keyboard, processor, and monitor are hardware. The word-processing application and operating system are software.

> **Remember:** Hardware and software work together. A computer needs suitable software to carry out many different tasks.

3.3 Types of Software

Software is commonly divided into two main categories:

1. System software
2. Application software

COMPUTER SOFTWARE

System Software	Application Software
Manages the computer and supports applications.	Helps users complete particular tasks.
Example: Windows	***Example: Microsoft Word***

A. System Software

System software manages computer hardware and provides the environment in which application programs can run.

Examples include:

- Operating systems, such as Windows.
- Device drivers, which help the operating system communicate with hardware.
- System utilities, which help maintain, protect, or manage a computer.

System software works mostly in the background, although users interact with it through the operating system's interface.

B. Application Software

Application software helps users perform specific tasks.

Examples include:



Word processing — Microsoft Word

Used to create letters, assignments, reports, and other text documents.



Spreadsheets — Microsoft Excel

Used to organize information, perform calculations, and create charts.



Presentations — Microsoft PowerPoint

Used to prepare slides for lessons, projects, and presentations.



Drawing — Paint

Used to draw pictures and create or edit simple images.

Can you identify the type of software?

Think about the following situations:

- You want to type a letter to your principal. Which application would you use?
- You want to calculate the total marks of a class. Which application would be suitable?
- You want to manage the computer's devices and run applications. Which type of software is needed?

These tasks require different programs, but all of them depend on the computer's system software.

3.4 What Is an Operating System?

An operating system (OS) is the main system software that manages a computer's hardware and software resources. It provides an environment in which users can interact with the computer and applications can run.

Examples of operating systems include:

- Microsoft Windows
- macOS
- Linux
- Android
- iOS

Different operating systems are designed for different kinds of devices, including desktop computers, laptops, tablets, and smartphones.



Main functions of an operating system

1	**Managing hardware**	The operating system coordinates the use of hardware such as the processor, memory, storage, keyboard, and display.
2	**Running applications**	It provides services that applications need to run.
3	**Managing files**	It helps organize and access files and folders stored on available drives.
4	**Providing a user interface**	It lets users interact with the computer through windows, icons, menus, and other controls.
5	**Managing memory and processing**	It helps allocate system resources to programs that are running.
6	**Supporting security**	It provides features such as user accounts, permissions, and security settings.
7	**Supporting devices**	With suitable drivers and system support, the operating system helps the computer communicate with devices such as printers and speakers.

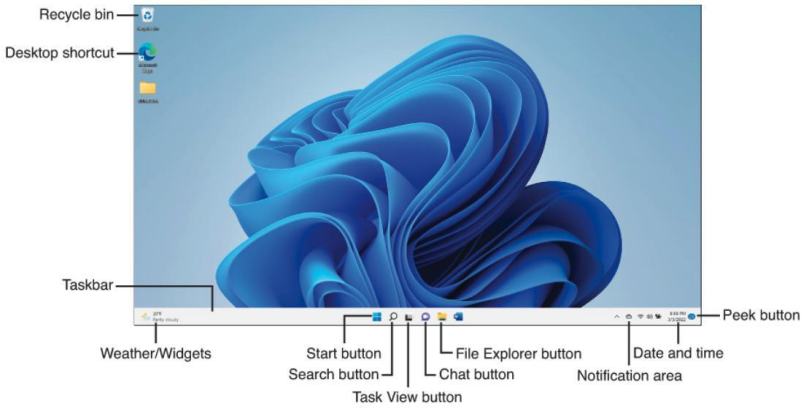
Why is an operating system important?

Imagine switching on a computer with no suitable operating system installed. The computer might start some basic firmware, but you would not have the normal desktop environment used for opening applications, managing files, and completing schoolwork.

The operating system makes these everyday activities possible.

3.5 Understanding the Windows Desktop

When a Windows computer starts successfully and you sign in, you usually see the desktop. It is the main workspace from which you can open applications, access files, and use computer features.



Main parts of the Windows desktop

1	**Desktop background**	The background image or colour behind the icons and windows.
2	**Desktop icons**	Small pictures representing applications, files, folders, or shortcuts.
3	**Start button**	Opens the Start menu, where you can access applications, settings, and power options.
4	**Taskbar**	Usually appears along the bottom of the screen. It provides access to Start, Search, pinned applications, and running applications.
5	**Search**	Helps you find applications, settings, files, and other information available to Windows.
6	**Notification area and system tray**	Usually near the right end of the taskbar. It can display items such as network status, volume, battery status on laptops, and the clock.

The exact appearance and position of these parts may differ between Windows versions and user settings.

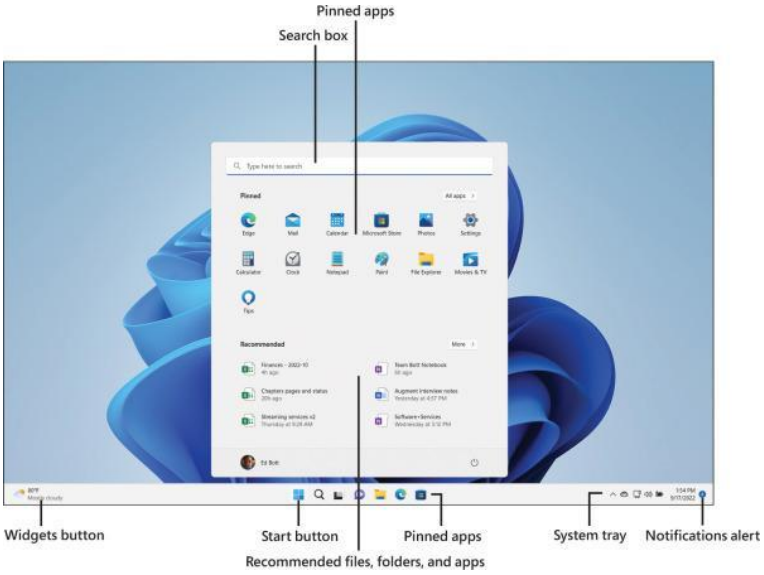
3.6 Using the Start Menu and Search

The Start menu is one of the main ways to access applications and settings in Windows.

Opening the Start menu

1. Click the Start button on the taskbar.
2. Review the available applications or pinned items.
3. Select the application you want to open.

You can also press the Windows key on the keyboard to open Start.



Using Search

Suppose you want to open Calculator.

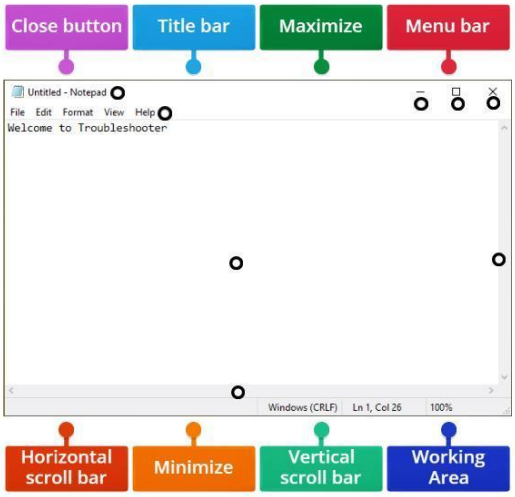
1. Open Start or select Search.
2. Type Calculator.
3. Select the Calculator application from the results.

You can use a similar method to find applications such as Paint or File Explorer.

> **Practical tip:** Search is useful when you know the name of an application but do not know where to find it.

3.7 Working with Application Windows

When you open an application, it usually appears in a window. A window is an area on the screen in which an application or document is displayed.



Common window controls

Control	Function
Minimize	Hides the window from the desktop while usually keeping the application running.
Maximize	Expands the window to fill the available screen area.
Restore Down	Returns a maximized window to a smaller size.
Close	Closes the window. Unsaved work may prompt you to save first.

Switching between applications

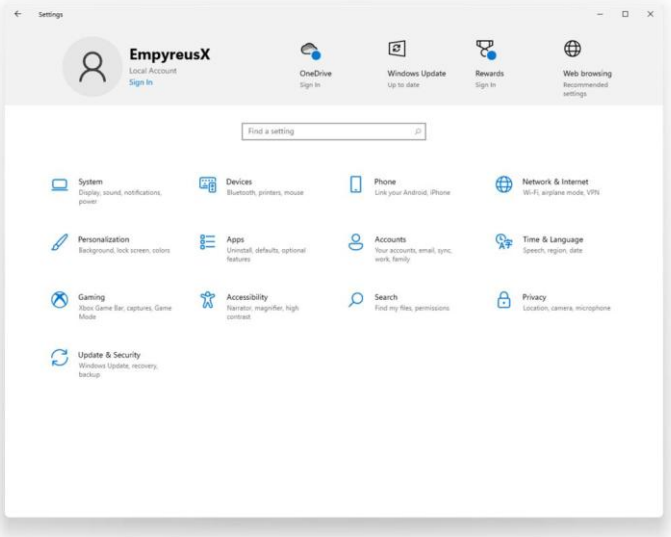
You may need to work with more than one application at a time. For example, you might read instructions in a PDF while preparing notes in Word.

You can switch between open applications by selecting them on the taskbar. In Windows, Alt + Tab is another common shortcut for switching between open windows.

> **Remember:** Closing a window is different from minimizing it. Minimized applications may continue running in the background.

3.8 Basic Windows Settings

Windows provides settings that allow users to adjust how the computer works and looks.



Common settings

- **Display:** Adjusts screen resolution, brightness options where supported, and display arrangement.
- **Personalization:** Changes the desktop background, colours, and other appearance options.
- **Sound:** Controls audio output and input settings.
- **Network and Internet:** Manages available network connections.
- **Bluetooth and devices:** Manages supported devices and connections.
- **Accessibility:** Provides features that help people use the computer in different ways.
- **Time and language:** Manages date, time, language, and related preferences.

How to open Settings

1. Open Start.
2. Select Settings, or search for Settings.
3. Choose the category you need.
4. Change only the settings you understand and are allowed to change.

On many Windows systems, Windows + I opens Settings.

Responsible use of settings

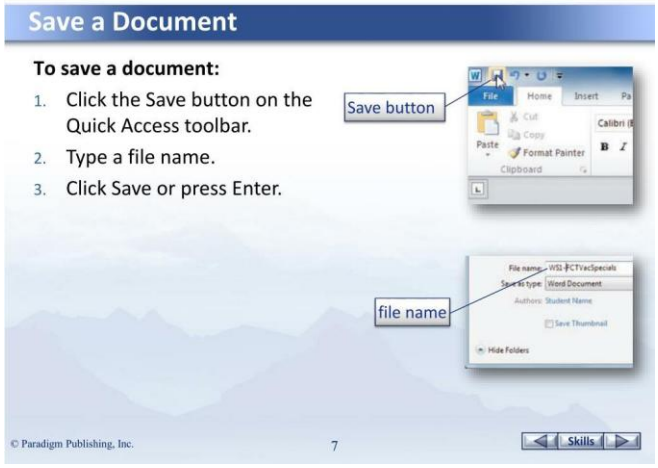
On a school computer, students should not change administrator settings, network configurations, security controls, or other restricted options without permission from the teacher.

If a display or sound setting needs adjustment, ask for help when necessary.

3.9 Opening and Saving a Document

Application software allows you to create work and save it for later use.

For example, Microsoft Word can be used to prepare a Computer Studies assignment.



Creating a simple document

1. Open Microsoft Word, if it is installed and available.
2. Choose a blank document.
3. Type a heading, such as My Computer Studies Assignment.
4. Type a few sentences about what you have learned.
5. Save your work in the location specified by your teacher.

Saving a document

1. Select File, then Save or Save As, depending on your situation.
2. Choose the permitted storage location.
3. Enter a meaningful file name, such as Computer_Assignment.
4. Confirm the save action.

In many applications, Ctrl + S saves the current document.

When saving a new document, the application may ask you to choose a location and file name. After the first save, Ctrl + S usually updates the saved document.

Opening an existing document

1. Open the application that supports the document.
2. Select File, then Open, or use the application's available Open command.
3. Browse to the document's location.
4. Select the file and open it.

You may also be able to open a document directly from File Explorer by double-clicking it, provided a suitable application is installed.

> **Important:** Save your work regularly. If a computer shuts down unexpectedly, unsaved changes may be lost.

3.10 Understanding File Types and Extensions

Different applications create different types of files. The file extension often helps identify the file format.

Extension	Common file type	Example use
.docx	Word document	Writing an assignment
.xlsx	Excel workbook	Recording marks
.pptx	PowerPoint presentation	Preparing lesson slides
.pdf	PDF document	Reading a textbook
.jpg	Image file	Saving a photograph
.png	Image file	Saving a diagram
.txt	Plain text file	Saving simple notes



Why do file extensions matter?

File extensions help users recognize common formats and identify which applications may open them.

For example:

- A .docx file is commonly opened with Microsoft Word or compatible word processors.
- A .xlsx file is commonly opened with spreadsheet software.
- A .pptx file is commonly opened with presentation software.
- A .pdf file is commonly opened with a PDF reader or a browser that supports PDFs.

Changing a file's name or extension does not automatically convert it to another format.

3.11 Safe Software Use and Updates

Software should be used responsibly to help protect computers, personal information, and schoolwork.

Safe practices

1. Install software only when authorized by the teacher or administrator.
2. Download programs only from trusted, approved sources.
3. Do not open suspicious attachments or unexpected downloads.
4. Keep software updated according to school or administrator instructions.
5. Never disable security features without permission.
6. Do not share passwords or sign in using another person's account without authorization.
7. Respect software licences and copyright.
8. Report unusual messages, warnings, or computer behaviour to the teacher.

Why are updates important?

Software updates may:

- Fix errors or bugs.
- Improve performance or compatibility.
- Repair security weaknesses.
- Add or improve features.

However, updates on school computers may be managed by the school's administrator. Students should follow school procedures instead of independently installing updates or changing system settings.

A safe or unsafe choice?

Imagine you are using a school computer and a pop-up says:

"Your computer is infected! Download this unknown program immediately."

What should you do?

- Do not click the pop-up.
- Do not download the suggested program.
- Tell your teacher or the school's computer administrator.

A message that looks urgent is not necessarily trustworthy.

3.12 Classroom Activities

Activity 1: Hardware or Software?

Objective: *Distinguish hardware from software.*

Write H for hardware and S for software.

1. Keyboard
2. Microsoft Word
3. Monitor
4. Windows
5. Printer
6. Microsoft Excel
7. Mouse
8. Paint

Extension task: Choose two hardware items and two software applications. Explain how each could help a student complete schoolwork.

Activity 2: Identify Software Types

Objective: *Understand system software and application software.*

Classify each item.

Item	System software or application software?
Windows	
Microsoft Word	
Microsoft PowerPoint	
A device driver	
Microsoft Excel	
An operating system	

Discuss why an operating system is important even when a student wants to use only one application.

Activity 3: Explore the Windows Desktop

Objective: *Recognize desktop components.*

With your teacher's permission:

1. Identify the Start button.
2. Locate Search.
3. Find the taskbar.
4. Open Calculator using Search.
5. Minimize the Calculator window.
6. Restore it from the taskbar.
7. Close Calculator.

Discussion: What is the difference between minimizing and closing an application?

Activity 4: Create and Save a Document

Objective: *Practise basic application use.*

Using Microsoft Word or another teacher-approved word processor:

1. Open a blank document.
2. Type the heading My Computer Studies Lesson.
3. Write three sentences about software.
4. Save the document as Software_Lesson in the location provided by your teacher.
5. Save your work again using Ctrl + S.
6. Close the document after saving.
7. Reopen it and check that your work is present.

> **Safety note:** Use only your assigned school account and approved storage location.

3.13 Review Questions

A. Multiple-Choice Questions (MCQs)

Choose the correct answer.

1. What is software?

- **A.** Only the physical parts of a computer
- **B.** Programs and instructions that tell a computer what to do
- **C.** A type of computer desk
- **D.** A power cable

2. Which of the following is hardware?

- **A.** Windows
- **B.** Microsoft Word
- **C.** Keyboard
- **D.** Calculator application

3. Which type of software manages computer hardware and supports applications?

- **A.** System software
- **B.** Drawing software only
- **C.** Presentation software
- **D.** Word-processing software

4. Which of the following is an operating system?

- **A.** Microsoft Word
- **B.** Windows
- **C.** Microsoft Excel
- **D.** Paint

5. Which application is commonly used to prepare presentations?

- **A.** Microsoft PowerPoint
- **B.** Calculator
- **C.** File Explorer
- **D.** Windows Settings

6. **What is the main purpose of the Start menu?**
   - **A.** To clean the computer physically
   - **B.** To access applications, settings, and power options
   - **C.** To print every document
   - **D.** To delete all files

7. **Which shortcut commonly opens File Explorer in Windows?**
   - **A.** Windows + E
   - **B.** Ctrl + P
   - **C.** Ctrl + B
   - **D.** Alt + F4

8. **Which shortcut commonly saves a document in an application?**
   - **A.** Ctrl + S
   - **B.** Ctrl + X
   - **C.** Ctrl + C
   - **D.** Ctrl + A

9. **Which extension is commonly used for Microsoft Excel workbooks?**
   - **A.** .jpg
   - **B.** .pptx
   - **C.** .xlsx
   - **D.** .mp3

10. **What should you do if an unknown pop-up asks you to download suspicious software on a school computer?**
    - **A.** Download it immediately
    - **B.** Disable security settings
    - **C.** Follow the pop-up's instructions without checking
    - **D.** Avoid interacting with it and inform the teacher

B. Short-Answer Questions

1. Define software.
2. What is the difference between hardware and software?
3. Give four examples of hardware and four examples of software.
4. What is system software?
5. What is application software? Give three examples.
6. Define an operating system and name two operating systems.

7. Write any four functions of an operating system.
8. Name four important parts of the Windows desktop.
9. What is the purpose of the Start menu and Search?
10. Write the steps to create and save a document.
11. What is a file extension? Give three examples.
12. Write four rules for using software safely on a school computer.

C. Critical-Thinking Questions

1. A student says, “A computer only needs hardware because hardware is what we can see and touch.” Explain why this statement is incorrect.
2. A student wants to write an assignment, calculate marks, and prepare a presentation. Which applications would be suitable for each task?
3. Why is it important to save a document regularly instead of waiting until all the work is finished?
4. A classmate asks you to install an unknown application on a school computer. What should you do, and why?
5. Explain how an operating system helps hardware and application software work together.

3.14 Homework

1. Write the definitions of hardware, software, system software, application software, and operating system.
2. Draw a computer and label at least four hardware components.
3. Draw a diagram showing the relationship between system software and application software.
4. List five functions of an operating system.
5. Draw a simplified Windows desktop and label the Start button, taskbar, desktop icons, and notification area.
6. Write the names and common uses of six file extensions.
7. Write five rules for safe and responsible computer use.

Quick Revision

Hardware	The physical components of a computer.
Software	Programs and instructions that make a computer perform tasks.
Operating System	Manages hardware and software resources and provides an environment for applications.
Application Software	Helps users complete tasks such as writing, calculating, drawing, and presenting.
Saving Work	Stores changes so they can be accessed later.
Safe Computer Use	Use approved software, protect passwords, and ask for help when something seems suspicious.

Chapter 4: Working with Files and Folders in Windows

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain the meaning of files, folders, and drives.
- Open and use File Explorer in Windows.
- Create, rename, copy, move, and delete files and folders.
- Understand the Recycle Bin and restore deleted files.
- Organize schoolwork into subject-wise folders.
- Recognize common file extensions.
- Follow safe practices when managing files on a computer.

4.1 What Is a File?

A file is a collection of information stored on a computer with a name. It may contain text, pictures, music, videos, or other information.

Think of a file as a page or document that you keep for future use.

Examples of files include:

- A Computer Studies assignment.
- A photograph of a school activity.
- A presentation about the solar system.
- A spreadsheet containing examination marks.
- A PDF version of a textbook.

Examples of computer files



Document
`Assignment.docx`



Picture
`School.jpg`



Presentation
`Science.pptx`

IMPORTANT TERMS

- **File name:** The name used to identify a file, such as Assignment.
- **File extension:** The letters after the final dot that often indicate the file type, such as .docx.
- **File location:** The drive and folders where the file is stored.

For example, in Science_Project.docx, Science_Project is the file name and .docx is the extension.

4.2 What Is a Folder?

A folder is a place used to store and organize files and other folders. Folders help us keep related information together.

Imagine a school bag containing separate notebooks for English, Mathematics, Science, and Computer Studies. Instead of mixing all your work together, you keep each subject's work organized. Folders serve a similar purpose on a computer.



Why do we use folders?

Folders help us to:

1. Keep files organized.
2. Find information quickly.
3. Separate schoolwork by subject.
4. Avoid mixing personal and school files.
5. Manage large numbers of documents more easily.

Example: Organizing schoolwork

A Grade 6 student might create a main folder called Grade 6 Schoolwork.

Inside it, the student can create separate folders for different subjects.

```
Grade 6 Schoolwork
├── Mathematics
├── English
├── Science
└── Computer Studies
    ├── Chapter_1.docx
    ├── Chapter_2.docx
    └── Computer_Diagram.png
```

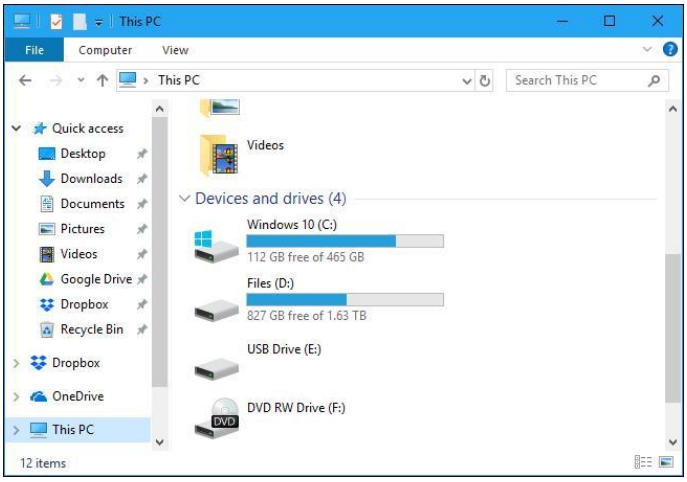
This arrangement makes it easy to find Computer Studies assignments without searching through every file on the computer.

4.3 What Is a Drive?

A drive is a storage location used by a computer to store files and folders.

Common examples in Windows include:

- **Local Disk (C:)** — often contains Windows, installed programs, and user files.
- **USB Drive (D:, E:, or another letter)** — a removable storage device. The letter depends on the computer.
- **External Drive** — a separate storage device connected to the computer.



Drive letters can differ from one computer to another. A USB drive is not always assigned the same letter.

The relationship between drives, folders, and files

A computer stores files inside folders, and folders are stored on drives.

```
Drive (C:)
└── Grade 6 Schoolwork
    └── Computer Studies
        └── Chapter_1.docx
```

4.4 What Is File Explorer?

File Explorer is a Windows application that allows users to view and manage files, folders, and drives.

Using File Explorer, we can:

- Browse files and folders.
- Create new folders.
- Open documents and pictures.
- Copy and move files.
- Rename files and folders.
- Delete unwanted files.
- Search for files.

How to open File Explorer



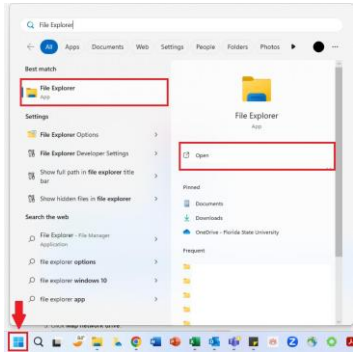
Method 1: Taskbar

Click the yellow folder icon on the taskbar, if it is available.



Method 2: Keyboard shortcut

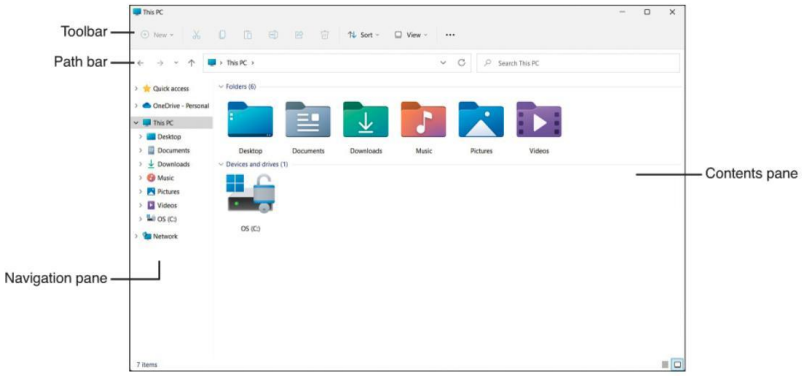
Press Windows + E together.



Method 3: Start menu

Open Start, type File Explorer, and select the application.

Parts of File Explorer



Important parts include:

Part	Purpose
Navigation pane	Helps you access locations such as Home, This PC, and drives.
Address bar	Shows the current folder location.
Search box	Helps you find files and folders.
File list	Displays files and folders in the selected location.
Toolbar	Provides commands for managing files and folders.

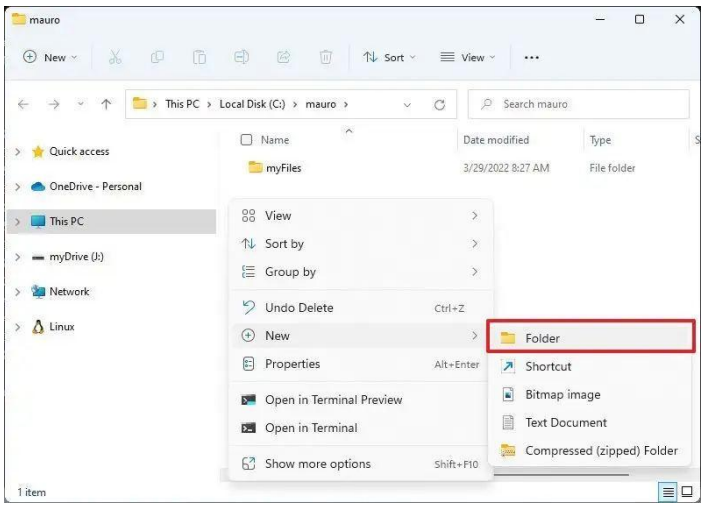
The appearance of File Explorer may vary slightly between Windows versions.

4.5 Creating a New Folder

A new folder can be created to organize files for a subject, project, or activity.

Steps to create a folder

1. Open File Explorer.
2. Navigate to the location where you want the folder.
3. Select New, then Folder. In some Windows versions, use the New Folder button.
4. Type a meaningful name, such as Grade 6 Science.
5. Press Enter.



Good folder-naming practices

- Use names that clearly describe the contents.
- Avoid confusing names such as New Folder 2 when a more meaningful name is possible.
- Keep names reasonably short.
- Use consistent naming for schoolwork.

Examples:

- `English_Projects`
- `Science_Notes`
- `Computer_Assignment`
- `Term_1_Revision`

4.6 Renaming Files and Folders

Renaming means changing the name of a file or folder without changing its contents.

For example:

`New Document.docx → Computer_Assignment.docx`

Steps to rename

1. Select the file or folder.
2. Right-click it.
3. Choose Rename.
4. Type the new name.
5. Press Enter.

You can also select an item and press F2 on many Windows systems.

Before and after renaming

`New Document.docx`	→	`Computer_Assignment.docx`

Important: When renaming a file, do not accidentally change its extension. Changing an extension does not necessarily convert the file into another format.

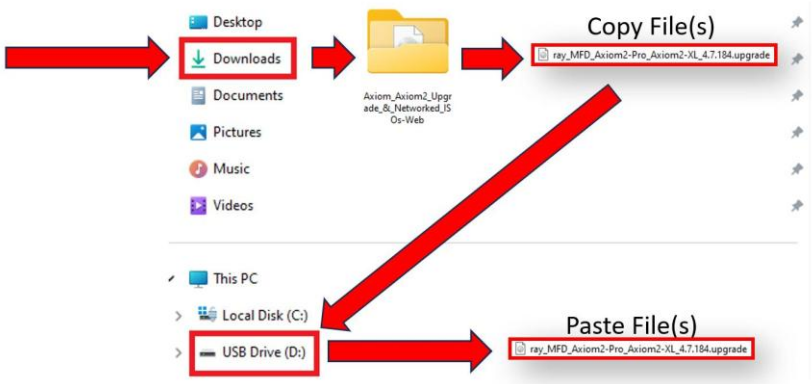
4.7 Copying Files and Folders

Copying creates another copy of a file or folder while keeping the original in its existing location.

For example, you may copy an assignment to a USB drive so you can take it to school.

Steps to copy

1. Select the file or folder.
2. Right-click and select Copy, or press Ctrl + C.
3. Open the destination folder or drive.
4. Right-click and select Paste, or press Ctrl + V.



Example

You have Science_Project.docx in your Science folder. You copy it to a USB drive.

The original remains in the Science folder, and a second copy is saved on the USB drive.

4.8 Moving Files and Folders

Moving transfers a file or folder from one location to another. Unlike copying, the item normally disappears from its original location after the move is completed.

Steps to move

1. Select the file or folder.
2. Press Ctrl + X to cut it.
3. Open the destination folder.
4. Press Ctrl + V to paste it.



Copying versus moving

Copying	Moving
Creates another copy.	Transfers the item to another location.
Original remains in place.	Original location no longer contains the moved item.
Useful for backups and sharing.	Useful for reorganizing files.

Remember: Check the destination before moving important work. If you are unsure, copy the file first.

4.9 Deleting Files and Using the Recycle Bin

Deleting means removing a file or folder from its usual location.

In many Windows situations, deleting a file from an ordinary local drive sends it to the Recycle Bin. From there, it may be restored or permanently deleted.

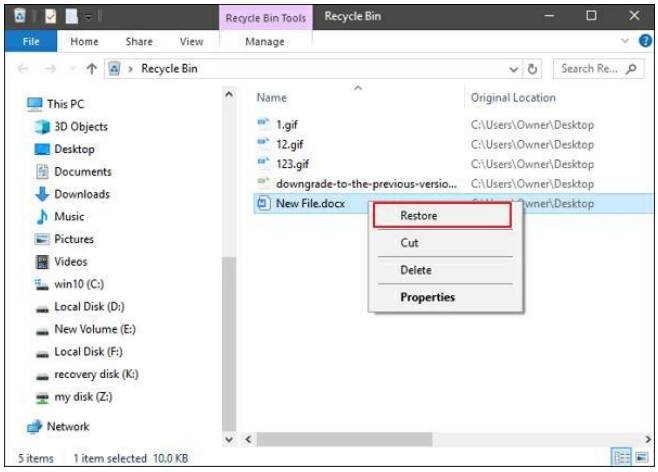
How to delete a file

1. Select the file.
2. Press Delete, or right-click and choose Delete.
3. Confirm the action if Windows asks.

How to restore a file

1. Open the Recycle Bin.
2. Find and select the deleted item.
3. Right-click and choose Restore.

The item will usually return to its original location.



Important safety points

- Check a file before deleting it.
- Do not delete files just because you do not recognize their names.
- Files deleted from removable drives, network locations, or using certain commands may not go to the Recycle Bin.
- Permanently deleted files may be difficult or impossible to recover.

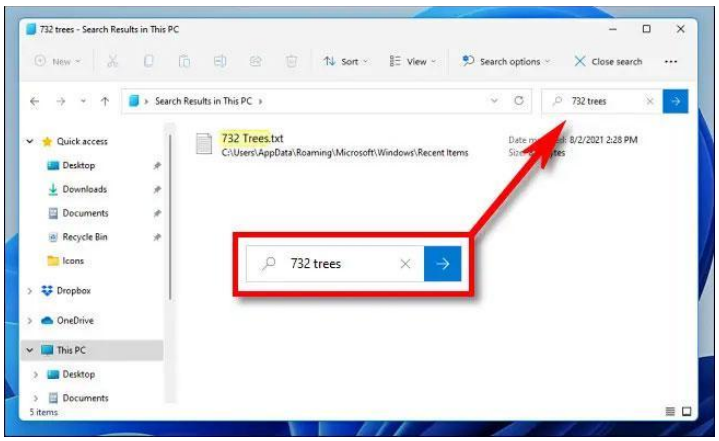
4.10 Searching for Files and Folders

Sometimes we know the name of a file but do not remember where we saved it. File Explorer's search box can help.

Steps to search

1. Open File Explorer.
2. Navigate to a suitable location, such as Documents or This PC.
3. Click the search box.
4. Type part or all of the file name.
5. Review the search results.

For example, search for Science_Project to find a file with that name.



> **Tip:** Meaningful file names make searching easier.

4.11 Understanding Common File Extensions

A file extension is the part of a file name after the final dot. It often identifies the file's format.

Extension	Common use
.docx	Microsoft Word document
.xlsx	Microsoft Excel workbook
.pptx	Microsoft PowerPoint presentation
.pdf	Portable Document Format file
.jpg / .png	Picture or image file
.txt	Plain text file
.mp3	Audio file
.mp4	Video file

For example, My_Presentation.pptx is commonly a PowerPoint presentation.

Windows may hide file extensions by default. You can enable them in File Explorer's View settings; the exact steps depend on the Windows version.

> **Safety reminder:** Do not open unexpected files from unknown sources just because their names or extensions look familiar. File extensions alone cannot guarantee that a file is safe.

4.12 Keeping Schoolwork Safe and Organized

Good file management saves time and helps prevent the loss of important schoolwork.

Follow these practices:

1. Save each assignment in the correct subject folder.
2. Use meaningful names such as Maths_Revision_Term1.
3. Save your work regularly while editing.
4. Keep backup copies of important files where permitted.
5. Use school-approved USB drives and storage locations.
6. Do not delete or change another student's work.
7. Do not download or install unknown programs.

8. Always safely eject a removable drive when Windows recommends it.
9. Follow your teacher's instructions when using shared computers.
10. Keep personal information private.

Example of a well-organized school folder

```
My Grade 6 Work
├── Mathematics
├── English
├── Science
└── Computer Studies
```

Each subject folder contains its own notes, assignments, and projects.

4.13 Classroom Activities

Activity 1: Create a Folder Structure

Objective: *Learn to create and organize folders.*

Instructions:

1. Open File Explorer on a school computer.
2. Open the location permitted by your teacher.
3. Create a folder named Grade 6 Practice.
4. Inside it, create three folders: English, Science, and Computer Studies.
5. Check that all three folders appear inside the main folder.

Discussion: Why is it better to use separate subject folders instead of saving every file in one location?

Activity 2: Copy and Rename a File

Objective: *Practise copying and renaming.*

1. With your teacher's permission, select a practice document.
2. Copy it into another practice folder.
3. Rename the copied file to My_Practice_File.
4. Check that the original file still exists.

Discussion: What is the difference between copying a file and moving a file?

Activity 3: Recycle Bin Practice

Objective: *Understand deletion and restoration.*

1. Create a temporary practice file in your assigned practice folder.
2. Delete it.
3. Open the Recycle Bin and locate the file.
4. Restore it.
5. Check that it has returned to its original location.

> **Important:** Only use files specifically created for this activity. Never practise deletion with real schoolwork or another person's files.

4.14 Review Questions

A. Multiple-Choice Questions (MCQs)

Choose the correct answer.

1. What is a folder used for?

- **A.** To organize files and other folders
- **B.** To increase screen brightness
- **C.** To print documents automatically
- **D.** To turn off the computer

2. Which Windows application is used to manage files and folders?

- **A.** Calculator
- **B.** File Explorer
- **C.** Paint
- **D.** Notepad

3. Which keyboard shortcut is commonly used to copy a selected file?

- **A.** Ctrl + P
- **B.** Ctrl + S
- **C.** Ctrl + C
- **D.** Ctrl + Z

4. What normally happens when you copy a file?

- **A.** The original file is always deleted.
- **B.** Another copy is created.
- **C.** The computer shuts down.
- **D.** The file extension disappears.

5. Which shortcut is commonly used to paste a copied file?

- **A.** Ctrl + V
- **B.** Ctrl + A
- **C.** Ctrl + X
- **D.** Ctrl + F

6. What is the Recycle Bin used for?

- **A.** Storing music permanently
- **B.** Installing applications
- **C.** Holding many items deleted from ordinary local locations until they are restored or removed
- **D.** Creating new folders

7. Which extension is commonly associated with a Microsoft Word document?

- **A.** .mp3
- **B.** .docx
- **C.** .mp4
- **D.** .png

8. What is the purpose of renaming a file?

- **A.** To change its name
- **B.** To print it
- **C.** To move it to another computer automatically
- **D.** To delete it permanently

9. Which shortcut is commonly used to cut a selected file?

- **A.** Ctrl + X
- **B.** Ctrl + B
- **C.** Ctrl + N
- **D.** Ctrl + P

10. Which is a good file-management practice?

- **A.** Saving every assignment in a random location
- **B.** Deleting files without checking them
- **C.** Using meaningful file names and subject folders
- **D.** Sharing passwords with classmates

B. Short-Answer Questions

1. Define a file.
2. What is a folder, and why is it useful?
3. What is a drive? Give one example.
4. What is File Explorer?
5. Write the steps to create a new folder in Windows.
6. Explain how to rename a file.

7. What is the difference between copying and moving a file?
8. What is the Recycle Bin?
9. Write any four common file extensions and their uses.
10. Mention four good practices for protecting and organizing schoolwork.

C. Critical-Thinking Questions

1. Ali saves all his assignments directly in one folder called Documents. After a few months, he cannot find his Science project. How could he organize his files more effectively?
2. Sara wants to take her assignment to school using a USB drive but also wants to keep the original on her computer. Should she copy or move the file? Explain why.
3. You accidentally delete an assignment and it appears in the Recycle Bin. What should you do?
4. A classmate gives you a file from an unknown source and asks you to open it. What safety steps should you follow?

4.15 Homework

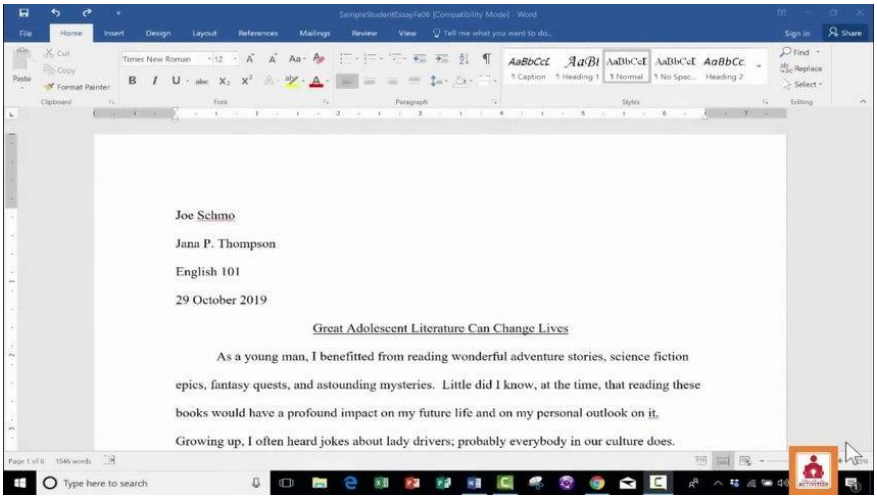
1. Draw a diagram showing one main folder with four subject folders inside it.
2. Write the steps for creating, renaming, copying, and moving a file.
3. List six file extensions and describe what each one is commonly used for.
4. Explain the difference between deleting a file and restoring it from the Recycle Bin.
5. Write five rules for keeping schoolwork safe and organized on a computer.

Quick Revision

File	Stores information such as text, pictures, or presentations.
Folder	Organizes files and other folders.
Drive	Provides a storage location for files and folders.
Copy	Creates another copy while keeping the original.
Move	Transfers a file or folder to another location.
Recycle Bin	May allow deleted files to be restored.

Chapter 5:
Introduction to Microsoft Word

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

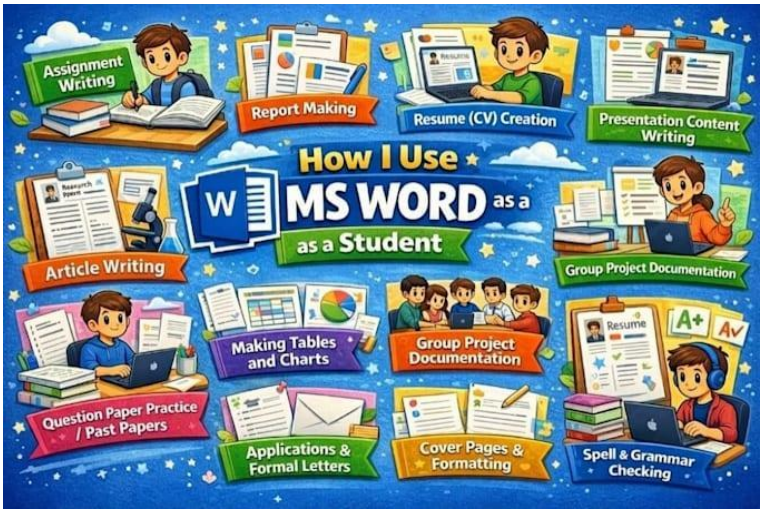
- Explain what Microsoft Word is and describe its uses.
- Identify the main parts of the Microsoft Word window.
- Create, open, save, and close a document.
- Select, type, edit, and format text.
- Change font style, size, colour, and alignment.
- Use bold, italic, and underline formatting.
- Create bulleted and numbered lists.
- Insert pictures and tables into a document.
- Use Print Preview and understand basic printing options.
- Follow good practices when preparing school assignments.

5.1 What Is Microsoft Word?

Microsoft Word is a word-processing application developed by Microsoft. It allows users to create, edit, format, save, and print text documents.

A document is a file containing information such as text, pictures, tables, and other elements.

Students can use Microsoft Word to prepare assignments, letters, reports, stories, and project work.



Uses of Microsoft Word

Microsoft Word can be used to:

1. Write school assignments.
2. Prepare letters and applications.
3. Create reports and project documents.
4. Write stories and essays.
5. Insert pictures into written work.
6. Create tables to organize information.
7. Format text to make documents attractive and readable.
8. Prepare documents for printing or sharing.

Example

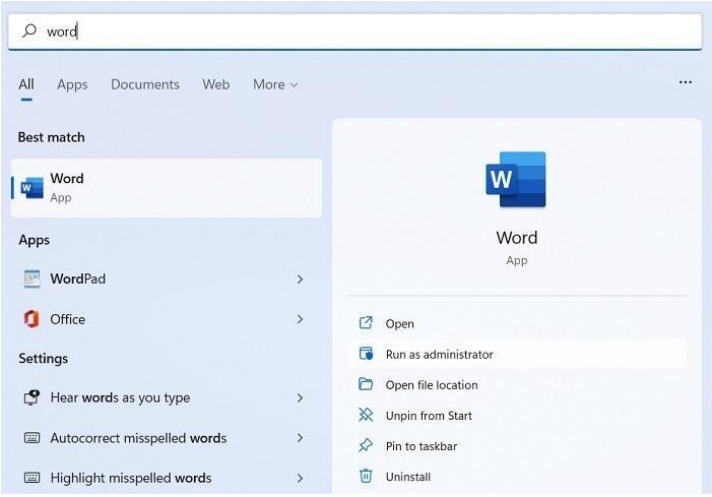
A Grade 6 student is asked to write a report on the importance of trees. The student can use Word to type the report, add a heading, insert a picture of a tree, and save the work for submission.

5.2 Opening Microsoft Word

Microsoft Word may be installed on a computer or provided through an authorized Microsoft 365 account. The available features depend on the version and the school's setup.

Steps to open Word in Windows

1. Open the Start menu.
2. Type Word in Search.
3. Select Microsoft Word from the search results.
4. If prompted, choose a blank document or an available template.



If Word is not installed or available, ask your teacher which approved word-processing application you should use.

Creating a blank document

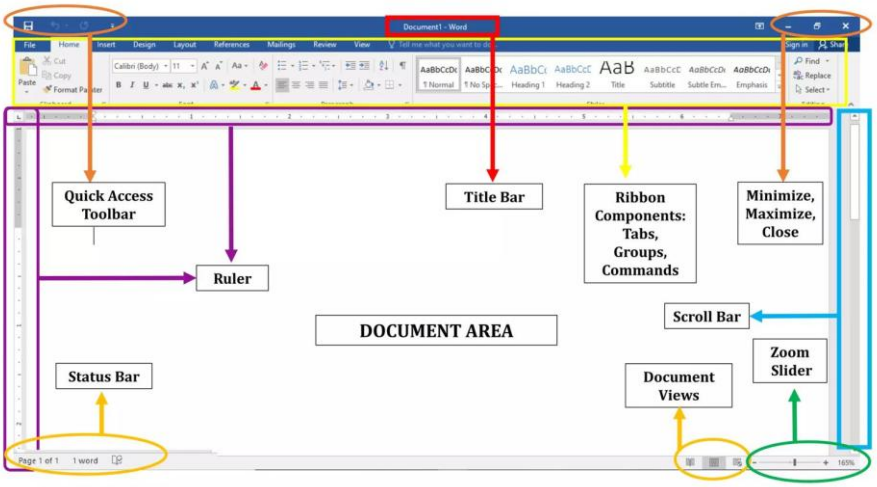
After opening Word:

1. Select Blank document.
2. Wait for the document page to appear.
3. Click in the document area.
4. Begin typing your text.

A blank document is useful when you want to create your work from the beginning.

5.3 Understanding the Microsoft Word Window

The Microsoft Word window contains tools that help you type, edit, format, and manage documents.



Main parts of the Word window

Part	Purpose
Title bar	Displays the document name and application information.
Quick Access Toolbar	May provide shortcuts for commands such as Save and Undo.
File tab	Opens document-management options such as New, Open, Save, and Print.
Ribbon	Contains tabs and groups of commands.
Home tab	Provides common text formatting and paragraph tools.
Insert tab	Allows you to insert items such as pictures and tables.
Document area	The main space where you type and edit text.
Status bar	Displays information such as page number and word count, depending on settings.
Zoom control	Changes how large the document appears on the screen.

The exact appearance may vary depending on the version of Word, screen size, and settings.

Understanding the Ribbon

The Ribbon organizes commands into tabs. Each tab contains tools related to particular tasks.

Common tabs include:

- **Home:** Text formatting, paragraph alignment, and lists.
- **Insert:** Pictures, tables, shapes, and other elements.
- **Layout:** Margins, orientation, and page size.
- **Review:** Proofing and review tools, including spelling and grammar options.
- **View:** Different ways to display a document.
- **File:** Saving, opening, printing, and other document-management options.

5.4 Typing and Editing Text

Typing is the first step in creating a document. Editing means changing existing text to correct mistakes or improve the content.

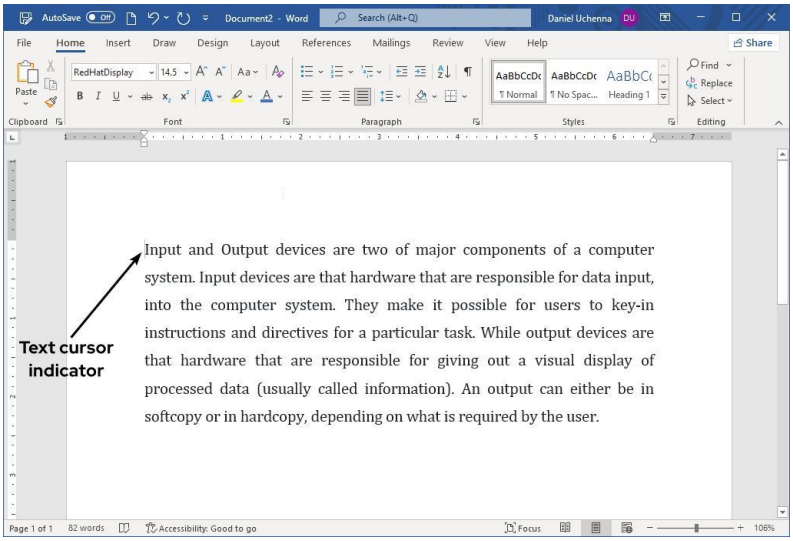
How to type text

1. Open a blank document.
2. Click in the document area.
3. Type your heading or paragraph using the keyboard.
4. Press Enter when you want to begin a new paragraph.
5. Continue typing your content.

Example

Type the following paragraph:

> Computers help students learn new skills. We can use computers to write assignments, prepare presentations, and find information. We should always use computers responsibly.



Useful editing keys

Key	Function
Backspace	Deletes the character to the left of the cursor.
Delete	Deletes the selected text or the character to the right of the cursor, depending on the situation.
Enter	Starts a new paragraph in ordinary document text.
Spacebar	Inserts a space between words.
Arrow keys	Move the cursor through the text.
Home	Moves the cursor to the beginning of a line in many editing contexts.
End	Moves the cursor to the end of a line in many editing contexts.

Correcting mistakes

Suppose you type:

> Computers help studnts learn.

You can place the cursor near the incorrect word and correct it to:

> Computers help students learn.

> **Tip:** Read your document after typing. Correct spelling, punctuation, and grammar before submitting it.

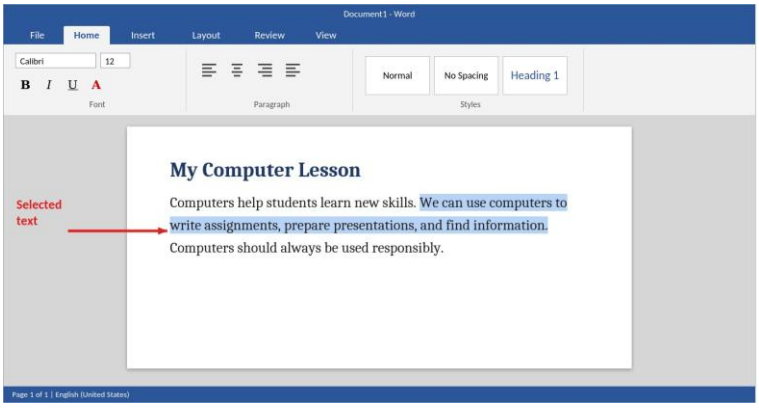
5.5 Selecting Text

Before changing the appearance of text, you often need to select it.

Selected text is highlighted so you can apply an action to the chosen words or sentences.

Ways to select text

- Click and drag across the text with the mouse.
- Double-click a word to select it in many editing contexts.
- Use keyboard selection shortcuts when appropriate.
- Use Ctrl + A to select all content in the current document area in many standard Word editing situations.



Why is text selection useful?

Text selection allows you to:

- Change the font size of a heading.
- Make a word bold.
- Change the colour of a title.
- Delete unwanted text.
- Copy or move text within a document.

Always check what is selected before applying a formatting command.

5.6 Formatting Text

Formatting means changing the appearance of text to improve readability and presentation.

Microsoft Word offers many formatting options.

A. Font type

A font is a design used to display letters and other characters.

Examples include Arial, Calibri, and Times New Roman. Available fonts depend on the computer and installed software.

B. Font size

Font size controls how large the text appears.

For example:

- A main heading might use 20–24 points.
- A subheading might use 14–16 points.
- Ordinary body text might use 11–12 points.

These are examples, not fixed rules. The appropriate sizes depend on the document.

C. Bold, italic, and underline

B	*I*	U
Bold	**Italic**	**Underline**
Makes text appear heavier and darker. Useful for headings and important words.	Slants text. It can emphasize a word or identify a title.	Draws a line beneath the selected text.

Common keyboard shortcuts:

- **Ctrl + B:** Bold
- **Ctrl + I:** Italic
- **Ctrl + U:** Underline

To apply formatting:

1. Select the text.
2. Open the Home tab.
3. Choose the desired formatting command.
4. Check that the text looks the way you intended.

D. Font colour

Font colour changes the colour of selected text.

For example, a heading may be dark blue while the main paragraph remains black.

Use colour carefully. Too many colours can make a document difficult to read.

Example of formatted text

> **The Importance of Computers**
>
> Computers are useful tools for learning, communication, and problem-solving. They help students prepare assignments and organize information.
>
> *Computers should always be used responsibly.*

5.7 Aligning Paragraphs

Paragraph alignment determines how text is positioned between the left and right margins.

Word commonly provides four alignment options.

1. Align Left

Computers help students learn.
They support many school activities.

Text begins at the left margin.

2. Center

Computers help students learn.
They support many school activities.

Text is positioned centrally between the margins.

3. Align Right

Computers help students learn.
They support many school activities.

Text ends at the right margin.

4. Justify

Computers help students learn. They support many school activities and help students organize information effectively.

Text is aligned along both margins where possible.

To change alignment:

1. Place the cursor in the paragraph or select the paragraphs.
2. Open the Home tab.
3. Choose Align Left, Center, Align Right, or Justify.

> **Good practice:** Use centered alignment for many titles and left alignment for ordinary English paragraphs. Justified alignment can be useful in some reports, but it may create uneven spaces between words.

5.8 Creating Bulleted and Numbered Lists

Lists make information easier to read and understand.

Bulleted lists

Bullets are useful when items do not need to appear in a particular order.

Example: Items needed for a computer lesson.

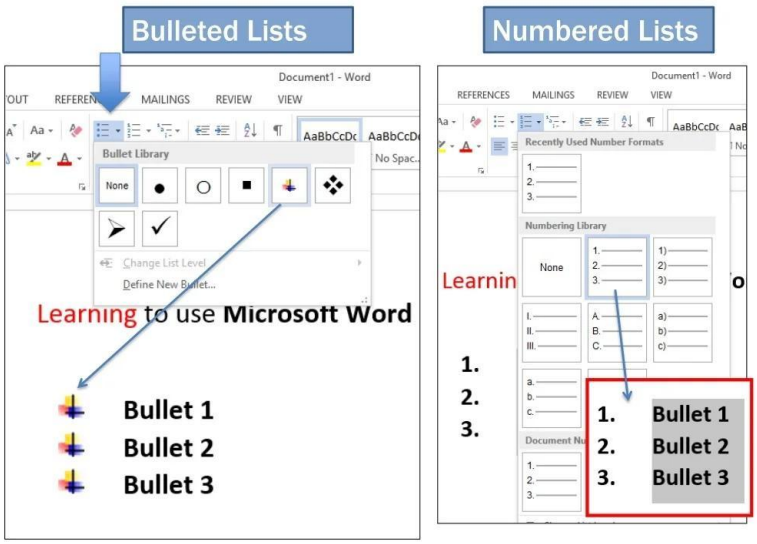
- Computer
- Notebook
- Pencil
- Textbook

Numbered lists

Numbering is useful when steps must be followed in order.

Example: Saving a document.

1. Open the File menu.
2. Select Save or Save As.
3. Choose a location.
4. Enter a file name.
5. Confirm the save action.



How to create a list

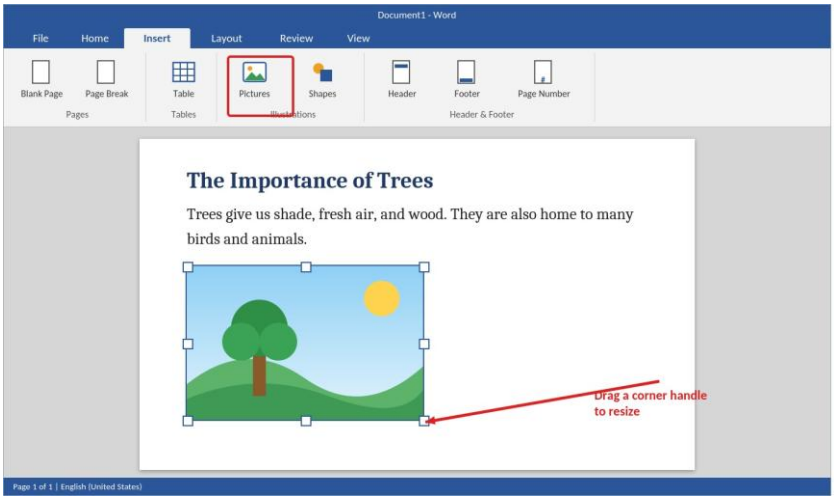
1. Place the cursor where the list should begin.
2. Select the Bullets or Numbering command on the Home tab.
3. Type the first item.
4. Press Enter to create the next item.
5. Continue until the list is complete.
6. Use the relevant command to finish the list when appropriate.

Use bullets for groups of items and numbering for ordered instructions.

5.9 Inserting Pictures

Pictures can make documents more interesting and help explain information.

For example, a report about plants may include a picture of a tree.



Steps to insert a picture

1. Place the cursor where you want the picture.
2. Select the Insert tab.
3. Choose the appropriate picture option, such as Pictures.
4. Select a permitted image from the available source.
5. Insert the image into the document.
6. Resize or position it as needed using the available picture tools.

The exact picture options depend on the version of Word.

Resizing a picture

1. Select the picture.
2. Drag a corner handle inward or outward.
3. Check that the picture is not stretched or distorted.

Dragging a corner handle usually preserves the picture's proportions.

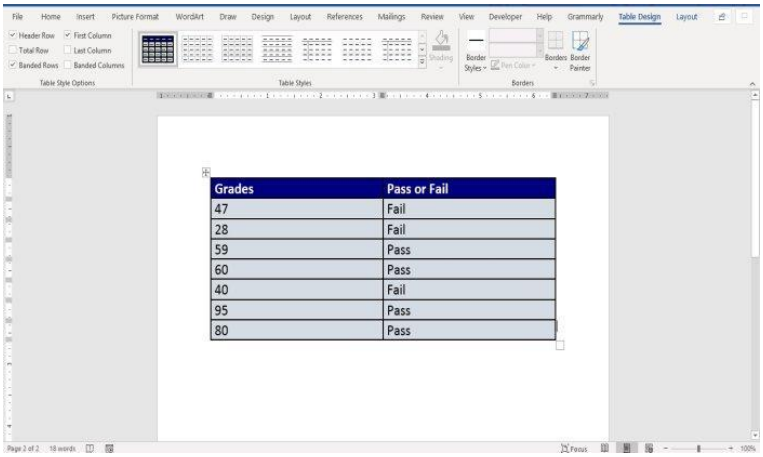
Responsible use of pictures

- Use images that are relevant to your topic.
- Use school-approved or appropriately licensed images.
- Avoid copying images without permission where permission is required.
- Add a source or credit when your teacher requires it.
- Do not use pictures that reveal private information about other people without permission.

5.10 Creating Tables

A table organizes information into rows and columns.

- A row runs horizontally across the table.
- A column runs vertically down the table.
- A cell is the individual box formed where a row and column meet.



Example: Student marks

Student	Subject	Marks
Ali	Computer Studies	85
Sara	Computer Studies	92
Ahmed	Computer Studies	78

Steps to insert a table

1. Place the cursor where you want the table.
2. Open the Insert tab.
3. Select Table.
4. Choose the required number of rows and columns.
5. Click the cells and enter the information.

Why are tables useful?

Tables help organize:

- Student marks.
- Class timetables.
- Lists of equipment.
- Project information.
- Comparison data.

> **Good practice:** Keep tables simple and make headings clear. Avoid putting too much information into one cell.

5.11 Page Layout and Printing

Before submitting or printing a document, it is important to check the page layout.

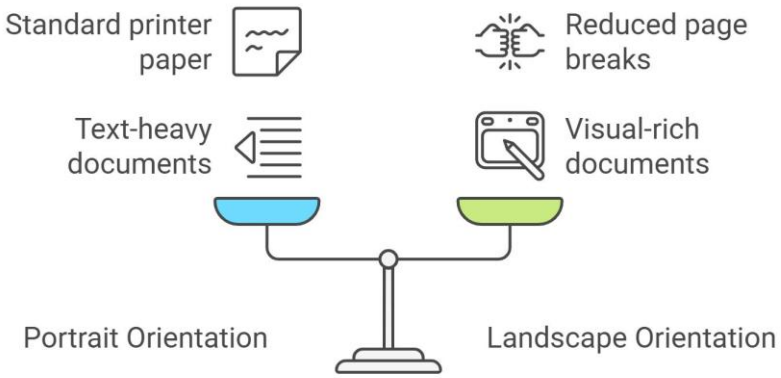
Common page layout options

Margins: The blank spaces around the edges of a page.

Orientation: The direction of the page.

- **Portrait** — taller than it is wide.
- **Landscape** — wider than it is tall.

Page size: The dimensions of the paper, such as A4 where supported.



Choose the right orientation for your document needs.

Checking a document before printing

1. Save the document.
2. Open the File menu.
3. Select Print or the available print preview option.
4. Review the page layout and page count.
5. Check that headings, pictures, and tables are not cut off.
6. Confirm the correct printer and settings with your teacher.
7. Print only when authorized.

Printing may not be available on every computer. Always follow school procedures.

Why is Print Preview useful?

Print Preview helps you see how a document may look on paper before you print it. This can prevent wasted paper and help you identify layout problems.

5.12 Classroom Activities

Activity 1: Create a Simple Document

Objective: *Learn to type and save a document.*

Instructions:

1. Open Microsoft Word or the teacher-approved word processor.
2. Create a blank document.
3. Type the title My School.
4. Write a paragraph of five sentences about your school.
5. Save it as My_School_Assignment.
6. Check that the document has been saved.

Activity 2: Format a Paragraph

Objective: *Practise text formatting.*

Type this paragraph:

> Computers are useful in education. They help students learn, write assignments, and prepare presentations.

Now complete these tasks:

1. Make the title Computers in Education bold.
2. Change the title's font size.
3. Center the title.
4. Underline the words useful in education.
5. Change the title colour to a suitable dark blue.
6. Save your document.

Activity 3: Make a List and Table

Objective: *Use lists and tables to organize information.*

1. Create a bulleted list of five computer applications or tools.
2. Create a numbered list of the steps for saving a document.
3. Insert a table with three columns: Application, Purpose, and Example Task.
4. Add three appropriate rows.
5. Save your work.

Activity 4: Prepare a Mini Report

Objective: *Combine several Word features.*

Prepare a one-page report titled “The Importance of Computers in Education.”

Your report should contain:

- A centered heading.
- Two short paragraphs.
- One bulleted list.
- One relevant picture.
- Your name and class, if required by your teacher.
- A suitable file name.

Check your spelling and save the document before submitting it.

5.13 Review Questions

A. Multiple-Choice Questions (MCQs)

Choose the correct answer.

1. What is Microsoft Word?

- **A.** A word-processing application
- **B.** A computer hardware component
- **C.** An operating system
- **D.** A storage device

2. Which tab contains common font formatting tools?

- **A.** View
- **B.** Home
- **C.** File
- **D.** Layout

3. Which keyboard shortcut makes selected text bold?

- **A.** Ctrl + P
- **B.** Ctrl + X
- **C.** Ctrl + B
- **D.** Ctrl + A

4. Which tab commonly contains tools for inserting pictures and tables?

- **A.** Insert
- **B.** Review
- **C.** View
- **D.** File

5. Which alignment places text in the centre between the margins?

- **A.** Align Left
- **B.** Align Right
- **C.** Justify
- **D.** Center

6. **Which shortcut is commonly used to save a document?**
   - **A.** Ctrl + S
   - **B.** Ctrl + Z
   - **C.** Ctrl + C
   - **D.** Ctrl + F

7. **What is a table used for in Word?**
   - **A.** To shut down the computer
   - **B.** To organize information into rows and columns
   - **C.** To install software
   - **D.** To change the desktop background

8. **Which option is useful for checking a document's appearance before printing?**
   - **A.** Print Preview
   - **B.** Recycle Bin
   - **C.** Task Manager
   - **D.** Start menu

9. **What does the .docx extension commonly indicate?**
   - **A.** A video file
   - **B.** An audio file
   - **C.** A Word document
   - **D.** A spreadsheet

10. **What should you do before submitting a school assignment?**
    - **A.** Delete the document
    - **B.** Check the work and save it
    - **C.** Change the file extension randomly
    - **D.** Close the computer without saving

B. Short-Answer Questions

1. Define Microsoft Word.
2. Write four uses of Microsoft Word.
3. Name five main parts of the Word window.
4. What is the Ribbon?
5. Explain the difference between bold, italic, and underline.
6. What is text selection, and why is it useful?
7. Name the four common paragraph alignment options.

8. Explain the difference between a bulleted list and a numbered list.
9. Write the steps for inserting a picture into a document.
10. What is a table? Define row, column, and cell.
11. What is the purpose of Print Preview?
12. Write five good practices for preparing a school assignment in Word.

C. Critical-Thinking Questions

1. A student prepares an assignment with several different font colours, many font sizes, and decorative effects. Explain how the student could improve the document's readability.
2. Your teacher asks you to prepare a list of instructions that must be followed in order. Should you use bullets or numbering? Explain your choice.
3. You have written an assignment but cannot find it after closing Word. What file-management and saving practices could help prevent this problem?
4. You are preparing a report about plants. Explain how a picture and a table could make your report more informative.
5. Why should you check Print Preview before printing a document at school?

5.14 Homework

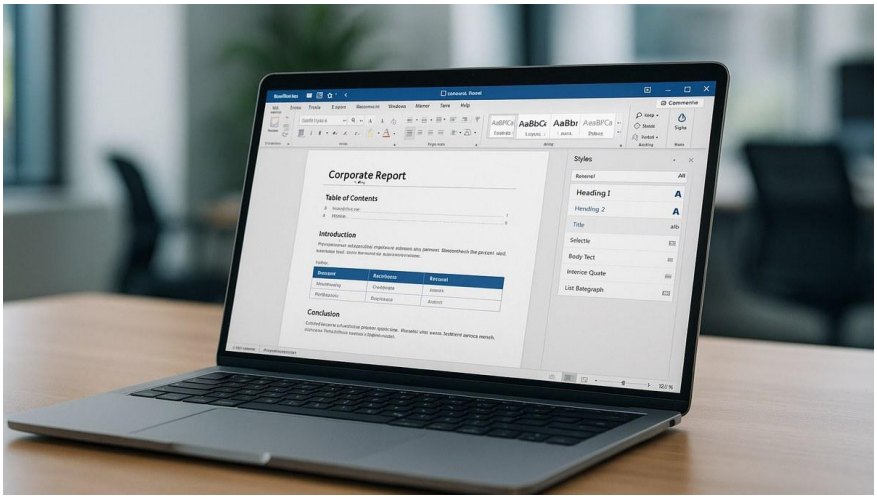
1. Write a paragraph explaining what Microsoft Word is and how students can use it.
2. Draw a simplified Word window and label the Title bar, Ribbon, Document area, and Status bar.
3. Write the keyboard shortcuts for Bold, Italic, Underline, Save, and Select All.
4. Explain the difference between portrait and landscape page orientation.
5. Draw an example of a table with three columns and four rows.
6. Prepare a short report titled "Responsible Use of Computers." Include a heading, two paragraphs, and a bulleted list of five rules.
7. Write five ways to improve the appearance and readability of a school assignment.

Quick Revision

Microsoft Word	A word-processing application for creating and editing documents.
Text Formatting	Changes the appearance of text through font, size, colour, bold, italic, and underline.
Paragraph Alignment	Positions text to the left, centre, right, or justified across the margins.
Lists	Bullets organize related items; numbering shows an ordered sequence.
Tables	Organize information into rows and columns.
Saving	Stores the document so it can be accessed later.

Chapter 6: Advanced Formatting and Document Design in Microsoft Word

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain the importance of professional document design.
- Set page margins, orientation, and paper size.
- Apply consistent styles and heading levels.
- Insert and format headers, footers, and page numbers.
- Add page borders, shapes, and horizontal lines where appropriate.
- Use line spacing, paragraph spacing, indentation, and page breaks.
- Arrange text and pictures in a readable layout.
- Create a title page and a well-organized school report.
- Use spelling, grammar, and document-review tools.
- Prepare a document for printing or digital submission.

6.1 What Is Document Design?

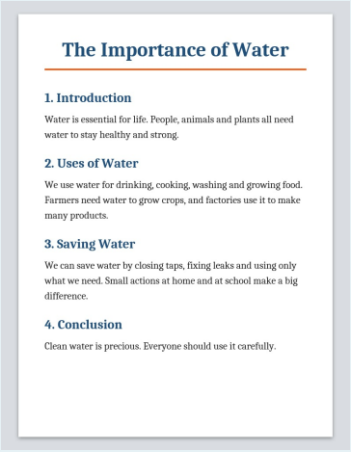
Document design is the process of arranging text, headings, pictures, tables, and page elements so that a document is clear, attractive, and easy to read.

A well-designed document does more than look good. It helps readers understand information, find important points, and follow the content in the correct order.

Documents that benefit from good design include:

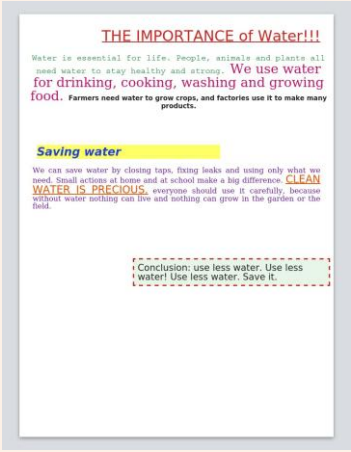
- School reports and assignments
- Research projects
- Formal letters
- Meeting minutes
- Project proposals
- Newsletters and information sheets
- Printed learning materials

Good design versus poor design



Effective design

Clear headings, readable text, consistent spacing, and balanced use of white space.



Poor design

Inconsistent fonts, crowded paragraphs, excessive colours, and unclear structure.

Principles of good document design

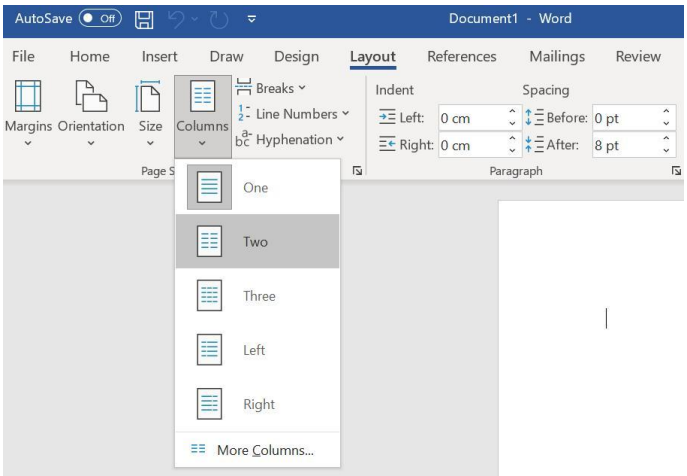
1. **Consistency:** Use the same heading styles, fonts, and spacing throughout the document.
2. **Readability:** Choose fonts and sizes that are comfortable to read.
3. **Hierarchy:** Make titles, headings, subheadings, and body text visually distinct.
4. **Alignment:** Arrange elements neatly along consistent margins.
5. **White space:** Leave suitable space around paragraphs, headings, tables, and pictures.
6. **Relevance:** Include only pictures and decorative elements that support the content.
7. **Accuracy:** Check spelling, grammar, page numbers, and other details before submission.

> **Remember:** Professional design means making information easier to understand, not adding as many decorative effects as possible.

6.2 Setting Page Margins, Orientation, and Size

Page layout controls how content is arranged on a page.

Microsoft Word provides page settings that help you prepare documents for different purposes.



A. Page margins

Margins are the blank spaces between the edges of a page and its content.

Margins help prevent text from appearing too close to the edges and provide room for printing or binding.

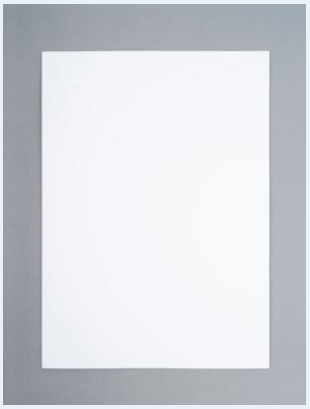
To change margins:

1. Open the Layout tab.
2. Select Margins.
3. Choose a preset option or select Custom Margins.
4. Enter the required values if necessary.
5. Apply the settings.

For a typical school report, Word's default margins are often suitable unless your teacher provides different instructions.

B. Page orientation

Orientation determines whether a page is taller or wider.



Portrait

The page is taller than it is wide. Commonly used for essays, reports, and letters.



Landscape

The page is wider than it is tall. Useful for wide tables, charts, and some presentations or forms.

To change orientation:

1. Open Layout.
2. Select Orientation.
3. Choose Portrait or Landscape.

C. Paper size

Paper size determines the dimensions of the page. A4 is commonly used for school documents in many countries.

To change paper size:

1. Open Layout.
2. Select Size.
3. Choose the required paper size, such as A4, if available.

Always use the paper size requested by your teacher or required by the printer.

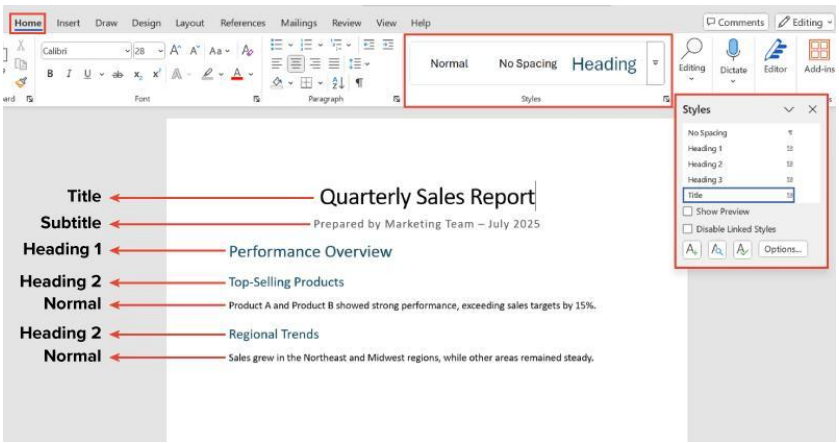
6.3 Using Styles and Heading Levels

A style is a predefined set of formatting settings that can be applied to text. Styles help keep documents consistent and make longer documents easier to navigate.

Instead of manually changing every heading, you can apply Word's built-in heading styles.

Common heading levels

- **Title:** The main title of the document.
- **Heading 1:** Major sections or chapter headings.
- **Heading 2:** Subsections within a major section.
- **Heading 3:** Smaller subsections, when needed.
- **Normal:** Ordinary paragraph text.



Example of heading structure

The Importance of Water

1. Introduction

Water is essential for life. People, animals, and plants all depend on water.

1.1 Uses of Water

Water is used for drinking, cleaning, farming, and many industrial activities.

1.2 Water Conservation

Conserving water helps reduce waste and protects supplies for future generations.

How to apply a heading style

1. Select the heading text or place the cursor in its paragraph.
2. Open the Home tab.
3. Find the Styles group.
4. Select the appropriate style, such as Heading 1 or Heading 2.
5. Repeat for other headings.

Why are styles useful?

Styles help you:

- Maintain consistent formatting.
- Change the appearance of many headings more efficiently.
- Navigate long documents.
- Generate an automatic table of contents when heading styles are used correctly.

> **Good practice:** Use Heading 1 for major sections and Heading 2 for subsections. Do not use font size alone as a substitute for a proper heading structure in long documents.

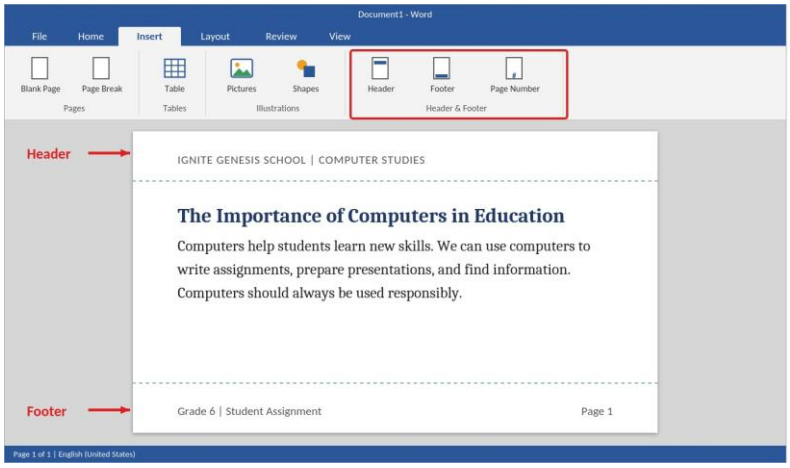
6.4 Headers and Footers

A header is an area at the top of a page, while a footer is an area at the bottom.

Headers and footers can contain information that helps identify or organize a document.

Common examples include:

- School name
- Report title
- Student name
- Class or section
- Date
- Page number
- Chapter title



Inserting a header

1. Open the Insert tab.
2. Select Header.
3. Choose a layout or select the option to edit the header.
4. Type the required information.
5. Close Header and Footer editing when finished.

Inserting a footer

1. Open Insert.
2. Select Footer.
3. Choose a layout.
4. Enter the required text.
5. Close the header and footer editing area.

Example

A school report might use:

- **Header:** IGNITE GENESIS SCHOOL | COMPUTER STUDIES
- **Footer:** Grade 6 | Student Assignment

Keep header and footer text brief. Too much information can distract readers from the main content.

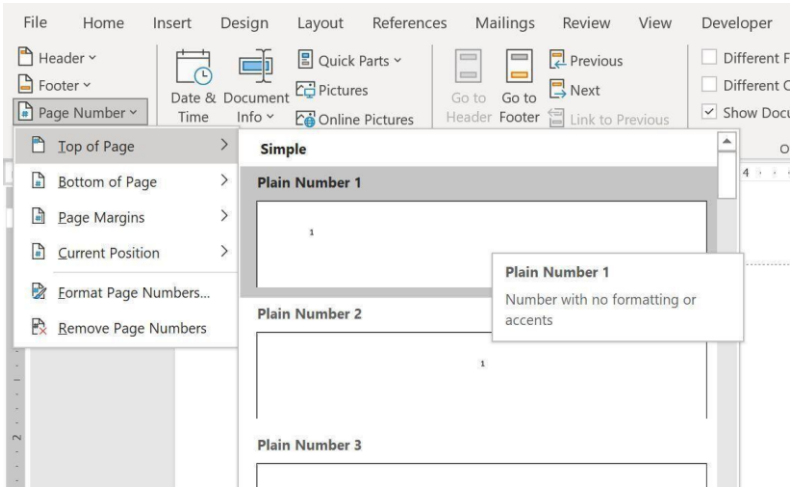
> **Important note:** Headers and footers often appear on multiple pages automatically. Word also provides options for different first pages or different odd and even pages when a document requires them.

6.5 Adding Page Numbers

Page numbers help readers navigate a document, especially when it contains several pages.

Steps to insert page numbers

1. Open the Insert tab.
2. Select Page Number.
3. Choose the position, such as the top or bottom of the page.
4. Select a suitable layout.
5. Close the header and footer editing area.



Good practices for page numbering

- Use a consistent position throughout the document.
- Choose a simple, readable format.
- Check that page numbers do not overlap other footer content.
- Follow any instructions about whether the title page should display a number.

In some reports, the title page is not numbered visibly, while the remaining pages display numbers. Word provides options to support this layout.

6.6 Page Breaks and Section Breaks

When preparing a long document, you may want a new chapter or major section to start on a new page.

A page break moves the following content to the beginning of the next page without requiring repeated Enter presses.

Inserting a page break

1. Place the cursor where the new page should begin.
2. Open Insert.
3. Select Page Break.

A common keyboard shortcut is Ctrl + Enter.

Example: Starting a new section

PAGE 1

Introduction

Main discussion

Page break inserted here

PAGE 2

Chapter 2: Findings

The new section begins at the top of the next page.

Why not press Enter repeatedly?

Using many blank paragraphs to push content to another page can create problems when text is added or removed. A page break is more reliable because it explicitly marks where the next page should begin.

What is a section break?

A section break divides a document into sections that can have different layout or formatting settings.

For example, a report might have portrait pages for most content but a landscape page for a wide table. Section breaks can help manage different page layouts within one document.

Section breaks are more advanced than page breaks and should be used when different sections need different settings.

6.7 Paragraph Spacing, Line Spacing, and Indentation

Paragraph formatting controls the space and position of text.

These settings can make a report easier to read and prevent the page from looking crowded.

A. Line spacing

Line spacing determines the vertical space between lines of text within a paragraph.

Common options include single spacing and larger spacing options, depending on the Word version.

B. Paragraph spacing

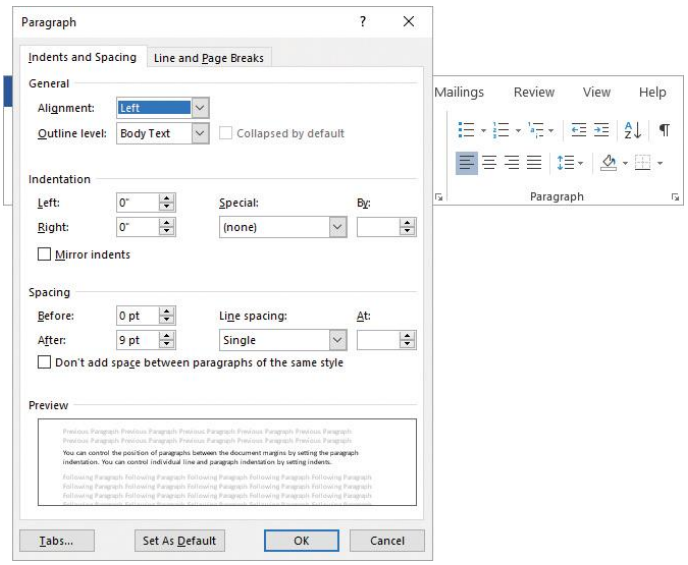
Paragraph spacing controls the space before or after a paragraph.

Adding a little space after paragraphs can make a document easier to read than separating paragraphs with repeated blank lines.

C. Indentation

Indentation moves a paragraph inward from the left or right margin.

It can be used to distinguish quotations, create a first-line indent, or improve the structure of certain documents.



How to adjust paragraph settings

1. Select the relevant paragraphs.
2. Open the Home tab.
3. Use the line and paragraph spacing command, or open the Paragraph dialog box for more options.
4. Adjust the settings as required.
5. Review the result and make sure the text remains readable.

Recommended approach for a school report

- Use consistent line spacing.
- Leave clear separation between paragraphs.
- Keep indentation consistent.
- Avoid adding excessive blank lines.
- Follow the teacher's required formatting rules if provided.

6.8 Page Borders, Lines, and Shapes

Word provides design elements that can be used to separate or emphasize content.

Page borders

A page border creates a line around the edges of a page. Borders may be suitable for certificates, selected title pages, or special information sheets.

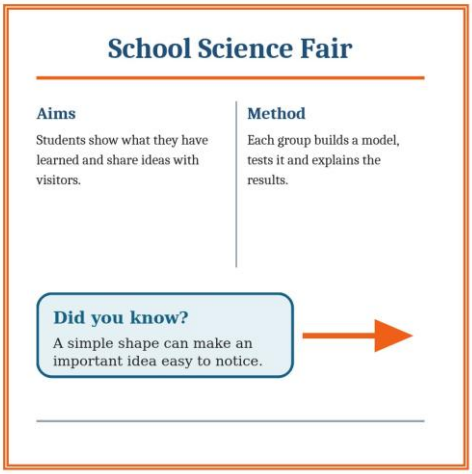
To add a page border, the usual desktop Word route is:

1. Open the Design tab.
2. Select Page Borders.
3. Choose the border style, colour, and width.
4. Apply the border to the appropriate part of the document.

The exact options may differ by version.

Lines and shapes

Lines can separate sections, while shapes can be used to highlight information or create simple diagrams.



Examples of suitable uses include:

- A thin line below a report title.
- A rectangle around an important note.
- Arrows showing a process.
- Simple shapes in a flowchart.

Good design practice

Use borders and shapes only when they serve a purpose. Thick borders, bright backgrounds, and too many decorative shapes can make a report look cluttered.

For a standard school assignment, clear headings and consistent spacing are usually more useful than elaborate decoration.

6.9 Inserting and Formatting Pictures Professionally

Pictures can support a report by explaining a concept, providing evidence, or making a complex topic easier to understand.

However, pictures should be relevant to the document and positioned so that they do not interrupt the reading flow.

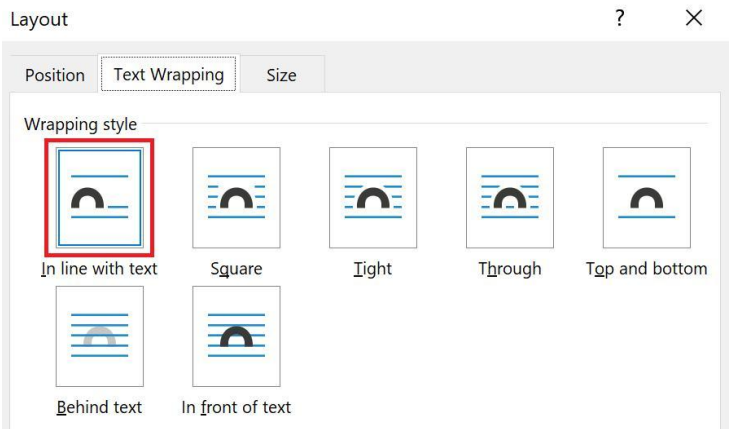
Picture placement options

When a picture is inserted into Word, text may appear above and below it, or it may flow around the picture depending on the selected layout.

Common layout options include:

- **In Line with Text:** The picture behaves like a large character within the text.
- **Square:** Text flows around the rectangular boundary of the picture.
- **Tight:** Text flows more closely around the picture's outline where supported.
- **Top and Bottom:** Text appears above and below the picture.
- **Behind Text:** The picture is placed behind text.
- **In Front of Text:** The picture can be positioned in front of other content.

The available options may vary with the picture and Word version.



Steps to format a picture

1. Insert the picture using the Insert tab.
2. Select the picture to reveal its picture-formatting tools.
3. Resize it using a corner handle.
4. Choose an appropriate text-wrapping option if needed.
5. Position it near the relevant paragraph.
6. Add a caption if the picture needs explanation.
7. Check the page layout to ensure that text remains readable.

Adding a picture caption

A caption is a short description placed near a picture.

Example:

> Figure 1: A computer network connecting several devices.

Captions are useful in reports containing diagrams, photographs, charts, or illustrations.

> **Good practice:** Do not stretch pictures out of proportion, cover text with images, or use decorative images that do not support the topic.

6.10 Creating a Professional Title Page

A title page introduces a report and provides important identifying information.

A school project title page may include:

- School name
- Report title
- Subject
- Student name
- Class and section
- Teacher’s name, if requested
- Submission date



Steps to create a title page

1. Open a new document.
2. Type the school name at the top.
3. Add the report title using a large, readable font.
4. Add the subject and required student details.
5. Use alignment and spacing to arrange the information neatly.
6. Add a relevant picture or a simple design element only if appropriate.
7. Insert a page break after the title page if the main report should begin on the next page.
8. Save the document.

Example title-page layout

IGNITE GENESIS SCHOOL

THE IMPORTANCE OF COMPUTERS IN EDUCATION

Computer Studies Project

Student: _____

Class: Grade 6

Teacher: _____

Submission Date: _____

Igniting Knowledge. Engineering the Future.

This is a layout example. In a real document, students should fill in their own details and follow their teacher's instructions.

6.11 Using the Navigation Pane and Table of Contents

Long documents are easier to manage when they have a clear structure.

Navigation Pane

The Navigation Pane helps users move between headings and search for words or phrases in a document. When built-in heading styles are applied, it can display the document's heading structure.

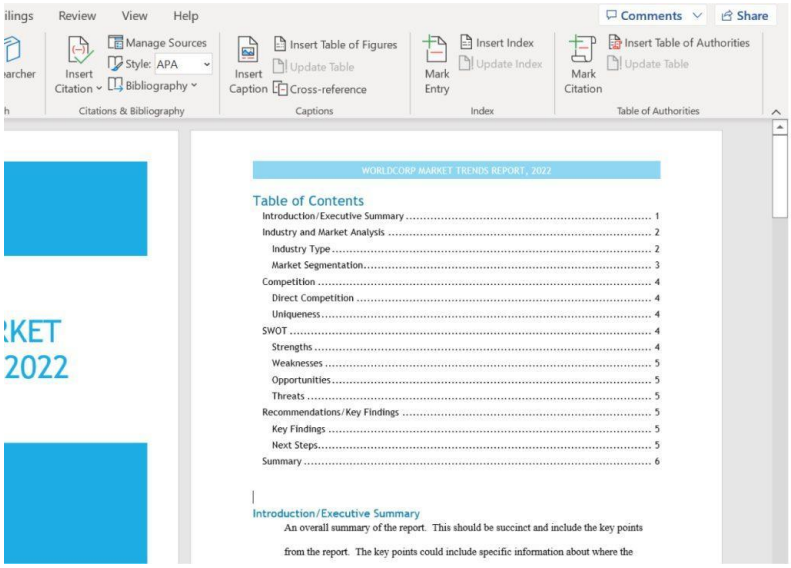
To use it in many desktop versions of Word:

1. Open the View tab.
2. Enable Navigation Pane.
3. Select the Headings view or search field.
4. Choose a heading to move to that part of the document.

Table of contents

A table of contents lists the main sections of a document and often shows the page number for each section.

Word can create an automatic table of contents using properly applied heading styles.



Creating an automatic table of contents

1. Apply Heading 1, Heading 2, and other appropriate styles to the headings.
2. Place the cursor where the table of contents should appear.
3. Open the References tab.
4. Select Table of Contents.
5. Choose an automatic format.
6. Review the generated entries.

If headings or page numbers change later, update the table of contents using the available update command.

> **Important:** A table of contents is most useful for longer reports, projects, and books. A one-page assignment usually does not need one.

6.12 Reviewing and Finalizing a Document

A document should be checked before it is submitted, shared, or printed.

Word provides tools that can help identify mistakes and improve consistency.

A. Spelling and grammar

Proofing tools can identify possible spelling or grammar issues. Their availability and accuracy depend on the language settings and Word version.

Do not accept every suggestion automatically. A computer may misunderstand a person's name, a technical term, or the meaning of a sentence.

B. Find and Replace

Find helps locate a word or phrase in a document.

Replace can change one word or phrase to another.

For example, if you have repeatedly typed computor instead of computer, Find and Replace may help you correct the repeated error.

Use Replace carefully. Replacing a word everywhere may unintentionally change text where it was correct.

C. Undo and Redo

- **Undo (Ctrl + Z):** Reverses a recent action.
- **Redo (Ctrl + Y):** Reapplies an action that was undone in many Word contexts.

These commands are useful if you accidentally delete text or apply unwanted formatting.

D. Final document checklist

Before submitting an assignment, check the following:

- ☐ The title and headings are clear.
- ☐ The font and font sizes are consistent.
- ☐ Paragraph spacing and alignment are appropriate.
- ☐ Pictures and tables are positioned correctly.
- ☐ Spelling and grammar have been reviewed.
- ☐ Page numbers and headers or footers are correct, if required.
- ☐ The document has been saved with a meaningful file name.
- ☐ Print layout or digital appearance has been checked.

6.13 Classroom Activities

Activity 1: Improve a Poorly Formatted Document

Objective: *Identify and correct common document-design problems.*

Your teacher will provide a sample document with inconsistent font sizes, unclear headings, excessive colours, and poor spacing.

Complete the following tasks:

1. Give the document a clear title.
2. Apply a consistent body font and size.
3. Use Heading 1 for the main sections.
4. Correct paragraph alignment and spacing.
5. Remove unnecessary colours and decorative effects.
6. Check spelling and save the revised document.

Discussion: Which changes improved readability the most? Explain your answer.

Activity 2: Create a Professional Report

Objective: *Combine page layout and formatting features.*

Create a report titled “The Role of Technology in Education.”

Your report must include:

- A title page.
- A clear main title and at least three section headings.
- Consistent fonts and paragraph spacing.
- One relevant picture with a caption.
- A table containing at least three rows.
- Page numbers.
- A header or footer containing suitable identifying information.
- A final spelling and layout check.

Save your work using the file name Technology_in_Education_Report.

Activity 3: Page Layout Practice

Objective: *Understand margins, orientation, and page breaks.*

1. Create a document with two sections.
2. Set the first page to Portrait orientation.
3. Insert a page break before the second section.
4. Practise changing the second section to Landscape orientation using section breaks, if your teacher permits.
5. Check that the page layout is correct.
6. Save the document.

Discussion: Why is a landscape page sometimes useful for a wide table?

Activity 4: Build a Table of Contents

Objective: *Use heading styles and document navigation.*

1. Create a document with a title and four major sections.
2. Apply Heading 1 to each major section.
3. Add at least one Heading 2 subsection under two of the major sections.
4. Insert an automatic table of contents.
5. Change one heading.
6. Update the table of contents and check the result.

6.14 Review Questions

A. Multiple-Choice Questions (MCQs)

Choose the correct answer.

1. What is the main purpose of document design?

- **A.** To add as many colours as possible
- **B.** To make information clear, readable, and well organized
- **C.** To increase the file size
- **D.** To remove all headings

2. Which tab commonly contains page margin and orientation settings?

- **A.** Review
- **B.** Home
- **C.** Layout
- **D.** References

3. What is a Word style?

- **A.** A predefined set of formatting settings
- **B.** A type of computer hardware
- **C.** A file extension
- **D.** A printing device

4. Which feature places information at the top of a page?

- **A.** Footer
- **B.** Header
- **C.** Page break
- **D.** Navigation Pane

5. Which shortcut commonly inserts a page break?

- **A.** Ctrl + B
- **B.** Ctrl + S
- **C.** Ctrl + Enter
- **D.** Ctrl + P

6. **Which orientation is usually suitable for a wide table?**
   - **A.** Portrait
   - **B.** Landscape
   - **C.** Vertical alignment
   - **D.** Justified

7. **What is the purpose of a table of contents?**
   - **A.** To list the main sections of a document
   - **B.** To change the computer's settings
   - **C.** To insert pictures automatically into every page
   - **D.** To delete unwanted pages

8. **Which feature helps users navigate between headings in a long document?**
   - **A.** Recycle Bin
   - **B.** Navigation Pane
   - **C.** Calculator
   - **D.** Print Queue

9. **Which shortcut reverses a recent action in Word?**
   - **A.** Ctrl + Z
   - **B.** Ctrl + P
   - **C.** Ctrl + I
   - **D.** Ctrl + U

10. **Why should a document be checked before printing?**
    - **A.** To make it harder to read
    - **B.** To increase the number of pages unnecessarily
    - **C.** To identify layout, spelling, and formatting problems
    - **D.** To remove all paragraph spacing

B. Short-Answer Questions

1. Define document design.
2. Write five principles of good document design.
3. What are page margins, and why are they important?
4. Explain the difference between Portrait and Landscape orientation.
5. What are styles in Microsoft Word? Name three heading styles or related styles.
6. What is the difference between a header and a footer?
7. Write the steps for inserting page numbers.

8. What is the difference between a page break and a section break?
9. Explain line spacing, paragraph spacing, and indentation.
10. What is text wrapping around a picture?
11. What is an automatic table of contents, and why are heading styles important for it?
12. Name four tools or methods that help review a document before submission.

C. Critical-Thinking Questions

1. A student uses a different font for every paragraph and adds several bright colours to a report. Explain how the student should improve the design.
2. You are preparing a report containing six sections and several pages. Explain how heading styles, page numbers, and a table of contents would help the reader.
3. A large table does not fit comfortably on a Portrait page. What layout change might help, and what should you check afterward?
4. A student presses Enter repeatedly to move a new chapter to the next page. Explain why inserting a page break is usually a better approach.
5. Your report contains a picture that overlaps important text. How could you correct the layout while keeping the picture relevant to the report?

6.15 Homework

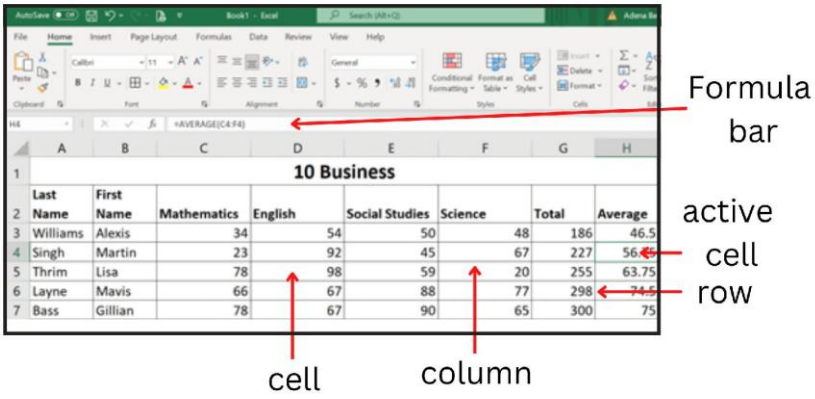
1. Define document design and explain why it is important for school reports.
2. Draw a labelled diagram showing the header, body area, margins, and footer of a Word page.
3. Explain how to change page orientation and margins.
4. Write the steps for inserting a page break and page numbers.
5. Explain the difference between Heading 1 and Heading 2.
6. Describe how an automatic table of contents is created and updated.
7. Prepare a one-page plan for a professional report titled “Technology and the Future.” Include the proposed title, section headings, picture, table, and footer details.
8. Write a checklist of eight things to verify before submitting a Word document.

Quick Revision

Page Layout	Controls margins, orientation, and paper size.
Styles	Maintain consistent headings and make long documents easier to navigate.
Headers and Footers	Display useful information at the top and bottom of pages.
Page and Section Breaks	Control where content begins and allow different sections to use different layouts.
Table of Contents	Organizes major sections and helps readers find information.
Final Review	Checks spelling, formatting, page layout, and saved files before submission.

Chapter 7:
Introduction to Microsoft Excel

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain what Microsoft Excel is and identify its uses.
- Distinguish between a workbook and a worksheet.
- Identify rows, columns, cells, and cell references.
- Enter, edit, and delete data in a worksheet.
- Understand different types of spreadsheet data.
- Save, open, and rename Excel workbooks.
- Adjust column widths and row heights.
- Format cell contents to improve readability.
- Use basic formulas for calculations.
- Follow safe and responsible practices when working with spreadsheets.

7.1 What Is Microsoft Excel?

Microsoft Excel is a spreadsheet application used to organize information, perform calculations, analyze data, and create charts.

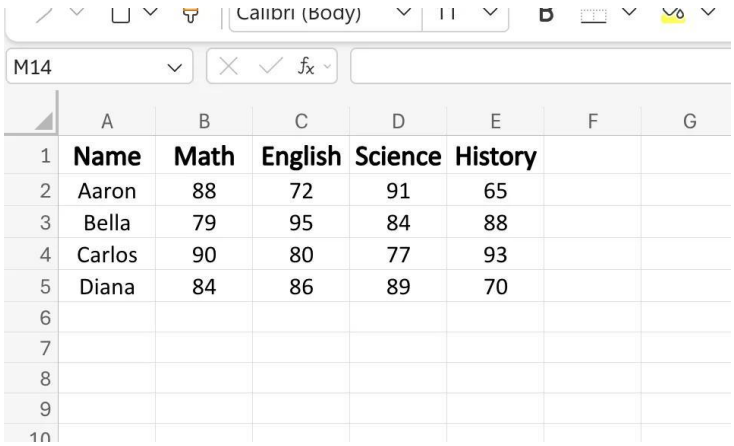
A spreadsheet is a grid of rows and columns in which data can be entered and processed.

Excel is useful when information needs to be organized in a structured form or calculations need to be performed accurately.

Uses of Microsoft Excel

Excel can be used to:

1. Record student marks.
2. Prepare attendance records.
3. Calculate totals and averages.
4. Maintain lists of books or equipment.
5. Prepare budgets and expense records.
6. Organize survey results.
7. Create charts and graphs.
8. Compare information and identify patterns.



Example: A student marks record

A teacher can use Excel to enter student names and their marks in different subjects. Excel can then calculate the total marks automatically using a formula.

Without a spreadsheet, the teacher might need to calculate each total manually. With Excel, a formula can be copied to other rows, reducing repeated work.

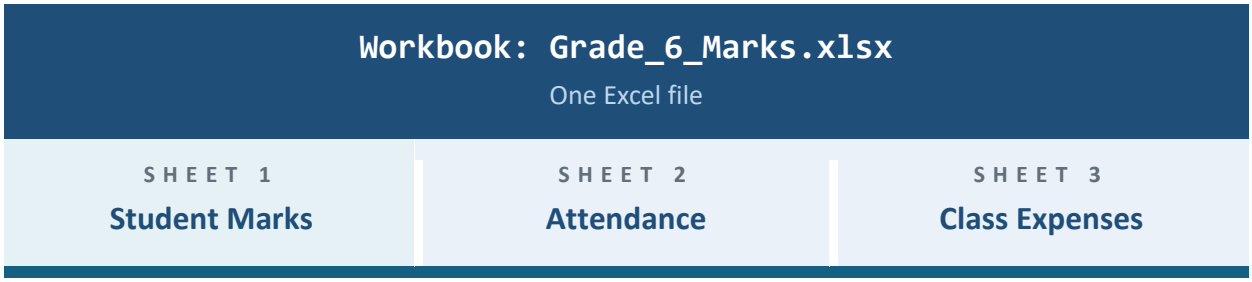
> **Remember:** Excel can perform calculations quickly, but the results depend on the accuracy of the data and formulas entered.

7.2 Understanding a Workbook and Worksheet

Two important terms in Excel are workbook and worksheet.

- A workbook is an Excel file that can contain one or more worksheets.
- A worksheet is an individual spreadsheet made up of rows and columns.

A workbook is similar to a notebook, while each worksheet is like a separate page within it.



A workbook can contain several worksheets, allowing related information to be stored in one file.

Examples

- `Grade_6_Marks.xlsx`
- `Class_Attendance.xlsx`
- `Science_Survey.xlsx`
- `Monthly_Budget.xlsx`

The .xlsx extension is commonly used for modern Excel workbook files.

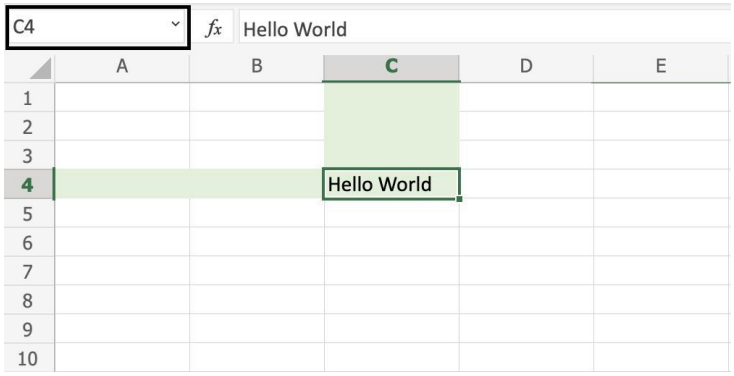
7.3 Understanding Rows, Columns, and Cells

A worksheet is organized into a grid.

Rows run horizontally and are identified by numbers.

Columns run vertically and are identified by letters.

Cells are the individual boxes where a row and a column intersect.



A. Rows

Rows run from left to right across the worksheet. They are identified by numbers such as 1, 2, 3, and 4.

B. Columns

Columns run from top to bottom. They are identified by letters such as A, B, C, and D. Excel continues beyond Z using labels such as AA and AB.

C. Cells

A cell is the intersection of a row and a column.

For example:

- A1 is the cell in column A and row 1.
- B3 is the cell in column B and row 3.
- C5 is the cell in column C and row 5.

Understanding a cell reference

A cell reference identifies the location of a cell.

In C4:

- C is the column.
- 4 is the row.

Therefore, C4 refers to the cell in column C and row 4.

Example worksheet

	A	B	C
1	Student	Subject	Marks
2	Ali	English	82
3	Sara	Mathematics	94
4	Ahmed	Science	87

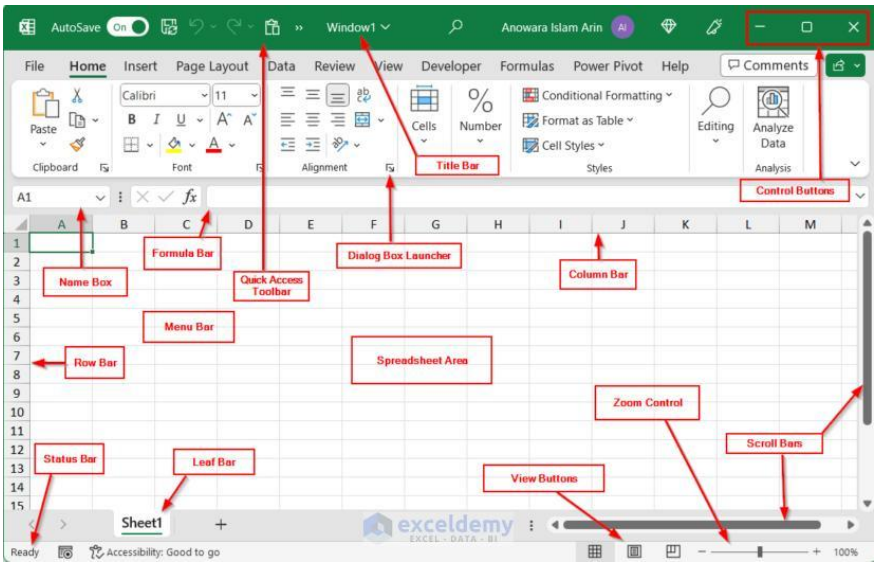
In this worksheet:

- A1 contains Student.
- B2 contains English.
- C3 contains 94.
- C4 contains 87.

The first row contains headings, while the rows below contain the records.

7.4 Parts of the Microsoft Excel Window

The Excel window provides tools for entering data, performing calculations, formatting cells, and managing worksheets.



Main parts of the Excel window

Part	Purpose
Title bar	Displays the workbook name and application information.
Quick Access Toolbar	Provides shortcuts to selected commands, depending on the setup.
Ribbon	Contains tabs and groups of spreadsheet commands.
Formula bar	Displays or allows editing of a cell's contents or formula.
Name Box	Shows the active cell reference and can be used to navigate to a cell.
Worksheet grid	The area containing rows, columns, and cells.
Sheet tabs	Allow users to switch between worksheets.
Status bar	Displays information about the worksheet and selected data.
Zoom control	Changes how large the worksheet appears on the screen.

The interface can differ slightly between Excel versions and screen sizes.

Important Ribbon tabs

- **Home:** Font formatting, alignment, number formats, and cell operations.
- **Insert:** Tables, charts, pictures, and other elements.
- **Page Layout:** Page setup and printing-related layout options.
- **Formulas:** Formula-related tools and functions.
- **Data:** Tools for sorting, filtering, and working with data.
- **Review:** Proofing, comments, and review-related tools.
- **View:** Worksheet display and navigation options.
- **File:** Opening, saving, printing, and workbook management.

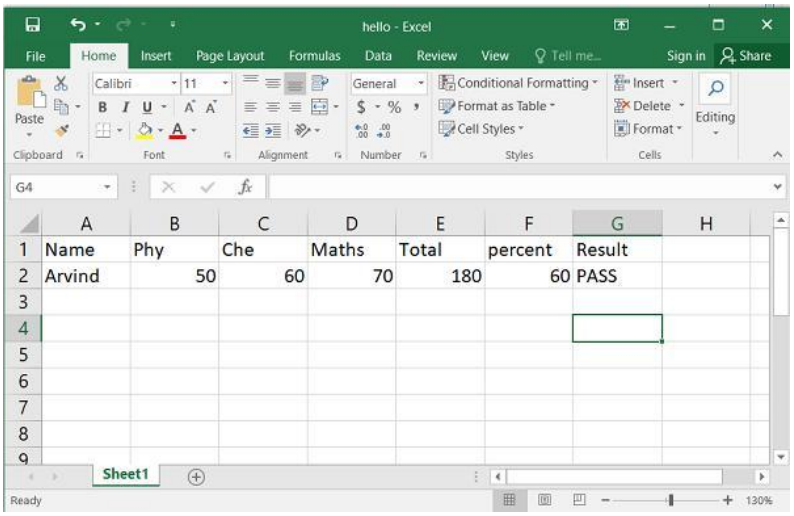
7.5 Selecting Cells and Entering Data

To enter information into Excel, first select the cell where the data should appear.

How to enter data

1. Open a blank workbook.
2. Click a cell, such as A1.
3. Type the required information.
4. Press Enter to confirm the entry.
5. Select another cell to continue.

You can enter text, numbers, dates, and formulas into cells.



Types of data

1. **Text:** Words or labels, such as Student Name or Mathematics.
2. **Numbers:** Values such as 85, 120, or 450.50.
3. **Dates:** Values entered as dates, such as 17/10/2026, depending on regional settings.
4. **Formulas:** Expressions beginning with an equals sign, such as =A1+B1.

Excel interprets entries according to their content and cell formatting. For example, a number formatted as text may not behave like an ordinary numeric value in calculations.

Editing cell contents

To change a cell's content:

1. Select the cell.
2. Type the replacement content and press Enter, or edit the existing content using the formula bar or cell-editing method.
3. Check the result.

To clear a cell, select it and use the Delete key or the appropriate Clear command. The exact effect depends on the command used.

Important: Clearing cell contents is not the same as deleting an entire row or column.

7.6 Moving Around a Worksheet

A worksheet may contain many rows and columns. Excel provides several ways to move between cells.

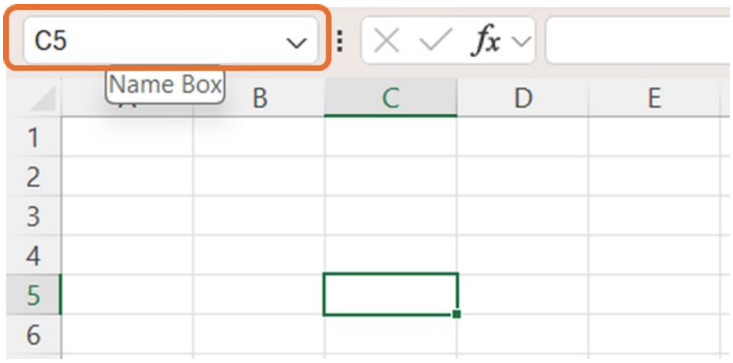
Common navigation methods

- **Mouse:** Click the cell you want to select.
- **Arrow keys:** Move one cell up, down, left, or right.
- **Enter:** Confirm an entry and usually move to another cell.
- **Tab:** Confirm an entry and usually move to the next cell on the right.
- **Name Box:** Type a cell reference, such as D15, and press Enter to go directly to that cell.
- **Ctrl + Home:** Commonly moves to cell A1 in a worksheet.

The active cell

The active cell is the currently selected cell. It is usually shown with a visible border.

When you type data or a formula, the entry goes into the active cell.



7.7 Editing and Deleting Data

Information in a spreadsheet may need to be corrected, updated, or removed.

Editing a cell

Suppose cell C2 contains 78, but the correct mark is 87.

1. Select cell C2.
2. Enter the correct value, or edit the existing contents.
3. Press Enter.
4. Verify the corrected value.

Clearing cell contents

1. Select the cell or range of cells.
2. Press Delete, or use the appropriate Clear command.
3. Confirm that the unwanted contents have been removed.

Deleting rows and columns

Sometimes you need to remove an entire row or column, not just its contents.

1. Select the row number or column letter.
2. Use the relevant Delete command.
3. Check the worksheet because removing a row or column shifts or removes other information.

> **Important:** Be careful when deleting rows or columns from a marks register or other important worksheet. You may accidentally remove information that is still needed.

7.8 Saving and Opening an Excel Workbook

Saving protects your work so that you can open it later.

Saving a new workbook

1. Open the File menu.
2. Select Save As if required.
3. Choose the approved storage location.
4. Enter a meaningful file name.
5. Make sure the file type is an Excel workbook, commonly .xlsx.
6. Select Save.

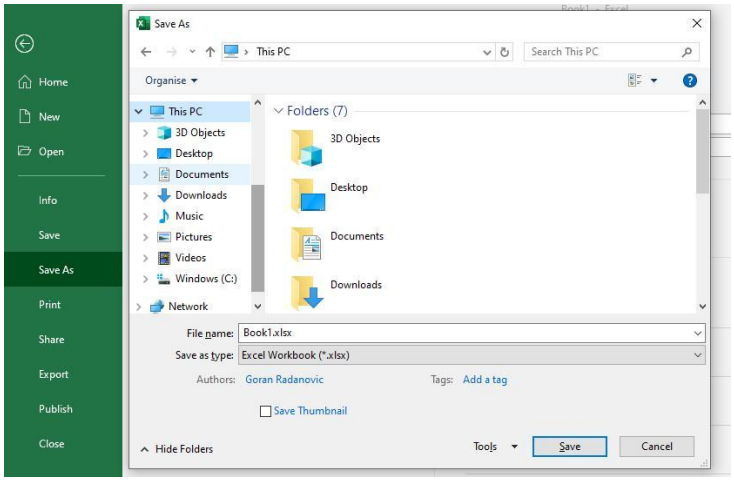
Example file name: `Grade_6_Science_Survey.xlsx`

Saving changes

After the first save, use Ctrl + S to save changes in many versions of Excel.

Opening an existing workbook

1. Open Excel.
2. Select File, then Open.
3. Browse to the saved workbook.
4. Select the file and open it.



Good file-naming practices

Use meaningful names such as:

- `Class_Attendance.xlsx`
- `Science_Results.xlsx`
- `Computer_Practice.xlsx`

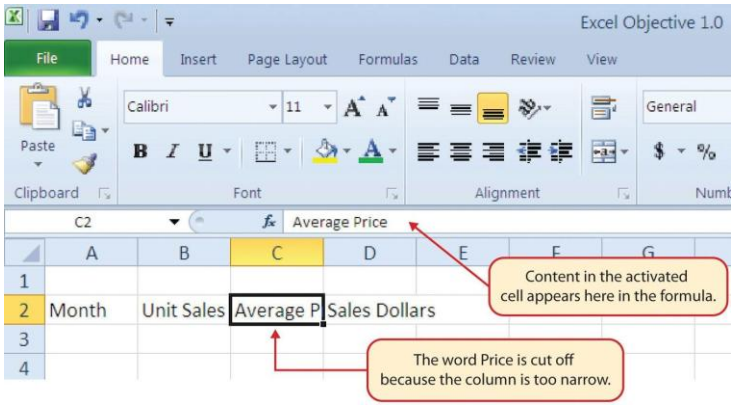
Avoid confusing names such as New File 1 or Final Final Latest.

For important work, save it in the correct folder and follow your school's backup and storage rules.

7.9 Adjusting Column Width and Row Height

Sometimes data does not fit inside a cell. A heading may appear cut off, or a long name may be difficult to read.

Excel allows you to change the width of columns and the height of rows.



Changing column width

1. Move the pointer to the boundary between two column letters.
2. Drag the boundary left or right.
3. Release the mouse when the width looks suitable.

You can also use the Home tab's Format commands to set a column width or automatically adjust it to the contents.

AutoFit

AutoFit adjusts a column's width or a row's height to fit its contents.

For example, if a heading reads Computer Studies, AutoFit can help make the full heading visible.

Changing row height

1. Move the pointer to the boundary between two row numbers.
2. Drag upward or downward.
3. Release the mouse when the height is suitable.

> **Tip:** Keep columns wide enough to display information clearly, but avoid unnecessarily wide columns that make the worksheet difficult to view or print.

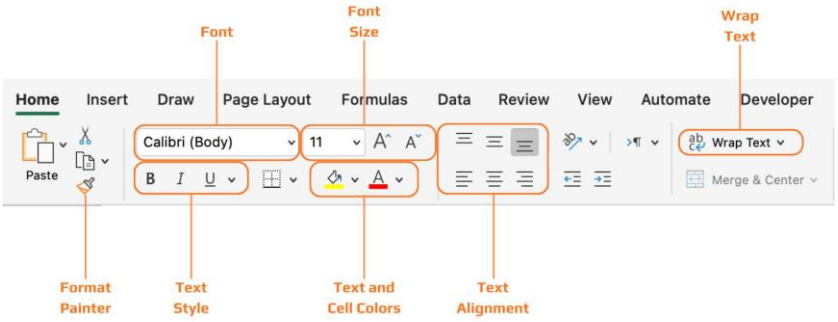
7.10 Formatting Cells

Formatting changes the appearance of cell contents without necessarily changing the underlying data.

Formatting helps make worksheets more readable and allows important information to stand out.

Common formatting options

- Font type and size
- Bold and italic
- Font colour
- Cell background colour
- Horizontal and vertical alignment
- Number formats
- Borders
- Text wrapping



A. Formatting headings

For a marks register, you might:

1. Select the heading row.
2. Make the headings bold.
3. Apply a subtle background colour.
4. Center the headings where appropriate.
5. Adjust column widths.

B. Number formatting

Excel can display numbers in different formats, including:

- General
- Number
- Currency
- Percentage
- Date

For example, a value of 0.25 displayed as a percentage becomes 25%.

Formatting changes how a value is displayed. It does not necessarily change the underlying value stored in the cell.

C. Borders and cell colours

Borders can separate headings and data. Background colours can highlight important rows or columns.

Use formatting consistently. Too many colours or decorative borders can make a spreadsheet difficult to read.

7.11 Introduction to Formulas

One of Excel's most useful features is its ability to perform calculations automatically.

A formula is an expression used to calculate a result. In Excel, a formula usually begins with an equals sign (=).

For example:

```
=5+3
```

Excel calculates the result and displays 8.

Common arithmetic operators

Operator	Meaning	Example	Result
+	Addition	=5+3	8
-	Subtraction	=9-4	5
*	Multiplication	=6*2	12
/	Division	=12/3	4

Using cell references in formulas

Instead of typing numbers directly into a formula, you can refer to cells.

Suppose:

- A1 contains 20.
- B1 contains 10.

Enter the following formula in C1:

```
=A1+B1
```

Excel reads the values in A1 and B1 and displays 30 in C1.

Formula example

Cell	Value or formula
A1	20
B1	10
C1	=A1+B1
Result in C1	30

Why use cell references?

If the value in A1 changes from 20 to 25, the formula =A1+B1 recalculates automatically and displays 35.

This is more useful than typing 30 directly into C1 because the result updates when the input values change.

Steps to enter a formula

1. Select the cell where the answer should appear.
2. Type =.
3. Enter the formula, such as =A1+B1.
4. Press Enter.
5. Check the result.

> **Remember:** A formula usually begins with =. If you type the expression without the equals sign, Excel may treat it as ordinary text.

7.12 Using Basic Functions: SUM and AVERAGE

Excel provides built-in functions that make calculations easier.

A function is a predefined formula that performs a particular calculation.

A. SUM

The SUM function adds values together.

Suppose cells B2 to B5 contain the marks 70, 80, 90, and 60.

Enter:

```
=SUM(B2:B5)
```

The result is 300.

The colon in B2:B5 indicates the range from cell B2 through cell B5.

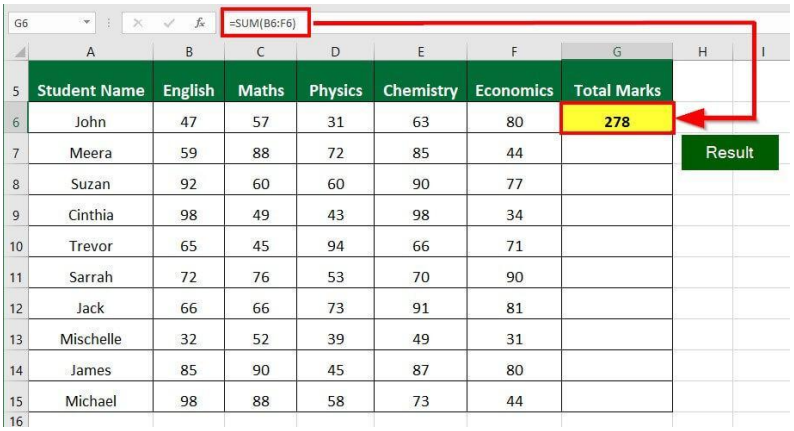
B. AVERAGE

The AVERAGE function calculates the arithmetic mean of numeric values.

Using the same marks:

```
=AVERAGE(B2:B5)
```

The result is 75.



	A	B	C	D	E	F	G	H	I
5	Student Name	English	Maths	Physics	Chemistry	Economics	Total Marks		
6	John	47	57	31	63	80	278		
7	Meera	59	88	72	85	44			
8	Suzan	92	60	60	90	77			
9	Cinthia	98	49	43	98	34			
10	Trevor	65	45	94	66	71			
11	Sarrah	72	76	53	70	90			
12	Jack	66	66	73	91	81			
13	Mischelle	32	52	39	49	31			
14	James	85	90	45	87	80			
15	Michael	98	88	58	73	44			
16									

Example: Class marks

Student	Marks
Ali	70
Sara	80
Ahmed	90
Ayesha	60
Total	300
Average	75

In this example:

- **Total:** =SUM(B2:B5)
- **Average:** =AVERAGE(B2:B5)

These formulas assume the four marks are stored in cells B2 through B5 and the summary rows are below them.

Why use functions?

Functions save time, reduce repetitive work, and recalculate results when the underlying data changes.

However, always check that the selected cell range includes the correct values. An incorrect range can produce an incorrect answer.

7.13 Copying Formulas to Other Cells

When a worksheet contains many records, it is often unnecessary to type the same formula repeatedly.

Excel allows formulas to be copied to other cells. When a formula uses relative cell references, Excel usually adjusts those references to match the new location.

Example: Calculating total marks

Suppose a worksheet contains marks in columns B, C, and D.

Student	English	Mathematics	Science	Total
Ali	75	80	85	240
Sara	90	92	88	270
Ahmed	65	70	75	210

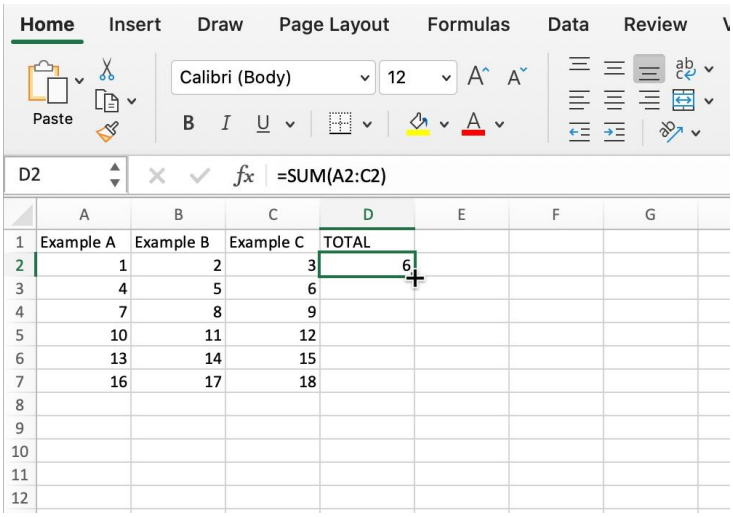
If the subject marks are in columns B, C, and D and the total is in column E, enter this formula in E2:

```
=SUM(B2:D2)
```

To calculate totals for other students:

1. Select cell E2.
2. Move to the small square at the lower-right corner of the selected cell, called the fill handle.
3. Drag the fill handle down through the required rows.
4. Check the totals.

Excel adjusts the formula for each row, so E3 becomes =SUM(B3:D3) and E4 becomes =SUM(B4:D4).



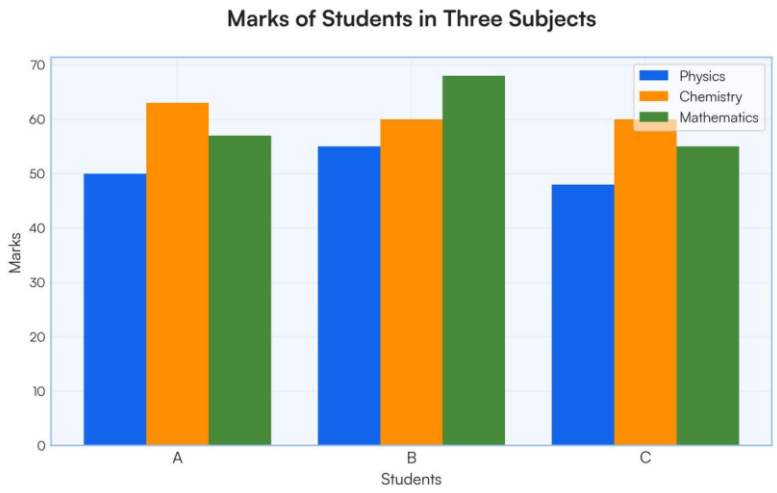
Important: Always verify copied formulas. Copying a formula does not guarantee that the formula is correct for every situation.

7.14 Creating a Simple Chart

A chart presents data visually. Charts help readers compare values, recognize patterns, and understand information more quickly.

Excel can create several types of charts.

- **Column chart:** Compares values using vertical bars.
- **Bar chart:** Compares values using horizontal bars.
- **Line chart:** Shows changes or trends over time.
- **Pie chart:** Shows how categories contribute to a whole, when the data is suitable.



Example: Subject marks

Suppose a student receives the following marks:

Subject	Marks
English	78
Mathematics	92
Science	85

A column chart can compare the marks across the three subjects.

Steps to create a chart

1. Enter the data in a worksheet.
2. Select the cells containing the headings and values.
3. Open the Insert tab.
4. Choose a suitable chart type.
5. Review the chart and add a meaningful title.
6. Check that the labels and values are correct.

Good chart design

- Use a title that explains what the chart shows.
- Include readable category labels.
- Avoid unnecessary decoration.
- Choose a chart type suitable for the data.
- Check that the chart represents the selected values accurately.

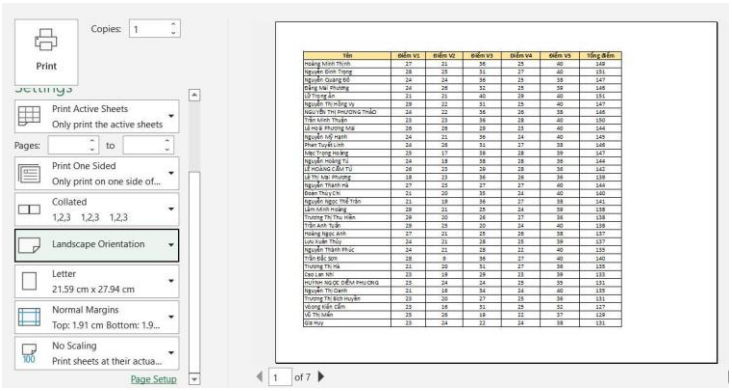
Charts should make information easier to understand, not more confusing.

7.15 Printing a Worksheet

A worksheet may contain many columns and rows, so it is important to check its layout before printing.

Steps to prepare a worksheet for printing

1. Open the Page Layout tab.
2. Check the page orientation.
3. Select an appropriate paper size.
4. Review the margins.
5. Open Print Preview using the File menu’s Print option.
6. Check whether all required columns and rows appear correctly.
7. Adjust scaling or page setup if necessary.
8. Print only when authorized.



Common printing problems

- Some columns are printed on another page.
- Headings are too small because the worksheet has been scaled excessively.
- Data is cut off at the page edge.
- Empty pages appear in the printout.

Use Print Preview to identify these problems before printing.

7.16 Responsible Use of Spreadsheets

Spreadsheets may contain personal or confidential information, such as student marks, attendance, contact details, or financial records.

Responsible spreadsheet use includes:

1. Entering information accurately.
2. Checking formulas and calculated results.
3. Saving work in the correct location.
4. Protecting confidential information.
5. Sharing work only with authorized people.
6. Avoiding unnecessary changes to another person's worksheet.
7. Using meaningful workbook names.
8. Keeping backup copies when permitted.
9. Reporting errors rather than hiding them.
10. Following school rules for storing and sharing data.

> **Example:** If a student notices that a mark has been entered incorrectly in a school spreadsheet, the student should report it to the teacher rather than changing an official record without permission.

7.17 Classroom Activities

Activity 1: Create a Student Marks Worksheet

Objective: *Understand rows, columns, cells, and data entry.*

Create a worksheet with the following information:

Student Name	English	Mathematics	Science
Ali	75	80	85
Sara	90	92	88
Ahmed	65	70	75
Ayesha	85	87	90

Tasks:

1. Open Excel and create a blank workbook.
2. Enter the headings and data.
3. Make the heading row bold.
4. Adjust column widths so all names and headings are visible.
5. Save the workbook as Grade_6_Marks.xlsx.
6. Identify the cell containing Sara's Mathematics mark.
7. Identify the cell containing Ahmed's Science mark.

Activity 2: Perform Calculations

Objective: *Use basic formulas and functions.*

Continue working with the marks worksheet.

1. Add a new column called Total.
2. Enter a SUM formula to calculate the total marks for Ali.
3. Copy the formula down for the other students.
4. Add a row or a separate summary area to calculate the average for English.
5. Check your calculations manually.
6. Save the workbook.

Discussion: What happens to a formula's result if one of the input marks changes?

Activity 3: Format a Worksheet

Objective: *Improve the appearance of a spreadsheet.*

1. Make the headings bold.
2. Apply a suitable background colour to the heading row.
3. Add borders to the data table.
4. Align headings consistently.
5. Adjust column widths.
6. Use a number format appropriate for the marks.
7. Check that the worksheet remains easy to read.

Discussion: How can consistent formatting help someone understand a spreadsheet?

Activity 4: Create a Chart

Objective: *Present spreadsheet data visually.*

Enter this data into a new worksheet:

Subject	Marks
English	78
Mathematics	92
Science	85
Computer Studies	95

Tasks:

1. Select the data, including the headings.
2. Insert a column chart.
3. Add the title Marks by Subject.
4. Check the category labels.
5. Compare the marks represented in the chart.
6. Save the workbook as Subject_Marks_Chart.xlsx.

Activity 5: Worksheet Navigation Challenge

Objective: *Practise selecting and navigating cells.*

With your teacher's permission:

1. Open a blank worksheet.
2. Select cell C5 using the mouse.
3. Use the Name Box to move to cell F10.
4. Use the arrow keys to move between cells.
5. Enter a short word or number into selected cells.
6. Clear the practice data when finished.

7.18 Review Questions

A. Multiple-Choice Questions (MCQs)

Choose the correct answer.

1. What is Microsoft Excel mainly used for?

- **A.** Editing videos
- **B.** Organizing data and performing calculations
- **C.** Playing music only
- **D.** Designing computer hardware

2. What is a workbook?

- **A.** A single cell
- **B.** An Excel file that can contain worksheets
- **C.** A row of data
- **D.** A type of chart

3. How are rows identified in Excel?

- **A.** By numbers
- **B.** By letters only
- **C.** By colours
- **D.** By file extensions

4. Which cell reference identifies column C and row 4?

- **A.** 4C
- **B.** C4
- **C.** C-4-0
- **D.** Row C

5. Which symbol normally begins an Excel formula?

- **A.** #
- **B.** @
- **C.** =
- **D.** &

6. **What does the formula =A1+B1 do?**
   - **A.** Adds the values in A1 and B1
   - **B.** Deletes cells A1 and B1
   - **C.** Changes the worksheet name
   - **D.** Creates a chart automatically

7. **Which function adds a range of values?**
   - **A.** AVERAGE
   - **B.** SUM
   - **C.** SAVE
   - **D.** FORMAT

8. **What is the purpose of AutoFit?**
   - **A.** To close a workbook
   - **B.** To adjust row height or column width to fit contents
   - **C.** To delete formulas
   - **D.** To change the operating system

9. **Which chart is commonly suitable for comparing marks across subjects?**
   - **A.** Column chart
   - **B.** Audio chart
   - **C.** File chart
   - **D.** Folder chart

10. **What should you do before printing a worksheet?**
    - **A.** Delete the headings
    - **B.** Check Print Preview and page layout
    - **C.** Remove all formulas
    - **D.** Change every number to text

B. Short-Answer Questions

1. Define Microsoft Excel.
2. What is the difference between a workbook and a worksheet?
3. Define a row, column, cell, and cell reference.
4. What is the purpose of the formula bar?
5. Explain the difference between text, numbers, and formulas in a worksheet.
6. Write the steps for saving a new workbook.
7. What is AutoFit, and why is it useful?

8. Explain the purpose of cell formatting.
9. What is a formula? Give two examples.
10. What is the difference between SUM and AVERAGE?
11. What is the fill handle used for?
12. Name three types of Excel charts and describe one use for each.
13. Write four good practices for managing spreadsheet data responsibly.

C. Critical-Thinking Questions

1. A teacher has a class marks register containing four subjects for 30 students. Explain how Excel could reduce the amount of manual calculation required.
2. A student enters =B2+C2 into cell D2. The result is incorrect because the value in C2 was entered incorrectly. Explain how the student should investigate and correct the problem.
3. Why is using a formula better than typing the total marks manually when many students are listed?
4. A worksheet has long headings that are cut off. Which Excel feature could help, and why?
5. A student prepares a chart but selects only the marks, leaving out the subject names. Explain how this could affect the chart and how to correct it.
6. Why should student marks and attendance records be shared only with authorized people?

7.19 Homework

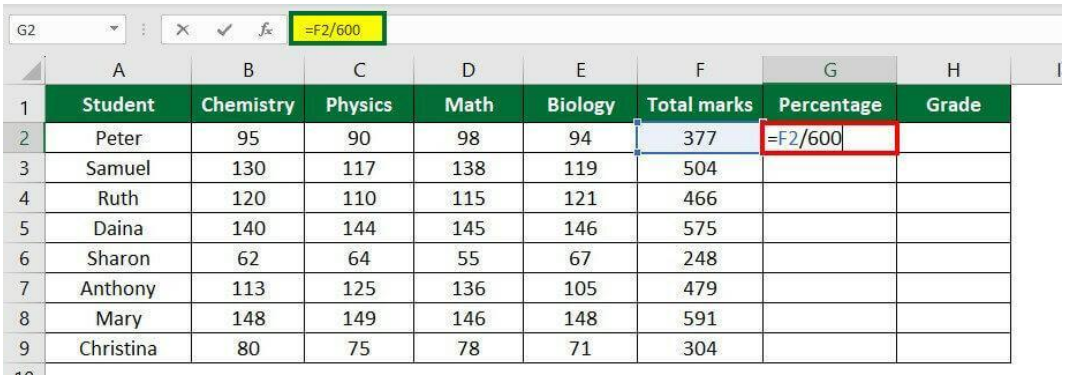
1. Define workbook, worksheet, row, column, cell, and cell reference.
2. Draw a simple worksheet with three columns and four rows, and label the cell references.
3. Explain the difference between text, numbers, and formulas.
4. Write the formulas for adding A1 and B1, subtracting B1 from A1, multiplying A1 by B1, and dividing A1 by B1.
5. Explain the purpose of the SUM and AVERAGE functions.
6. Create a sample marks table containing four students and three subjects. Add a Total column.
7. Describe how to create a column chart from spreadsheet data.
8. Write five rules for protecting information in a spreadsheet.

Quick Revision

Workbook	An Excel file that can contain one or more worksheets.
Worksheet	A grid of rows and columns used to organize data.
Cell Reference	A cell's location, such as B3 or C4.
Formula	An expression that calculates a result, usually beginning with =.
SUM and AVERAGE	Functions for calculating totals and arithmetic means.
Chart	A visual representation of data used for comparison and analysis.

Chapter 8: Excel Formulas, Functions, and Data Analysis

Digital Foundations · Student Textbook



	A	B	C	D	E	F	G	H
1	Student	Chemistry	Physics	Math	Biology	Total marks	Percentage	Grade
2	Peter	95	90	98	94	377	=F2/600	
3	Samuel	130	117	138	119	504		
4	Ruth	120	110	115	121	466		
5	Daina	140	144	145	146	575		
6	Sharon	62	64	55	67	248		
7	Anthony	113	125	136	105	479		
8	Mary	148	149	146	148	591		
9	Christina	80	75	78	71	304		

LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain how formulas and functions work in Excel.
- Use arithmetic operators in calculations.
- Apply SUM, AVERAGE, MIN, and MAX functions.
- Understand relative and absolute cell references at an introductory level.
- Calculate totals, averages, and percentages.
- Sort data in ascending and descending order.
- Filter records to display selected information.
- Apply conditional formatting to highlight important values.
- Identify common formula errors.
- Check calculations and handle spreadsheet data responsibly.

8.1 Understanding Formulas

A formula is an expression that performs a calculation using numbers, cell references, or functions.

In Excel, formulas normally begin with an equals sign (=).

For example:

```
=10+5
```

Excel calculates the expression and displays 15.

Formulas become especially useful when they refer to cells containing data.

Example: Adding two values

Suppose:

- Cell A1 contains 20.
- Cell B1 contains 15.

Enter the following formula in C1:

```
=A1+B1
```

Excel displays 35 in C1.

How a formula works



Formula in C1: **=A1+B1**

If A1 changes from 20 to 25, the result updates automatically to 40.

This is one of Excel's main advantages: calculations can update when the underlying data changes.

Why are formulas important?

Formulas help users:

- Calculate results quickly.
- Reduce repeated manual calculations.
- Update results when data changes.
- Apply the same calculation to many records.
- Check and analyze information more efficiently.

> **Remember:** A formula can calculate a result only as accurately as the data and formula allow. Incorrect input or an incorrect formula can produce an incorrect answer.

8.2 Arithmetic Operators in Excel

Excel uses operators to perform mathematical calculations.

Operator	Meaning	Formula	Result
+	Addition	=12+8	20
-	Subtraction	=12-8	4
*	Multiplication	=12*8	96
/	Division	=12/8	1.5

Example: Calculating the remaining balance

Suppose a student has a budget of 500 units and spends 175 units.

The remaining balance is:

```
=500-175
```

Result: 325

Example: Calculating total cost

If one notebook costs 40 units and a student buys 3 notebooks:

```
=40*3
```

Result: 120

The currency is not important to the formula. In a real worksheet, use the appropriate currency and follow the teacher's instructions.

Order of calculations

Excel follows standard mathematical order of operations. Multiplication and division are generally performed before addition and subtraction, unless parentheses change the order.

For example:

- `=2+3*4` gives 14.
- `=(2+3)*4` gives 20.

Parentheses help make the intended calculation clear.

8.3 Using Cell References in Formulas

A cell reference identifies a cell by its column letter and row number, such as A1, B3, or D10.

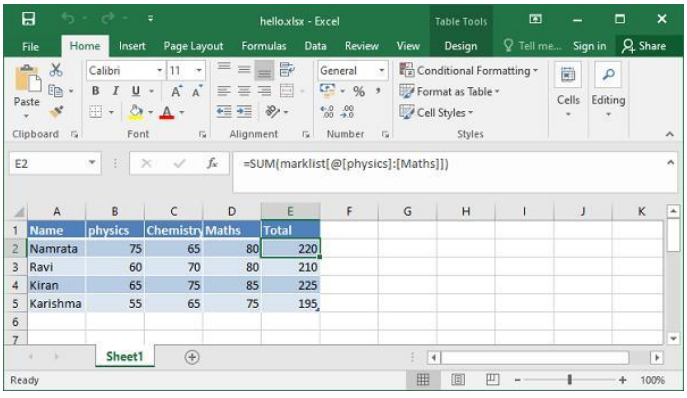
Using cell references allows formulas to work with values stored elsewhere in the worksheet.

Example: Calculating a total

Cell	Description	Value
B2	English marks	75
C2	Mathematics marks	80
D2	Science marks	85
E2	Total marks	=SUM(B2:D2)

The formula in E2 adds the marks stored in B2, C2, and D2.

Result: 240



Advantages of cell references

- The formula can be reused for other rows.
- Results update when the source values change.
- The worksheet is easier to maintain.
- The formula clearly shows which data is being used.

Formula versus fixed result

Suppose B2 contains 75 and C2 contains 80.

- `=B2+C2` calculates the result using the two cells.
- Typing 155 directly stores the number 155 without linking it to B2 and C2.

If either input changes, the formula recalculates, but the manually typed result does not.

8.4 Understanding Functions

A function is a predefined formula that performs a specific calculation.

Functions are useful because they reduce the amount of typing required and make common calculations easier.

Excel provides many functions. In this chapter, we will study four basic functions:

- `SUM`
- `AVERAGE`
- `MIN`
- `MAX`

A. SUM

The SUM function adds numbers together.

Example:

```
=SUM(B2:B6)
```

This adds the numeric values in cells B2 through B6.

B. AVERAGE

The AVERAGE function calculates the arithmetic mean of numeric values.

Example:

```
=AVERAGE(B2:B6)
```

To calculate an average, add the values and divide by the number of included numeric values.

C. MIN

The MIN function returns the smallest numeric value in a range.

Example:

```
=MIN(B2:B6)
```

D. MAX

The MAX function returns the largest numeric value in a range.

Example:

```
=MAX(B2:B6)
```

Example: Four students' marks

Student	Marks
Ali	70
Sara	85
Ahmed	65
Ayesha	90

Total	**310**	`=SUM(B2:B5)`
Average	**77.5**	`=AVERAGE(B2:B5)`
Lowest mark	**65**	`=MIN(B2:B5)`
Highest mark	**90**	`=MAX(B2:B5)`

The range B2:B5 includes cells B2, B3, B4, and B5.

Important: SUM, AVERAGE, MIN, and MAX normally ignore text entries in a range. Check that the range contains the intended numeric values.

8.5 Calculating Percentages

A percentage expresses a value as a fraction of 100. Percentages are commonly used to calculate examination results, discounts, attendance rates, and survey results.

The basic formula is:

$$\text{Percentage} = \frac{\text{Obtained Value}}{\text{Total Value}} \times 100$$

Example: Calculating examination percentage

A student obtains 72 marks out of 90.

$$\frac{72}{90} \times 100 = 80\%$$

The student's percentage is 80%.

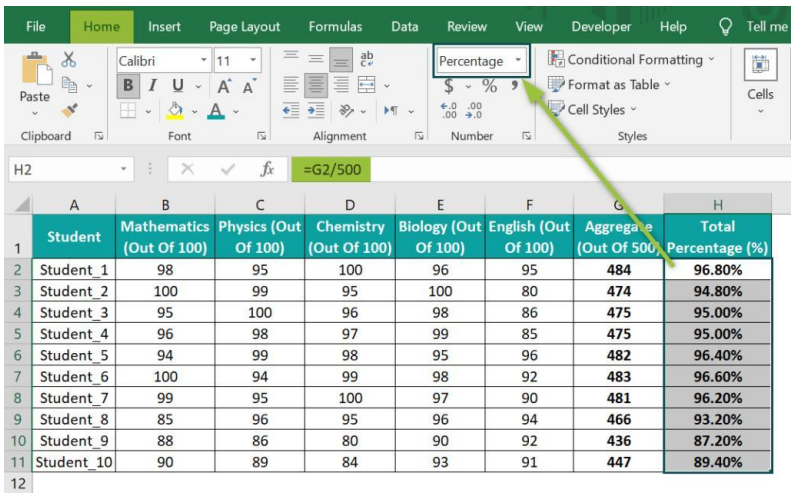
Calculating percentages in Excel

Suppose a worksheet contains the following information:

Cell	Description	Value
A2	Student	Ali
B2	Obtained marks	72
C2	Total marks	90
D2	Percentage	=B2/C2

Enter =B2/C2 in D2. The result is 0.8.

To display it as 80%, select D2 and apply the Percentage number format from the Home tab.



	A	B	C	D	E	F	G	H
1	Student	Mathematics (Out Of 100)	Physics (Out Of 100)	Chemistry (Out Of 100)	Biology (Out Of 100)	English (Out Of 100)	Aggregate (Out Of 500)	Total Percentage (%)
2	Student_1	98	95	100	96	95	484	96.80%
3	Student_2	100	99	95	100	80	474	94.80%
4	Student_3	95	100	96	98	86	475	95.00%
5	Student_4	96	98	97	99	85	475	95.00%
6	Student_5	94	99	98	95	96	482	96.40%
7	Student_6	100	94	99	98	92	483	96.60%
8	Student_7	99	95	100	97	90	481	96.20%
9	Student_8	85	96	95	96	94	466	93.20%
10	Student_9	88	86	80	90	92	436	87.20%
11	Student_10	90	89	84	93	91	447	89.40%
12								

You can also use the formula =B2/C2*100 to calculate 80 as a numeric value. In that case, do not apply percentage formatting to the result unless you change the formula, because formatting the value 80 as a percentage would display 8000%.

> **Important distinction:** Use either =B2/C2 with Percentage formatting, or =B2/C2*100 with an ordinary numeric format. Do not combine both methods.

Another example: Attendance percentage

If a student attends 18 days out of 20 school days:

$$\frac{18}{20} \times 100 = 90\%$$

Excel formula:

```
=18/20
```

Apply Percentage formatting to display 90%.

8.6 Relative and Absolute Cell References

When formulas are copied to other cells, cell references may change. Understanding this behaviour helps prevent calculation errors.

A. Relative references

A relative reference changes when a formula is copied to another location.

Suppose D2 contains:

```
=B2+C2
```

When you copy the formula from D2 to D3, Excel normally adjusts it to:

```
=B3+C3
```

This is useful when calculating totals for several students.

B. Absolute references

An absolute reference remains fixed when a formula is copied. It uses dollar signs before the column and row, such as B1.

Suppose cell B1 contains a tax rate or another fixed rate of 5%, and the worksheet contains prices in column A.

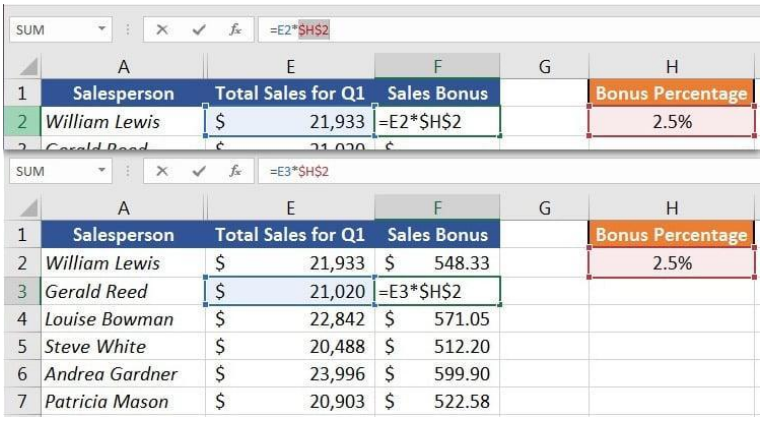
In B2, you could enter:

```
=A2*$B$1
```

When copied down to B3, the formula becomes:

```
=A3*$B$1
```

The reference to A2 changes to A3, but B1 remains fixed.



Comparison

Relative reference	Absolute reference
Example: A1	Example: A1
Usually changes when copied.	Keeps the same row and column when copied.
Useful for row-by-row calculations.	Useful when many formulas use one fixed value.

At this level, focus on recognizing the difference and understanding why absolute references are useful.

8.7 Understanding Common Formula Errors

Excel may display an error when a formula contains a problem. Recognizing common errors helps users identify and correct mistakes.

`#DIV/0!`	**Division by zero** A formula attempts to divide a number by zero, or by a cell whose value is zero. *Check the divisor and ensure it is not zero.*
`#NAME?`	**Unrecognized name or text in a formula** This can occur when a function name is misspelled or text is entered incorrectly in a formula. *Check the spelling and formula syntax.*
`#REF!`	**Invalid cell reference** This can occur when a formula refers to a cell reference that is no longer valid, for example after certain cells or ranges are deleted. *Review the formula and restore or correct the reference.*
`#####`	**Value not displayed properly** The column may be too narrow to display the value, or a date or time may be negative or otherwise unsupported by the current format. *Widen the column first and check the value's format if necessary.*

General troubleshooting steps

1. Read the displayed error carefully.
2. Check that the formula begins with =.
3. Verify cell references.
4. Check function names and brackets.
5. Make sure the intended cells contain the correct data.
6. Correct the formula and check the result again.

> **Remember:** Do not hide an error simply to make the worksheet look correct. Find and correct the underlying problem.

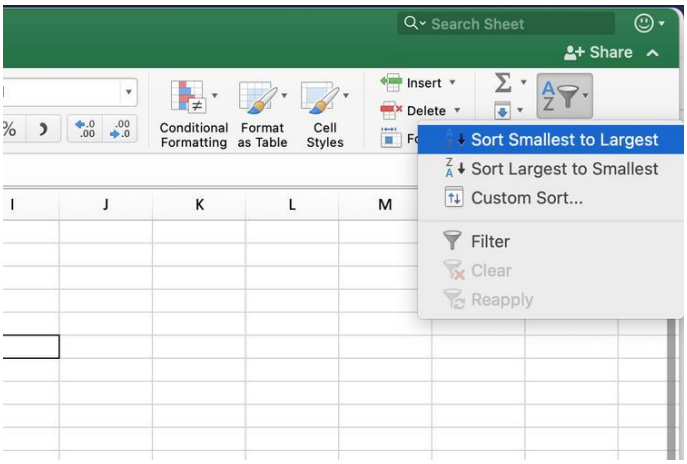
8.8 Sorting Data

Sorting arranges information in a particular order.

Excel can sort text alphabetically, numbers from smallest to largest, or dates from earliest to latest.

Common sorting options

- **Ascending:** A to Z, smallest to largest, or earliest to latest.
- **Descending:** Z to A, largest to smallest, or latest to earliest.



Example: Sorting student marks

Original data:

Student	Marks
Ali	75
Sara	92
Ahmed	65
Ayesha	85

After sorting marks from largest to smallest:

Student	Marks
Sara	92
Ayesha	85
Ali	75
Ahmed	65

Steps to sort data

1. Select a cell in the data table.
2. Open the Data tab.
3. Choose the appropriate sorting option.
4. If prompted, confirm that the data has headings.
5. Choose the column and order for sorting when using the full Sort dialog box.
6. Check the results.

Important sorting rule

Sort the complete table, not just one column of values. Sorting only the marks column while leaving student names in place can cause marks to become associated with the wrong students.

Always check that each row's information remains together.

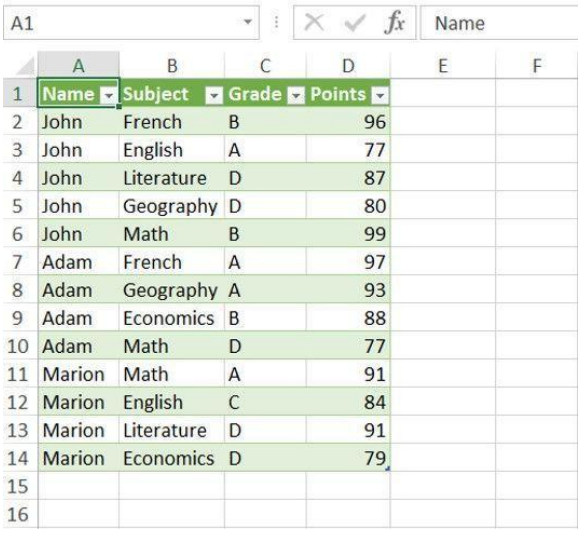
8.9 Filtering Data

Filtering displays only records that match selected conditions while hiding other rows temporarily from view.

Filtering is useful when a worksheet contains many records and you want to focus on particular information.

Example: Filtering students

Suppose a worksheet contains student names, subjects, and marks. You want to view only the records for Mathematics.



	A	B	C	D	E	F
1	Name	Subject	Grade	Points		
2	John	French	B	96		
3	John	English	A	77		
4	John	Literature	D	87		
5	John	Geography	D	80		
6	John	Math	B	99		
7	Adam	French	A	97		
8	Adam	Geography	A	93		
9	Adam	Economics	B	88		
10	Adam	Math	D	77		
11	Marion	Math	A	91		
12	Marion	English	C	84		
13	Marion	Literature	D	91		
14	Marion	Economics	D	79		
15						
16						

Steps to apply a filter

1. Select a cell within the data table.
2. Open the Data tab.
3. Select Filter.
4. Use the dropdown arrow in the required column heading.
5. Select the values or conditions you want to display.
6. Confirm the selection.

Only matching rows will be shown. Other rows are hidden from view, not deleted.

Sorting versus filtering

Sorting	Filtering
Changes the order of records.	Displays only records matching a condition.
Can arrange marks from highest to lowest.	Can display only marks above a chosen value.
Normally keeps all records visible.	Temporarily hides records that do not match.

> **Good practice:** Clear the filter when you want to see all records again. Do not assume that hidden rows have been deleted.

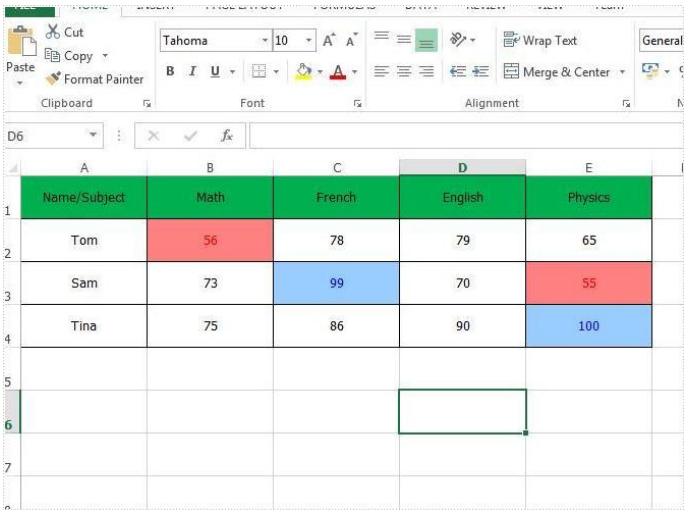
8.10 Conditional Formatting

Conditional formatting automatically changes the appearance of cells when they meet specified conditions.

It helps users identify important values without manually formatting each cell.

For example, in a marks register you could highlight:

- Marks below 40 in one colour.
- Marks of 80 or above in another colour.
- Duplicate values.
- Values above or below a selected threshold.



Example: Highlighting low marks

Suppose marks are in cells B2 through B10.

To highlight marks below 40:

1. Select cells B2:B10.
2. Open the Home tab.
3. Select Conditional Formatting.
4. Choose a rule for highlighting cells below a specified value.
5. Enter 40.
6. Select an appropriate format and confirm.

Excel will apply the chosen formatting to cells that meet the condition.

Why is conditional formatting useful?

- It makes important values easier to identify.
- It can reveal patterns in large tables.
- It reduces the need to format each cell manually.
- It updates automatically when values change.

> **Important:** A colour is a visual signal, not a replacement for reading the actual value. Check the numbers before drawing conclusions.

8.11 Using Data to Make Decisions

Data analysis means examining information to understand patterns, compare values, and answer questions.

Excel can help students analyze information from surveys, experiments, class activities, or other approved sources.

Example: Class survey

A class asks 20 students which type of book they prefer.

Book Type	Number of Students
Science	6
Stories	8
History	3
Other	3
Total	20

From this table, students can observe that Stories received the highest number of responses.

Excel can help by:

- Calculating the total responses using SUM.
- Calculating percentages for each category.
- Sorting categories by number of responses.
- Creating a chart to compare results.
- Highlighting the highest or lowest values.

For example, the percentage who prefer Stories is:

$$\frac{8}{20} \times 100 = 40\%$$

This means 40% of the surveyed students selected Stories.

Responsible interpretation

Data should be interpreted carefully.

A survey of 20 students describes the responses of those students. It does not automatically prove that all students in every school have the same preferences.

Check that the data is accurate, the sample is appropriate, and conclusions are supported by the evidence.

8.12 Classroom Activities

Activity 1: Functions Practice

Objective: *Practise SUM, AVERAGE, MIN, and MAX.*

Enter the following data into Excel:

Student	Marks
Ali	72
Sara	88
Ahmed	64
Ayesha	96
Bilal	80

Tasks:

1. Enter the headings and marks.
2. Calculate the total using SUM.
3. Calculate the average using AVERAGE.
4. Find the lowest mark using MIN.
5. Find the highest mark using MAX.
6. Format the worksheet neatly.
7. Save it as Functions_Practice.xlsx.

Activity 2: Percentage Calculations

Objective: *Calculate percentages using formulas.*

Enter this information:

Student	Obtained Marks	Total Marks
Ali	72	90
Sara	85	100
Ahmed	63	90
Ayesha	45	50

Tasks:

1. Add a column called Percentage.
2. Calculate the percentage using a formula.
3. Apply Percentage formatting.
4. Check one result manually.
5. Save the workbook as Percentage_Practice.xlsx.

Activity 3: Sorting and Filtering

Objective: *Organize and view selected data.*

Use this table:

Student	Subject	Marks
Ali	English	75
Sara	Mathematics	92
Ahmed	English	65
Ayesha	Mathematics	88
Bilal	English	81

Tasks:

1. Sort the complete table by marks from largest to smallest.
2. Apply a filter to show only English records.
3. Clear the filter to display all records.
4. Explain the difference between sorting and filtering.

Activity 4: Conditional Formatting

Objective: *Highlight values that meet a condition.*

Using the marks from Activity 1:

1. Select the marks.
2. Apply conditional formatting to highlight values below 70.
3. Add a second rule to highlight values of 85 or above.
4. Check that the correct cells are highlighted.
5. Explain how conditional formatting helps a reader identify patterns.

Activity 5: Formula Error Investigation

Objective: *Learn to identify and correct common mistakes.*

With your teacher's guidance, create examples of these problems in a practice workbook:

- A formula missing the equals sign.
- A formula that divides by zero.
- A misspelled function name.
- A formula referring to an incorrect cell.

Correct each problem and record what you changed.

> **Safety and accuracy note:** Use a practice worksheet rather than an official marks register.

8.13 Review Questions

A. Multiple-Choice Questions (MCQs)

Choose the correct answer.

1. What symbol normally begins an Excel formula?

- **A.** #
- **B.** =
- **C.** @
- **D.** %

2. Which function adds values in a range?

- **A.** MAX
- **B.** MIN
- **C.** SUM
- **D.** AVERAGE

3. Which function returns the smallest numeric value in a range?

- **A.** MIN
- **B.** MAX
- **C.** SUM
- **D.** COUNT

4. Which function calculates the arithmetic mean of numeric values?

- **A.** MAX
- **B.** AVERAGE
- **C.** MIN
- **D.** SUM

5. What does the formula =A1*B1 do?

- **A.** Adds the two cells
- **B.** Divides the two cells
- **C.** Multiplies the two cells
- **D.** Deletes both cells

6. **Which reference remains fixed when a formula is copied?**
   - **A.** A1
   - **B.** B2
   - **C.** C3
   - **D.** A1

7. **What is the purpose of sorting data?**
   - **A.** To arrange records in a particular order
   - **B.** To permanently hide all rows
   - **C.** To delete formulas
   - **D.** To create a new workbook

8. **What does filtering do?**
   - **A.** Deletes records that do not match
   - **B.** Displays records that match selected conditions
   - **C.** Changes all values to percentages
   - **D.** Removes cell references

9. **Which Excel feature highlights cells that meet specified conditions?**
   - **A.** Page Layout
   - **B.** Conditional Formatting
   - **C.** Save As
   - **D.** Print Preview

10. **What does #DIV/0! commonly indicate?**
    - **A.** The workbook has been saved.
    - **B.** A cell contains a date.
    - **C.** A formula is attempting to divide by zero.
    - **D.** The worksheet has no headings.

B. Short-Answer Questions

1. Define a formula in Excel.
2. What is a function? Give two examples.
3. Explain the purpose of SUM, AVERAGE, MIN, and MAX.
4. What is the difference between a formula using cell references and a manually entered result?
5. Explain how to calculate a percentage in Excel.
6. What is the difference between a relative and an absolute cell reference?

7. Explain two common formula errors and how to correct them.
8. What is sorting? Give an example.
9. What is filtering? How is it different from sorting?
10. Define conditional formatting and explain one use.
11. Why is it important to check a formula's cell range?
12. Write four rules for interpreting and sharing spreadsheet data responsibly.

C. Critical-Thinking Questions

1. A teacher needs to calculate totals for 30 students. Explain why using a formula and copying it down is more efficient than calculating every total manually.
2. A student calculates a percentage by using =B2/C2*100 and then applies Percentage formatting. Explain why the displayed result may be incorrect and how to fix it.
3. A marks table is sorted by the Marks column alone, causing student names and marks to become mismatched. Explain how this problem can be prevented.
4. A worksheet uses conditional formatting to highlight marks below 40. One cell is highlighted, but its value is 75. What should the student check?
5. A class survey shows that 60% of the students who responded prefer Science. Can the student conclude that 60% of all students in the country prefer Science? Explain why or why not.
6. A formula displays #REF!. What does this suggest, and what steps should the user take to investigate it?

8.14 Homework

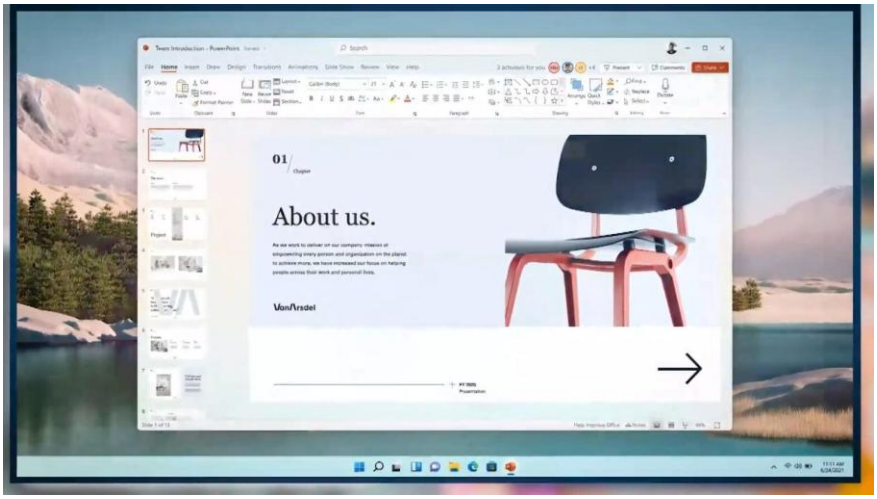
1. Define formula, function, relative reference, absolute reference, sorting, filtering, and conditional formatting.
2. Write the formulas for SUM, AVERAGE, MIN, and MAX using the range B2:B8.
3. A student obtains 54 marks out of 60. Calculate the percentage and write an Excel formula to calculate it.
4. Explain the difference between A1 and A1.
5. Describe how to sort a marks register from highest to lowest while keeping student names correctly matched with their marks.
6. Explain how to filter a table to display only records belonging to one subject.
7. Write three examples of formula errors and explain how to investigate them.
8. Prepare a sample data table containing five records. Explain how you could use a formula, sorting, filtering, and conditional formatting to analyze it.

Quick Revision

Formulas	Expressions beginning with = that calculate results.
Functions	SUM, AVERAGE, MIN, and MAX perform common calculations.
Percentages	Compare an obtained value with a total value.
Cell References	Relative references usually change when copied; absolute references remain fixed.
Sorting and Filtering	Sorting changes record order; filtering displays records matching selected conditions.
Conditional Formatting	Highlights cells based on rules.

Chapter 9: Microsoft PowerPoint: Creating Effective Presentations

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain what Microsoft PowerPoint is and identify its uses.
- Understand presentations, slides, layouts, and themes.
- Identify the main parts of the PowerPoint window.
- Create, save, open, and organize a presentation.
- Add, edit, and format text on slides.
- Insert pictures, shapes, tables, and charts.
- Apply themes and slide layouts consistently.
- Use transitions and animations appropriately.
- Run a slide show and use presentation tools.
- Prepare and deliver a clear, well-organized presentation.

9.1 What Is Microsoft PowerPoint?

Microsoft PowerPoint is a presentation application used to create and display information through a sequence of slides.

A presentation can include text, pictures, diagrams, tables, charts, audio, video, and other visual elements.

PowerPoint is commonly used in schools, businesses, meetings, and training sessions to explain ideas to an audience.

Uses of PowerPoint

PowerPoint can be used to:

1. Present school projects.
2. Explain scientific concepts.
3. Display research findings.
4. Summarize a lesson.
5. Present charts and statistics.
6. Introduce a topic using images and short text.
7. Support speeches and classroom discussions.
8. Share information during meetings and training sessions.



What is a presentation?

A presentation is a collection of slides arranged in an order to communicate information.

For example, a student preparing a presentation about renewable energy might use these slides:

1. Title: Renewable Energy
2. What Is Renewable Energy?
3. Types of Renewable Energy
4. Advantages and Challenges
5. Conclusion

Each slide focuses on one part of the topic.

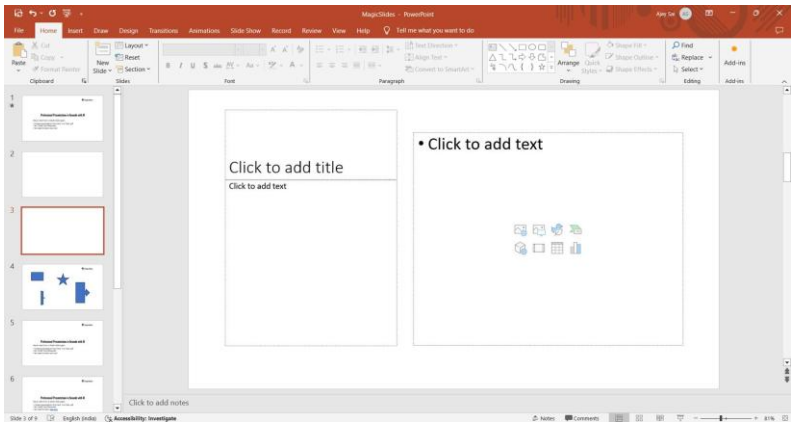
> **Remember:** PowerPoint supports a presentation; it does not replace the presenter's understanding of the topic.

9.2 Understanding Slides and Slide Layouts

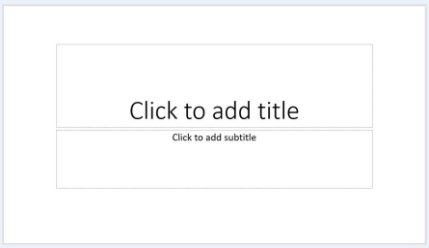
A slide is an individual page of a PowerPoint presentation.

Slides are arranged in sequence and shown to the audience one at a time during a slide show.

A slide layout is a predefined arrangement of content placeholders, such as a title, subtitle, text area, picture, or chart.

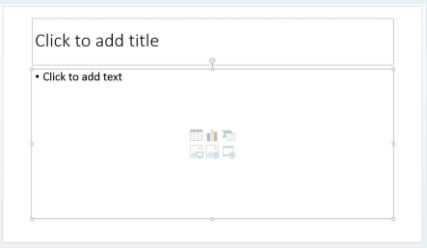


Common slide layouts



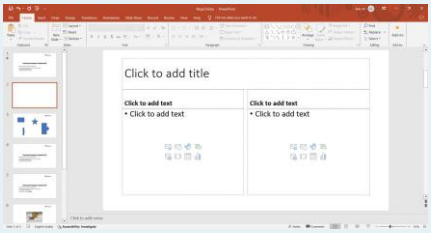
1. Title Slide

Introduces the topic and may include the presenter's name, class, and date.



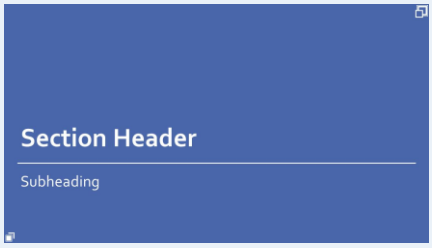
2. Title and Content

Suitable for a heading followed by text, a picture, a table, or another supported content type.



3. Two Content

Useful for comparing two subjects or presenting related information side by side.



4. Section Header

Introduces a new part of a longer presentation.

Why are layouts useful?

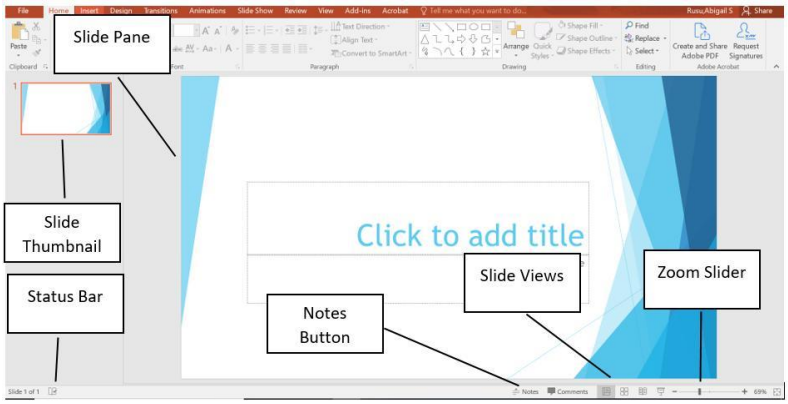
Layouts help students:

- Position content consistently.
- Keep titles in predictable places.
- Organize text and pictures.
- Save time when creating slides.
- Maintain a professional appearance.

Choose a layout that matches the purpose of the slide instead of placing every item randomly.

9.3 Understanding the PowerPoint Window

The PowerPoint window contains tools for creating, editing, arranging, and presenting slides.



Main parts of the window

Part	Purpose
Title bar	Displays the presentation name and application information.
Quick Access Toolbar	Provides shortcuts to selected commands, depending on the setup.
Ribbon	Contains tabs and groups of presentation commands.
Slide thumbnails pane	Displays small previews of slides and helps change their order.
Slide canvas	The main area where the selected slide is edited.
Notes pane	Allows the presenter to add notes for speaking or explaining content.
Status bar	Displays presentation information and viewing controls.
Zoom control	Changes the size of the slide on the editing screen.

The appearance may differ depending on the PowerPoint version and screen size.

Important Ribbon tabs

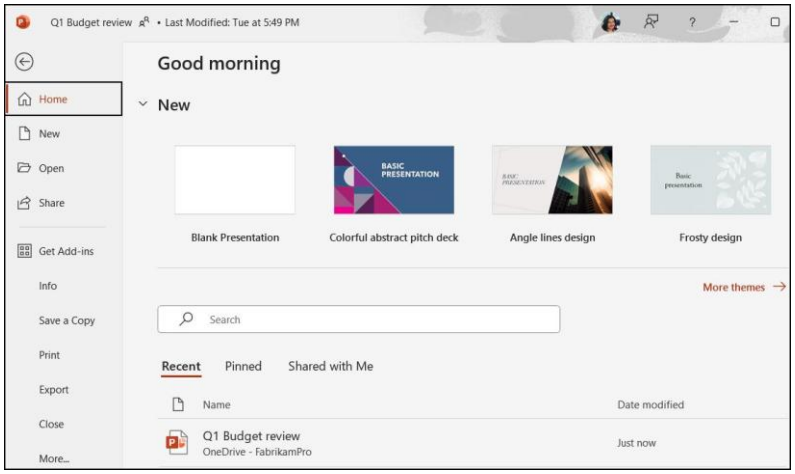
- **Home:** Add slides, choose layouts, and format text.
- **Insert:** Add pictures, shapes, tables, charts, and other objects.
- **Design:** Apply themes and adjust slide appearance.
- **Transitions:** Control how one slide changes to the next.
- **Animations:** Control how objects appear or move.
- **Slide Show:** Present the slides to an audience.
- **Review:** Provides review-related tools, depending on the version.
- **View:** Changes how the presentation is displayed during editing.

9.4 Creating a New Presentation

A presentation should have a clear purpose and a logical sequence before you begin designing individual slides.

Steps to create a presentation

1. Open Microsoft PowerPoint.
2. Select Blank Presentation or an appropriate template.
3. Choose a suitable title slide layout.
4. Enter the presentation title.
5. Add the presenter's name and other required details.
6. Save the presentation using a meaningful file name.



Planning before creating slides

Before opening PowerPoint, answer these questions:

- What is the topic?
- Who will view the presentation?
- What should the audience learn?
- How much time is available?
- What information and visuals are necessary?

For a short classroom presentation, five to eight slides may be enough, depending on the topic and the teacher's instructions.

A longer topic may require more slides, while a simple topic may need fewer.

> **Good practice:** Plan the content before spending time on slide decoration.

9.5 Adding, Duplicating, and Rearranging Slides

A presentation may need additional slides as the topic develops.

Adding a slide

1. Open the Home tab.
2. Select New Slide.
3. Choose an appropriate layout.
4. Add the slide title and content.

In many versions of PowerPoint, Ctrl + M inserts a new slide.

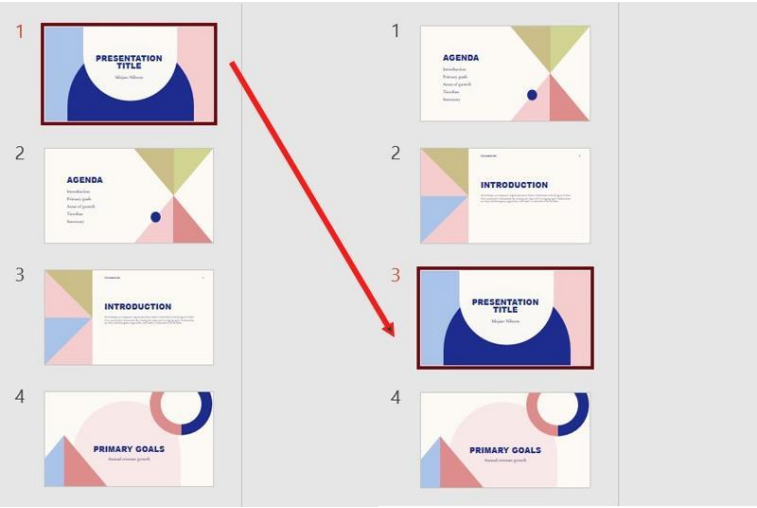
Duplicating a slide

Duplicating a slide creates a copy of an existing slide. This is useful when several slides need a similar structure.

1. Select the slide thumbnail.
2. Right-click and choose Duplicate Slide, or use the available command.
3. Edit the duplicated slide's content.

Rearranging slides

1. Locate the slide thumbnail in the left pane.
2. Select it.
3. Drag it to the required position.
4. Check that the presentation follows a logical order.



Deleting a slide

Select the slide thumbnail and use the Delete key or the available delete command.

Before deleting a slide, check that it does not contain information you still need.

9.6 Adding and Formatting Text

Text communicates the main ideas of a presentation. Slides should usually contain concise points rather than full paragraphs copied from a textbook.

Adding text

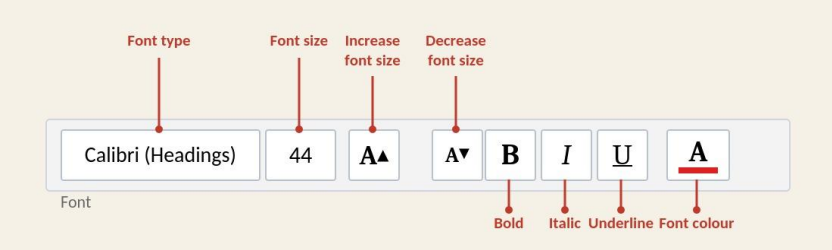
1. Select a text placeholder on the slide.
2. Click inside it.
3. Type the heading or content.
4. Adjust the text as necessary.

You can also insert a text box when the layout does not provide the required text area.

Formatting text

PowerPoint allows you to change:

- Font type
- Font size
- Bold and italic
- Font colour
- Text alignment
- Bullets and numbering



Recommended text practices

- Use a clear title on each slide.
- Use short phrases or bullet points.
- Keep font sizes large enough for the audience.
- Maintain strong contrast between text and background.
- Use consistent fonts and colours.
- Avoid filling slides with long paragraphs.
- Check spelling before presenting.

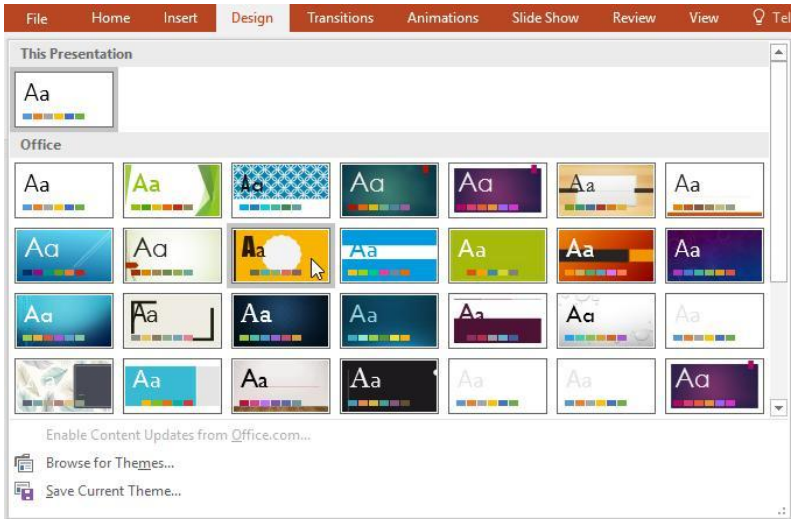
For a typical classroom presentation, titles around 28–36 points and body text around 20–28 points can be useful starting points. Adjust them according to the slide size, room, and amount of content.

> **Remember:** Slides support what you say. They should not force the audience to read a full essay while you speak.

9.7 Applying Themes and Backgrounds

A theme is a coordinated set of design choices that may include colours, fonts, backgrounds, and visual effects.

Themes help keep slides consistent throughout a presentation.



Applying a theme

1. Open the Design tab.
2. Review the available themes.
3. Select a theme that suits the topic.
4. Check the appearance of all slides.
5. Adjust the theme options if required.

Choosing a suitable theme

Consider the following:

- Is the text easy to read?
- Does the background contrast well with the text?
- Are the colours suitable for the subject?
- Does the theme look consistent across the slides?
- Do pictures and charts remain clear?

Changing a slide background

You may change a slide's background colour or use a suitable image where appropriate.

However, a background image should not make text difficult to read.

> **Good practice:** Use one consistent theme and a limited colour palette. A professional presentation does not need a different background on every slide.

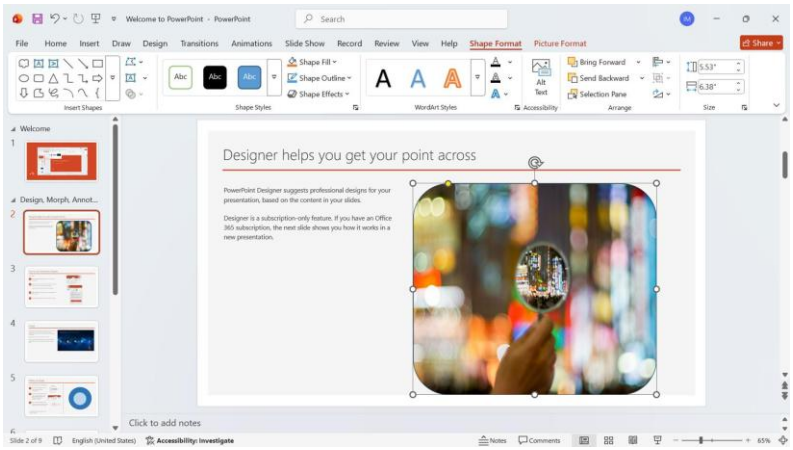
9.8 Inserting Pictures and Shapes

Pictures and shapes can help explain information visually.

A picture may show a real-world example, while a shape can highlight a point or represent part of a diagram.

Inserting a picture

1. Select the slide where the picture is required.
2. Open the Insert tab.
3. Select Pictures or the appropriate picture source.
4. Choose an approved image.
5. Insert it onto the slide.
6. Resize and position it.
7. Check that the picture does not cover important text.



Inserting shapes

Shapes include rectangles, circles, arrows, lines, and other diagram elements.

To insert a shape:

1. Open Insert.
2. Select Shapes.
3. Choose a suitable shape.
4. Draw it on the slide.
5. Adjust its size, outline, or fill if needed.

Example: A simple process diagram

A presentation about saving a document could use three boxes connected by arrows.



A simple diagram can explain a process more clearly than a long paragraph.

Responsible use of visuals

- Choose pictures that relate directly to the topic.
- Use suitable images that you have permission to use.
- Do not stretch images out of proportion.
- Avoid overcrowding slides with decorative elements.
- Credit image sources when required by your teacher.

9.9 Inserting Tables and Charts

Tables and charts help present data in a compact, organized form.

Tables

Tables are useful when an audience needs to compare specific values or read exact information.

Example:

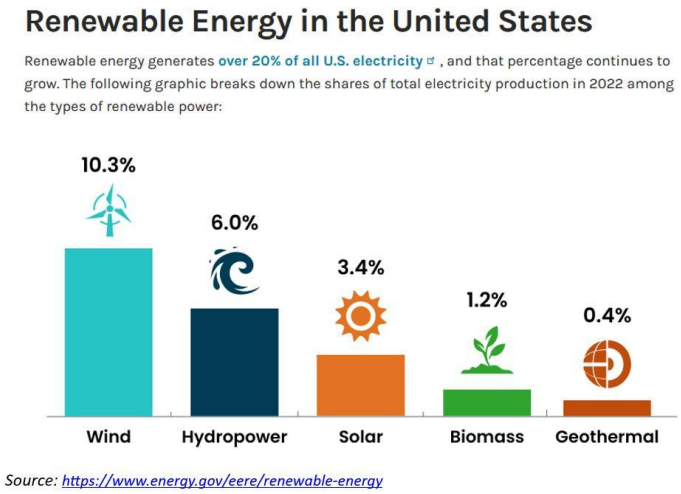
Energy Source	Renewable?
Solar	Yes
Wind	Yes
Coal	No
Natural gas	No

To insert a table:

1. Select the required slide.
2. Open Insert.
3. Select Table.
4. Choose the number of rows and columns.
5. Enter the data.
6. Format the table for readability.

Charts

Charts display data visually. They are particularly useful when the audience needs to compare quantities or understand trends.



Source: https://www.energy.gov/eere/renewable-energy

To insert a chart:

1. Select the slide.
2. Open Insert.
3. Select Chart.
4. Choose a chart type.
5. Enter or edit the data in the provided spreadsheet interface.
6. Return to the slide and review the chart.
7. Add a clear title and readable labels.

Choosing the right visual

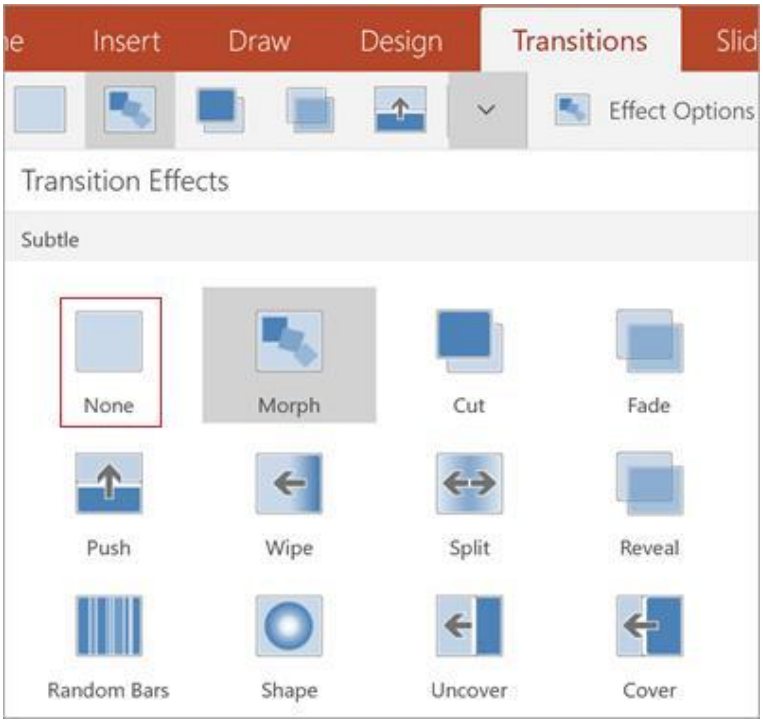
- Use a table when exact values are important.
- Use a column or bar chart to compare categories.
- Use a line chart to show changes over time.
- Use a pie chart only when showing parts of a meaningful whole is appropriate.

Charts should represent the data accurately. Do not change the scale or omit important context in a way that misleads the audience.

9.10 Using Transitions Between Slides

A transition is the visual effect that occurs when moving from one slide to the next during a presentation.

PowerPoint provides different transitions, such as Fade and other movement or reveal effects.



Applying a transition

1. Select the slide thumbnail.
2. Open the Transitions tab.
3. Choose a transition.
4. Preview the effect.
5. Adjust its duration or other available settings if needed.
6. Apply it to other slides only if appropriate.

Good transition practices

- Use simple transitions for most educational presentations.
- Keep transitions consistent.
- Avoid effects that distract the audience.
- Check that transitions do not make the presentation unnecessarily slow.
- Preview the presentation before delivering it.

A transition affects how one slide changes to another. It does not control how individual objects appear on a slide.

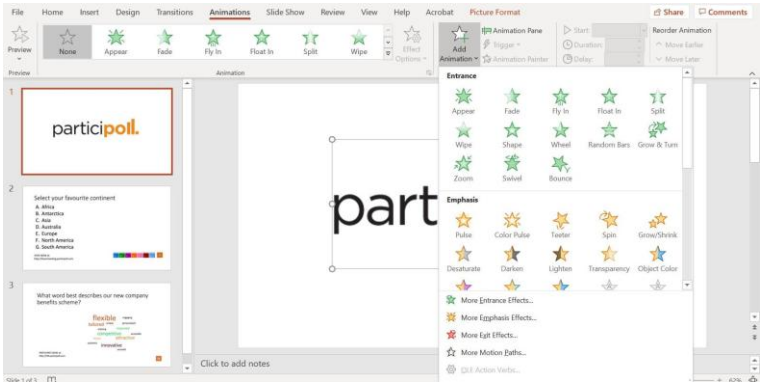
9.11 Using Animations

An animation is a visual effect applied to an object on a slide, such as a heading, picture, or bullet point.

Animations can help reveal information gradually or emphasize an important part of a diagram.

Common animation categories

- **Entrance:** An object appears on the slide.
- **Emphasis:** An object receives a visual effect to draw attention.
- **Exit:** An object disappears from the slide.
- **Motion path:** An object follows a specified path, where supported.



Applying an animation

1. Select the object on the slide.
2. Open the Animations tab.
3. Choose an animation effect.
4. Preview it.
5. Adjust its start and timing options if required.
6. Run the slide show to check the result.

Transitions versus animations

Transitions	Animations
Affect the change from one slide to another.	Affect objects on a slide.
Applied to slides.	Applied to text, pictures, shapes, and other objects.
Example: Fade between slides.	Example: A bullet point appears when clicked.

> **Important:** Animations should support understanding. Too many moving objects can distract the audience from the information.

9.12 Running a Slide Show

The Slide Show view displays slides to an audience, usually using the full screen.

Before presenting, check that the slides appear in the correct order and that all text, pictures, and charts are readable.

Starting a slide show

- Open the Slide Show tab and choose the option to start from the beginning or current slide.
- In many desktop versions of PowerPoint, F5 starts the slide show from the beginning.
- Shift + F5 commonly starts from the current slide.

Keyboard shortcuts may differ depending on the device and version.

Navigating during a presentation

During a slide show, you can commonly:

- Press the Right Arrow or Spacebar to move forward.
- Press the Left Arrow to move back.
- Use the available controls to navigate between slides.
- Press Esc to exit the slide show.



Presenter notes

Presenter notes allow you to keep reminders or additional details that support your spoken explanation.

For example, a slide may contain only three short points, while the notes provide examples that the presenter plans to explain aloud.

Notes should support preparation rather than become a script that the presenter reads word for word.

9.13 Saving, Opening, and Sharing a Presentation

A presentation should be saved regularly to prevent the loss of work.

Saving a presentation

1. Open File.
2. Select Save As if required.
3. Choose the appropriate storage location.
4. Enter a meaningful file name.
5. Save the presentation in PowerPoint format, commonly .pptx.

Example: `Renewable_Energy_Project.pptx`

After the first save, Ctrl + S commonly saves changes.

Opening an existing presentation

1. Open PowerPoint.
2. Select File, then Open.
3. Browse to the presentation.
4. Select it and open the file.

Sharing a presentation

Before sharing a presentation:

- Check that the content is correct.
- Save the latest changes.
- Remove private information that should not be shared.
- Follow the teacher's submission instructions.
- Use an approved method for sharing files.

PowerPoint can also export or save presentations in other formats, such as PDF, depending on the available version and features. A PDF is useful when recipients need to view a presentation without editing the slides, although interactive presentation features may not be preserved.

9.14 Planning and Delivering an Effective Presentation

A successful presentation depends on both the slides and the presenter.

Even a well-designed slide deck may be ineffective if the speaker is unprepared or the information is poorly organized.

Planning the presentation

1	**Introduction**	Introduce the topic and explain why it matters.
2	**Main content**	Present the key points in a logical order. Use evidence, examples, and visuals where appropriate.
3	**Conclusion**	Summarize the most important ideas and finish with a clear final message.

Presentation skills

- Speak clearly and at a suitable pace.
- Face the audience when possible.
- Avoid reading every word from the slides.
- Explain charts and pictures rather than merely displaying them.
- Keep within the allocated time.
- Practise before the actual presentation.
- Be prepared to answer questions politely and accurately.

Example presentation outline

Topic: Protecting the Environment

1. Title and introduction
2. Major environmental problems
3. Causes of pollution
4. Effects on people and nature
5. Practical solutions
6. Conclusion and key message

This sequence introduces the subject, explains the problem, explores solutions, and ends with a summary.

9.15 Classroom Activities

Activity 1: Create a Five-Slide Presentation

Objective: *Learn to create and organize slides.*

Prepare a presentation titled “The Importance of Computer Skills.”

Include:

1. A title slide.
2. A slide explaining what computer skills are.
3. A slide showing three examples of computer skills.
4. A slide explaining how students use computers for learning.
5. A conclusion slide.

Requirements:

- Use a consistent theme.
- Include at least one relevant picture.
- Use short bullet points.
- Save the file as Computer_Skills_Presentation.pptx.
- Run the slide show and check all slides.

Activity 2: Design and Compare Slides

Objective: *Understand effective visual design.*

Create two versions of the same slide:

- **Version A:** Use a clear heading, concise text, and one relevant visual.
- **Version B:** Use too much text, inconsistent fonts, and excessive colours.

Compare both versions and explain which is easier to read and why.

Activity 3: Create a Data Presentation

Objective: *Use tables and charts.*

Prepare a presentation titled “Favourite School Subjects.”

1. Enter sample data approved by your teacher.
2. Insert a table showing the results.
3. Create a suitable chart.
4. Add a title and readable labels.
5. Write two observations based on the data.
6. Save and present your findings.

If you use real survey responses, collect them appropriately and avoid including private information.

Activity 4: Practise Transitions and Animations

Objective: *Understand visual effects.*

1. Create a presentation with three slides.
2. Apply one simple transition.
3. Add an animation to one heading or bullet point.
4. Preview the slide show.
5. Remove any effect that distracts from the content.
6. Explain the difference between a transition and an animation.

Activity 5: Deliver a Short Presentation

Objective: *Develop presentation skills.*

Prepare a three-minute presentation on a teacher-approved topic.

Your presentation should include:

- A clear introduction.
- Three main points.
- At least one relevant visual.
- A conclusion.
- A consistent design.

Present to the class or a small group. Ask your classmates to give constructive feedback on clarity, organization, and delivery.

9.16 Review Questions

A. Multiple-Choice Questions (MCQs)

Choose the correct answer.

1. What is Microsoft PowerPoint mainly used for?

- **A.** Creating and delivering slide presentations
- **B.** Managing computer hardware
- **C.** Writing operating-system code only
- **D.** Deleting files

2. What is a slide?

- **A.** A computer cable
- **B.** An individual page of a presentation
- **C.** A type of worksheet formula
- **D.** A file extension

3. Which tab commonly contains themes?

- **A.** Review
- **B.** Design
- **C.** File
- **D.** View

4. What is the purpose of a slide layout?

- **A.** To arrange placeholders and content on a slide
- **B.** To delete a presentation
- **C.** To change the computer's operating system
- **D.** To calculate spreadsheet totals

5. Which tab is commonly used to insert pictures and charts?

- **A.** Insert
- **B.** Review
- **C.** Slide Show
- **D.** Transitions

6. **What is a transition?**
   - **A.** An effect between slides
   - **B.** An effect that changes a spreadsheet formula
   - **C.** A file-saving command
   - **D.** A type of document margin

7. **What is an animation?**
   - **A.** A page number
   - **B.** A visual effect applied to an object on a slide
   - **C.** A type of workbook
   - **D.** A spelling tool

8. **Which keyboard shortcut commonly starts a slide show from the beginning in desktop PowerPoint?**
   - **A.** Ctrl + S
   - **B.** Ctrl + B
   - **C.** F5
   - **D.** Ctrl + Enter

9. **What is the purpose of presenter notes?**
   - **A.** To provide reminders or extra information for the presenter
   - **B.** To delete slide thumbnails
   - **C.** To change a slide’s file extension
   - **D.** To calculate marks

10. **Which is a good presentation practice?**
    - **A.** Reading every word directly from the slides
    - **B.** Using many distracting animations
    - **C.** Using clear text, relevant visuals, and a logical order
    - **D.** Using a different font on every line

B. Short-Answer Questions

1. Define Microsoft PowerPoint.
2. What is a presentation, and what is a slide?
3. Name four common slide layouts.
4. Identify five main parts of the PowerPoint window.
5. Explain the purpose of a theme.
6. Write the steps for adding a new slide.

7. How can pictures and shapes improve a presentation?
8. What is the difference between a transition and an animation?
9. Explain how to start and navigate a slide show.
10. What are presenter notes?
11. Write the steps for saving a PowerPoint presentation.
12. List six characteristics of an effective presentation.

C. Critical-Thinking Questions

1. A student creates a presentation with several long paragraphs on each slide. Explain how the student could improve it.
2. A presentation contains many animations and different transitions. Explain why this might distract the audience and suggest a better approach.
3. You are presenting data about student survey results. Would a table or a chart be more suitable for comparing categories? Explain your choice.
4. Why should a presenter practise the slide show before delivering it in class?
5. A picture covers part of a slide's heading. How should the student correct the layout?
6. Explain why a good presentation requires both well-designed slides and effective speaking skills.

9.17 Homework

1. Define presentation, slide, slide layout, theme, transition, and animation.
2. Draw a labelled diagram of the PowerPoint window.
3. Write the steps for inserting a picture and a chart into a slide.
4. Explain the difference between a transition and an animation with one example of each.
5. Write five rules for designing readable and professional slides.
6. Prepare a six-slide outline for a presentation titled "Technology in Everyday Life."
7. Write five presentation skills that help a speaker communicate effectively.
8. Explain why saving, checking, and practising a presentation before delivery are important.

Quick Revision

PowerPoint	An application for creating and delivering slide presentations.
Layouts and Themes	Help organize slide content and maintain a consistent design.
Pictures, Tables, and Charts	Communicate information visually and support explanations.
Transitions and Animations	Add visual effects between slides and to objects on slides.
Slide Show	Displays the presentation to the audience.
Presentation Skills	Clear speech, logical organization, practice, and audience awareness.

Chapter 10: Internet, Web Browsers, and Online Research

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain what the internet is and identify common uses.
- Differentiate between the internet, the World Wide Web, a website, and a webpage.
- Identify web browsers and search engines.
- Understand URLs and navigate websites.
- Search for information effectively using suitable keywords.
- Evaluate whether online information is reliable.
- Understand copyright, plagiarism, and responsible use of online content.
- Follow important internet safety rules.

10.1 What Is the Internet?

The internet is a worldwide network of connected computers, servers, phones, and other devices that communicate and exchange information.

It allows people to communicate, learn, share files, watch educational videos, attend online classes, and access many services.



Common uses of the internet

- **Education:** Online lessons, digital libraries, educational videos, and research.
- **Communication:** Email, messaging, and video calls.
- **Entertainment:** Music, videos, and online games.
- **Information:** News, weather reports, and reference websites.
- **Online services:** Shopping, banking, bookings, and government services.
- **Collaboration:** Sharing documents and working with classmates on projects.

How does the internet work?

When you open a website, your device sends a request through a network. A computer called a server responds by sending the requested information back to your device.

How a webpage reaches your device

1	**Your device**	You enter a website address.
2	**The internet**	The request travels across connected networks.
3	**The web server**	The server sends the requested webpage.
4	**The webpage appears**	Your browser displays the information.

Diagram: A simplified view of a web request and response.

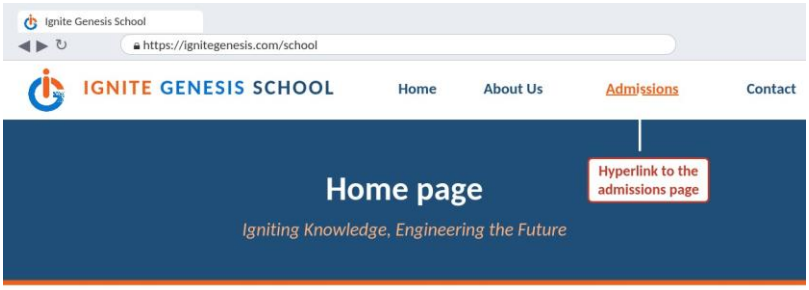
> **Remember:** The internet is the network infrastructure. The World Wide Web is one service that operates over it.

10.2 The Internet and the World Wide Web

The terms internet and World Wide Web are related, but they do not mean exactly the same thing.

Term	Meaning	Example
Internet	The worldwide network connecting devices	Connected computers and networks
World Wide Web (WWW)	A collection of linked webpages accessed over the internet	Websites containing pages and links
Website	A group of related webpages	A school's official website
Webpage	A single page within a website	The school's admissions page
Hyperlink	A clickable link to another page, file, or location	"Read More"

A website may contain a home page, an About Us page, a contact page, and other webpages.



A website is a collection of linked webpages. A **hyperlink** on the home page can take a visitor to another page, such as the admissions page.

Example

Imagine that Ignite Genesis School has a website.

- The website is the entire online collection.
- The home page introduces the school.
- The admissions page explains how to apply.
- A hyperlink may take a visitor from the home page to the admissions page.

10.3 Web Browsers

A web browser is a software application used to open, view, and interact with websites.

Popular browsers include:



Google Chrome

A widely used web browser for computers and mobile devices.



Microsoft Edge

A browser developed by Microsoft.



Mozilla Firefox

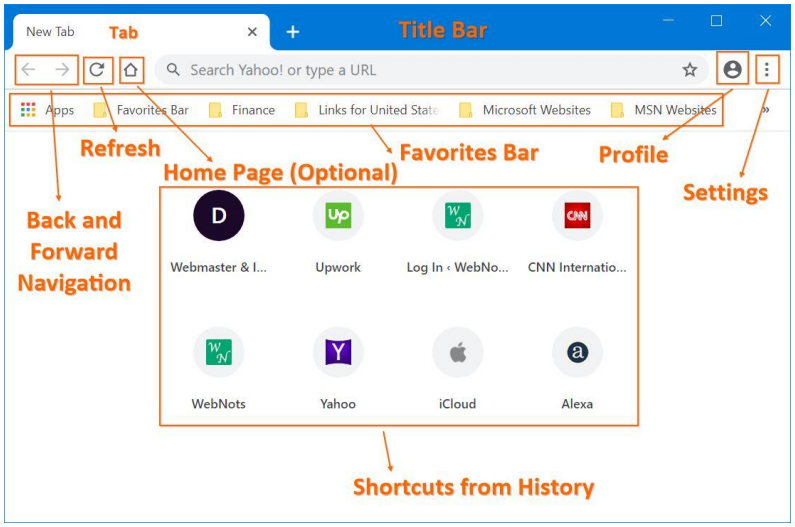
A browser known for its privacy features and customization options.



Apple Safari

The default browser on Apple devices.

Important browser features



- **Address bar:** Displays the website address and can be used to enter a URL or search terms.
- **Back button:** Returns to the previous page.
- **Forward button:** Moves forward after using the Back button.
- **Refresh button:** Reloads the current webpage.
- **Tabs:** Allow multiple webpages to remain open in one browser window.
- **Bookmarks or favourites:** Save links to webpages for quick access.
- **Downloads:** Show files downloaded through the browser.

> **Important distinction:** A browser opens websites; a search engine helps you find information and websites.

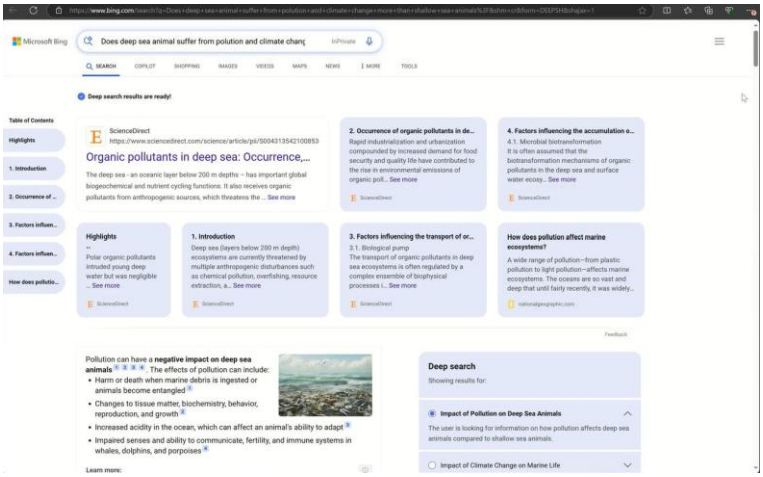
10.4 Search Engines

A search engine is an online service that helps users find webpages, images, videos, maps, and other information.

Examples include:

- Google Search
- Microsoft Bing
- DuckDuckGo

To use a search engine, type a question or keywords into its search box and review the results.



How are a browser and a search engine different?

Web browser	Search engine
Software installed on or available to a device	Online service accessed through a browser or app
Opens and displays webpages	Helps find relevant webpages
Examples: Chrome, Edge, Firefox	Examples: Google Search, Bing, DuckDuckGo

You can open a search engine in Chrome, Edge, or another browser.

10.5 Understanding Website Addresses (URLs)

A URL (Uniform Resource Locator) is the address used to locate a resource on the web.

Example:

Parts of a URL

https://	www.example.com	/science
Protocol Indicates a secure method for communication with the website.	**Domain** Identifies the website's domain.	**Path** Identifies a particular page or resource on the website.

This is an illustrative example, not a real school website address.

What do domain endings mean?

Domain endings can give clues about a website, but they do not guarantee that the information is trustworthy.

Ending	Common use
.com	Commercial or general-purpose websites
.org	Often used by organizations
.edu	Used by eligible educational institutions, particularly in the United States
.gov	Government websites, especially in the United States
.ae	United Arab Emirates country-code domain

Other countries have their own domain endings. For example, .pk is associated with Pakistan.

Safe browsing habits

- Check the website address before entering personal information.
- Look carefully for misspelled domain names.
- Do not assume a website is safe just because it uses https://.
- Avoid clicking suspicious links in messages or pop-ups.
- Ask a teacher or trusted adult if a website seems unusual.

10.6 Searching Effectively

A good search starts with a clear question. Choosing suitable keywords helps a search engine return more relevant results.

Keywords are the important words or phrases that describe what you want to find.

Improve your search

Too broad	⌕ `plants`
More specific	⌕ `how plants make food`
Focused on your assignment	⌕ `photosynthesis process for Grade 6 science`

Specific keywords help narrow the search to your learning needs.

Tips for better searches

1. Use important words instead of typing a long, unclear sentence.
2. Include the subject, location, date, or grade level when useful.
3. Try different keywords if the results are not helpful.
4. Use quotation marks to search for an exact phrase, when supported. For example: "water cycle".
5. Add words such as official, research, or Grade 6 when they fit the task.
6. Read the result title and short description before opening a page.
7. Open relevant results and compare information from more than one reliable source.

Example: researching renewable energy

Instead of searching for energy, try:

- renewable energy sources for students
- advantages of solar energy
- how wind turbines generate electricity
- official renewable energy statistics

Remember: The first search result is not automatically the best or most accurate result. Some results may be advertisements, outdated pages, or unreliable content.

10.7 Evaluating Online Information

Anyone can publish information online. Therefore, students must learn to check whether information is accurate, current, relevant, and trustworthy.

Use the CRAAP test as a helpful checklist.

C	**Currency**	When was the information published or updated? Is it recent enough for your topic?
R	**Relevance**	Does the information answer your question and suit your learning level?
A	**Authority**	Who created the content? Is the author or organization qualified to discuss the topic?
A	**Accuracy**	Can the claims be checked against other reliable sources? Are evidence and references provided?
P	**Purpose**	Was the content created to inform, educate, entertain, persuade, or sell something?

Example: two websites about healthy eating

Imagine that you find two pages:

- **Website A:** An article from a recognized health organization, with an author, references, and a recent review date.
- **Website B:** An anonymous page claiming that one food cures every illness, without evidence.

Website A appears more reliable because it provides identifiable authorship and supporting information. Website B contains an exaggerated claim and lacks evidence.

Still, always evaluate the actual content rather than judging a website by its appearance alone.

Signs that information may be unreliable

- No author or credible organization is identified.
- The page makes extreme claims without evidence.
- The information conflicts with several trustworthy sources.
- The page uses misleading headlines or fake-looking statistics.
- The content is outdated for a topic that changes frequently.
- The page pressures readers to buy something or share personal details.

10.8 Copyright, Plagiarism, and Using Online Content

Online information, photographs, diagrams, music, and videos may be protected by copyright. Finding something online does not automatically mean that you have permission to copy or reuse it.

Copyright

Copyright is a legal protection that generally gives creators control over how their original work is copied, distributed, or adapted, subject to applicable exceptions and permissions.

Plagiarism

Plagiarism means presenting another person’s words, ideas, or work as your own without proper acknowledgment.

For example, copying a paragraph from a website into a school assignment and claiming that you wrote it yourself is plagiarism.

How to use online information correctly

1. Read and understand the information.
2. Write the explanation in your own words.
3. Give credit to the original source.
4. Cite the source when your teacher requires it.
5. Use images and other materials only when permitted by the license, permission, or applicable rules.
6. Do not remove a creator’s name or watermark to make the work appear to be yours.

Example of a source note

Suppose you use information from an educational webpage about the water cycle. Your source note might include:

> **Title:** The Water Cycle
> **Organization or author:** Name of the publisher
> **Website:** Name of the website
> **URL:** Full webpage address
> **Access date:** The date you visited the page, if required by your teacher

A source note helps readers locate the information you used.

> **Remember:** Changing a few words in copied text does not automatically make it your own work. Understand the information, express it independently, and acknowledge the source.

10.9 Internet Safety and Responsible Online Behaviour

The internet is useful, but users must protect their personal information and behave respectfully online.

Protect your personal information

Never share sensitive information with strangers online, including:

- Passwords and verification codes.
- Home address and private contact details.
- School account credentials.
- Personal photographs or private family information.
- Financial information belonging to you or your family.

Use strong, unique passwords and enable multi-factor authentication where available and appropriate. Never share your password with classmates.

Recognize online risks



1. Phishing

Fake messages or websites try to trick people into revealing passwords or other private information.



2. Malware

Harmful software can damage devices, steal information, or interfere with normal computer use.



3. Cyberbullying

Using digital communication to threaten, humiliate, or repeatedly hurt someone.



4. Privacy risks

Websites and apps may collect information about users. Review permissions and share only what is necessary.

Rules for safe internet use

- Think before clicking links or downloading files.
- Never meet an online stranger in person without a trusted adult's involvement.
- Tell a teacher, parent, or trusted adult if someone makes you uncomfortable.
- Block and report abusive accounts when appropriate.
- Keep your device and software updated.
- Log out of school or shared computers after use.
- Respect other people's opinions and privacy.

Digital footprint

A digital footprint is the trail of information created by your online activities. Posts, comments, photographs, and shared content may remain accessible even after you delete them.

Before posting anything, ask yourself:

> **Would I be comfortable if my teacher, family, or future employer saw this?**

10.10 Using AI Tools for Online Research

Some students use artificial intelligence (AI) tools to explain concepts, suggest ideas, or summarize information. These tools can support learning, but they can also produce incorrect or misleading answers.

Use AI responsibly:

1. Ask clear questions.
2. Check important facts against reliable sources.
3. Never submit AI-generated work as entirely your own if your teacher requires independent work.
4. Follow your school's rules for AI use.
5. Never enter passwords, private school records, or other sensitive information into an AI tool.
6. Use AI to help you understand a topic, not to avoid learning it.

> **Example:** If an AI tool explains how volcanoes form, compare its explanation with your textbook or a trusted science website before using it in your assignment.

10.11 Classroom Activities

Activity 1: Search Like a Researcher

Choose a topic such as renewable energy, the water cycle, or computer networks.

1. Write three different search queries.
2. Compare the results.
3. Open two relevant sources.
4. Record the titles, publishers, and URLs.
5. Explain which source appears more reliable and why.

Activity 2: Spot the Warning Signs

Read this sample message:

> **"URGENT! You have won a free laptop. Click this unknown link and enter your school password within five minutes!"**

Answer:

- What makes this message suspicious?
- What should the student do?
- Who could the student ask for help?

Activity 3: Prepare a Mini Research Report

Research a topic approved by your teacher. Prepare a one-page report containing:

- A title and short introduction.
- Three facts written in your own words.
- At least two reliable sources.
- One appropriately licensed or permitted image, with credit.
- A short conclusion.

10.12 Review Questions

A. Multiple-Choice Questions

Choose the correct answer.

1. What is the internet?

- **A.** A type of word processor
- **B.** A worldwide network of connected devices and networks
- **C.** A single website
- **D.** A computer keyboard

2. Which of the following is a web browser?

- **A.** Microsoft Excel
- **B.** Google Search
- **C.** Mozilla Firefox
- **D.** Microsoft Word

3. What is the main purpose of a search engine?

- **A.** To create spreadsheets
- **B.** To find information and webpages
- **C.** To repair computer hardware
- **D.** To format documents

4. What does URL stand for?

- **A.** Universal Reading List
- **B.** Uniform Resource Locator
- **C.** User Record Link
- **D.** Unified Research Language

5. Which is the best search query for a Grade 6 project about photosynthesis?

- **A.** Things
- **B.** Plants
- **C.** Photosynthesis process for Grade 6 science
- **D.** Homework

6. **Which action demonstrates responsible research?**
   - **A.** Copying a whole article without credit
   - **B.** Believing every search result
   - **C.** Comparing reliable sources and acknowledging them
   - **D.** Sharing passwords to access websites

7. **Which is a warning sign of a phishing message?**
   - **A.** It comes from a verified school portal you normally use
   - **B.** It asks you to reveal your password through an unknown link
   - **C.** It contains your assigned homework
   - **D.** It links to a textbook you already know

8. **What is plagiarism?**
   - **A.** Saving a webpage as a bookmark
   - **B.** Using a search engine
   - **C.** Presenting someone else's work as your own without proper acknowledgment
   - **D.** Opening multiple browser tabs

B. Short-Answer Questions

1. Define the internet.
2. Explain the difference between a browser and a search engine.
3. What is a URL? Give an example.
4. State four tips for effective online searching.
5. Explain two ways to evaluate the reliability of a website.
6. What are copyright and plagiarism?
7. List five rules for safe internet use.
8. What is a digital footprint?

C. Critical-Thinking Questions

1. Two websites give different answers to the same science question. What steps would you take to decide which answer is more reliable?
2. A classmate copies a paragraph from a website and submits it as original work. Explain why this is wrong and how the classmate could correct the assignment.
3. You receive a message claiming that your school account will be deleted unless you enter your password immediately. What should you do, and why?
4. An AI tool gives you a useful explanation, but your textbook gives different information. How should you investigate the difference?

10.13 Homework

Complete the following tasks in your notebook.

1. Write the names of three web browsers and three search engines.
2. Explain the difference between the internet and the World Wide Web.
3. Choose a science or technology topic and write three effective search queries for it.
4. Find two sources about your chosen topic. Record each source’s title, publisher, and URL.
5. Use the CRAAP checklist to evaluate one of the sources.
6. Write six internet safety rules in your own words.
7. Explain why copying information without credit is wrong.

Quick Revision

Internet	A worldwide network connecting devices and networks.
World Wide Web	Linked webpages and resources accessed through the internet.
Browser	Software used to open and display websites.
Search engine	A service used to find online information.
URL	The address of a webpage or other online resource.
Reliable research	Check the author, date, evidence, purpose, and other trustworthy sources.
Responsible use	Protect privacy, respect copyright, avoid plagiarism, and behave respectfully.

Chapter 11: Online Safety and Responsible Technology Use

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain the importance of online safety and digital citizenship.
- Identify personal and sensitive information that should be protected.
- Create and manage strong passwords.
- Recognize phishing, scams, malware, and other online threats.
- Explain cyberbullying and demonstrate respectful online communication.
- Understand digital footprints and online reputation.
- Apply copyright rules and avoid plagiarism.
- Develop healthy technology habits.
- Respond appropriately to unsafe or uncomfortable online situations.

11.1 What Is Online Safety?

Online safety means protecting yourself, your information, your devices, and other people while using the internet and digital technology.

The internet helps us learn, communicate, create, and solve problems. However, careless use can expose users to scams, privacy violations, harmful content, and other risks.

Online safety is not only about avoiding danger. It also means making responsible choices and treating others with respect.

The four areas of digital safety

Personal safety	Protect yourself and your privacy.
Device safety	Protect devices from harmful software.
Social safety	Communicate respectfully and avoid bullying.
Ethical use	Respect others' work, rights, and information.

Illustration: Four connected responsibilities of a safe digital citizen.

Why is online safety important?

It helps us:

- Keep personal information private.
- Protect school accounts and digital files.
- Avoid fraudulent messages and suspicious downloads.
- Prevent harm to ourselves and others.
- Build a positive online reputation.
- Use technology confidently and responsibly.

11.2 Personal Information and Privacy

Personal information is information that identifies a person or reveals details about their life.

Examples include a person's full name, home address, phone number, school account, photographs, and location.

Some information is particularly sensitive, such as passwords, verification codes, financial details, and private family or school records.

What should you protect?

Passwords and verification codes	Never share these with classmates or strangers. A legitimate support request should not require you to disclose your password.
Location and contact details	Do not publicly post your home address, live location, or private contact information.
Photographs and videos	Ask permission before sharing other people's images. Consider what a photograph reveals about you or your location.
School and family records	Do not upload private student records, confidential documents, or family information to public websites or unapproved apps.

Privacy settings

Many apps and websites allow users to control who can view their information.

Good privacy habits include:

1. Set social accounts to appropriate privacy levels.
2. Review app permissions before allowing access to a camera, microphone, or location.
3. Share information only with people who genuinely need it.
4. Remove unnecessary permissions when possible.
5. Ask a trusted adult before joining an unfamiliar platform.

> **Important:** A private account can reduce exposure, but it does not guarantee that content will never be copied or shared.

11.3 Strong Passwords and Account Security

A password is a secret used to help verify a user's identity when accessing an account.

Weak passwords can be guessed easily. For example, passwords based on a person's name, birthday, or common words are often poor choices.

How to create a strong password

- Make it long and difficult to guess.
- Use a unique password for each important account.
- Avoid names, birthdays, school names, and predictable sequences.
- Consider using a long passphrase made of unrelated words.
- Use a trusted password manager where permitted.
- Enable multi-factor authentication (MFA) when available.

Multi-factor authentication adds another verification step, such as an authentication app or security key.

Password strength: examples

WEAK	BETTER EXAMPLE
`12345678`	`River!Copper7Cloud-Mango`
Short and predictable.	Longer and less predictable. This is an example only; do not use it as your real password.

Password safety rules

- Never send passwords through chat or email.
- Do not reuse the same password everywhere.
- Never share a one-time verification code with someone who asks for it unexpectedly.
- Sign out of shared computers.
- If you think an account has been compromised, tell a trusted adult or the responsible school staff member and change the password using the official website or app.

11.4 Phishing, Scams, and Malware

Online criminals sometimes use tricks to steal information, gain access to accounts, or damage devices.

A. Phishing

Phishing is an attempt to trick people into revealing confidential information or taking an unsafe action, often through fake emails, messages, websites, or links.

Warning signs include:

- Urgent demands or threats.
- Unexpected prizes or rewards.
- Strange sender addresses.
- Misspelled or misleading website addresses.
- Requests for passwords, verification codes, or payment.
- Unexpected attachments or links.

B. Online scams

A scam is a dishonest scheme designed to trick people into giving away money, information, or access.

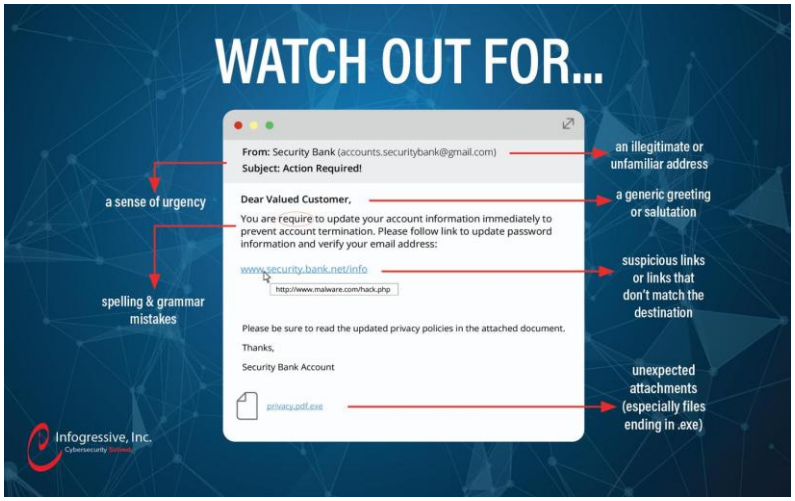
Examples include fake prize messages, fraudulent shopping pages, and impersonation of a trusted organization.

C. Malware

Malware is harmful software designed to damage devices, disrupt activities, or steal information.

Common types include:

- **Virus:** Malicious code that can spread by infecting files or programs.
- **Spyware:** Software that secretly collects information.
- **Ransomware:** Malware that locks or encrypts data and demands payment.
- **Trojan:** A malicious program disguised as something legitimate.



What should you do if you receive a suspicious message?

1. Do not click the link or open the attachment.
2. Do not reply with private information.
3. Check the message using an official contact method, not the details in the suspicious message.
4. Report it to a teacher, parent, or appropriate IT staff member.
5. If you already clicked or entered information, tell a trusted adult promptly and follow the appropriate account-security steps.

> **Remember:** A message can look professional and still be fraudulent. Always check before acting.

11.5 Cyberbullying and Respectful Online Communication

Cyberbullying is the use of digital technology to bully, threaten, humiliate, or repeatedly hurt another person.

It can happen through messaging apps, social media, online games, email, or other digital platforms.

Examples of cyberbullying

- Sending repeated insulting or threatening messages.
- Sharing embarrassing photographs without permission to hurt someone.
- Spreading harmful rumours online.
- Creating fake accounts to impersonate or humiliate someone.
- Deliberately excluding or targeting someone in online groups.

How to respond to cyberbullying

1. Do not retaliate

Avoid sending abusive replies or escalating the situation.

2. Keep evidence when safe

Save relevant messages or screenshots if appropriate. Do not forward humiliating content to others.

3. Tell a trusted adult

Speak to a parent, teacher, school counsellor, or another trusted adult.

4. Block and report

Use platform safety tools and seek help to stop further contact.

Digital etiquette

Digital etiquette, or netiquette, means behaving politely and responsibly when communicating online.

Follow these rules:

- Use respectful language.
- Think before posting or commenting.
- Do not type insults or threats.
- Respect different opinions.
- Ask permission before sharing another person's content.
- Do not spread rumours or unverified claims.
- Avoid sharing private conversations without permission.
- Remember that there is a real person behind every account.

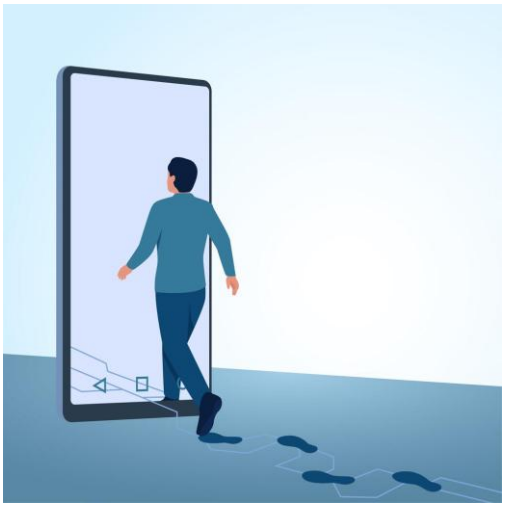
A good digital citizen uses technology to help others, not to hurt them.

11.6 Digital Footprints and Online Reputation

A digital footprint is the record of information associated with your online activities.

It may include posts, comments, uploaded photographs, search activity, and information collected by websites and apps.

There are two commonly described types.



Active digital footprint

Information you deliberately share, such as posting a comment, uploading a photograph, or submitting an online form.



Passive digital footprint

Information collected about your activity, such as certain browsing data, depending on the website, app, and privacy settings.

Why does your digital footprint matter?

Online information can be copied, saved, or shared beyond its original audience. A post that seems funny today may embarrass you later or affect how other people see you.

Before sharing anything, ask:

- Is it true?
- Is it respectful?
- Do I have permission to share it?
- Does it reveal private information?
- Would I be comfortable if other people saw it later?

Building a positive online reputation

- Share useful and respectful content.
- Avoid arguments, threats, and offensive comments.
- Give credit to creators.
- Correct mistakes when appropriate.
- Report harmful content rather than spreading it.
- Remember that deleting a post does not guarantee every copy disappears.

11.7 Copyright, Plagiarism, and Intellectual Property

When people create original work, they may have legal rights over how it is copied or used. This is one part of intellectual property.

Examples of creative work include:

- Photographs and illustrations.
- Books and articles.
- Music and videos.
- Computer programs.
- Original presentations and designs.

Copyright versus plagiarism

Copyright	Plagiarism
A legal protection for certain original works.	An ethical and academic issue involving presenting others' work as your own.
Copying or reuse may require permission or a valid legal exception.	Proper acknowledgment is important, but acknowledgment alone does not always grant permission to reuse protected work.
Rules depend on the work and applicable law.	School rules may apply even when a particular work is not protected by copyright.

How to use online content responsibly

1. Create your own writing, drawings, and presentations whenever possible.
2. Acknowledge sources used for research.
3. Check the usage licence before reusing images, music, or videos.
4. Follow any conditions attached to a licence, such as giving credit.
5. Do not assume that every image found through a search engine is free to use.
6. Ask your teacher if you are unsure whether a resource may be used.

Example

A student finds an attractive photograph online and places it in a school presentation.

A responsible student checks whether reuse is allowed, follows any licence conditions, and gives appropriate credit. The student does not claim to have taken the photograph.

11.8 Healthy Technology Habits

Technology is useful, but excessive or poorly managed use can interfere with sleep, physical activity, concentration, and relationships.

Develop a balanced routine



- Take regular breaks during extended screen sessions.
- Sit comfortably and maintain good posture.
- Keep the screen at a comfortable viewing distance.
- Use suitable lighting and avoid glare.
- Take part in physical activity and outdoor play.
- Protect your sleep by following a consistent bedtime routine.
- Avoid unnecessary notifications while studying.
- Make time for family, friends, reading, and hobbies away from screens.

Be aware of online content

Not everything online is accurate, appropriate, or helpful. If a webpage, video, message, or image makes you uncomfortable, close it and speak to a trusted adult.

Healthy technology use means choosing when and how to use devices, rather than allowing devices to control your time.

11.9 Responsible Use of Artificial Intelligence

Artificial intelligence (AI) tools can help students brainstorm ideas, understand difficult concepts, and practise skills. However, AI-generated information may be inaccurate, incomplete, or biased.

Use AI responsibly:

- Check important claims against reliable sources.
- Follow school rules about when AI is permitted.
- Be honest about AI assistance when disclosure is required.
- Do not submit generated work as your own if independent work is expected.
- Never enter confidential student information, passwords, or private records into an unapproved AI service.
- Ask a teacher for help if you do not understand an AI-generated answer.

> **Example:** You may ask an approved AI tool to explain a difficult computer term. You should then check the explanation, understand it, and write your own answer for class.

11.10 What to Do When Something Goes Wrong

Even careful users can encounter online problems. Acting promptly and seeking help can reduce harm.

A simple response plan

1	**Stop**	Stop interacting with suspicious or harmful content. Do not click more links or send additional information.
2	**Protect**	Leave the page, block the account if appropriate, and secure affected accounts with help.
3	**Report**	Tell a trusted adult, teacher, parent, or appropriate school IT staff member. Use the platform's reporting tools when relevant.
4	**Recover**	Follow advice to change compromised passwords, remove unsafe apps, scan devices, or restore account security.

If you have shared a password or verification code with a suspicious person, tell a trusted adult immediately. Use the official account recovery process and change affected credentials. If the same password was reused elsewhere, secure those accounts too.

11.11 Classroom Activities

Activity 1: Password Safety Challenge

Examine the following sample passwords and explain which is easier to guess and why.

- 12345678
- School2026
- River!Copper7Cloud-Mango

Then write three rules for creating a strong password. Do not write or share your real password.

Activity 2: Identify the Scam

Read the sample message:

> **URGENT ACCOUNT ALERT**

Your school account will be permanently deleted in 10 minutes! Click this unknown link and enter your password to save your account.

Answer:

1. Identify three warning signs.
2. What should the student avoid doing?
3. How could the student check whether the alert is genuine?

Activity 3: Digital Citizenship Role-Play

In small groups, act out one of these situations:

- A classmate receives insulting messages in a group chat.
- A student wants to share a friend's photograph without asking.
- Someone posts a copied paragraph in a school assignment.
- A stranger asks a student for their home address.

Demonstrate a safe and responsible response to each situation.

Activity 4: Create a Digital Safety Poster

Design a poster titled "Think Before You Click."

Include:

- Five internet safety rules.
- One example of a phishing warning sign.
- One rule about respectful online communication.
- A short slogan encouraging responsible technology use.

You may create the poster using Microsoft Word or PowerPoint.

11.12 Review Questions

A. Multiple-Choice Questions

Choose the correct answer.

1. What is online safety?

- **A.** Using a computer only for games
- **B.** Protecting yourself, your information, and your devices online
- **C.** Sharing all your information publicly
- **D.** Avoiding all forms of technology

2. Which is the safest password practice?

- **A.** Using your birthday
- **B.** Using the same password for every account
- **C.** Using long, unique passwords
- **D.** Sharing your password with friends

3. What is phishing?

- **A.** A method of formatting documents
- **B.** An attempt to trick people into revealing information or taking unsafe actions
- **C.** A type of spreadsheet formula
- **D.** A method of protecting a monitor

4. Which of the following is malware?

- **A.** A presentation theme
- **B.** A spreadsheet chart
- **C.** Ransomware
- **D.** A bookmark

5. What should you do if you experience cyberbullying?

- **A.** Send threatening messages in return
- **B.** Share the messages publicly to embarrass the sender
- **C.** Seek help from a trusted adult and use reporting tools
- **D.** Keep the situation secret in every circumstance

6. What is a digital footprint?

- **A.** A mark left on a computer screen
- **B.** A record of information associated with online activities
- **C.** A computer virus
- **D.** A printer setting

7. What is plagiarism?

- **A.** Using a browser to find information
- **B.** Giving credit to an author
- **C.** Presenting someone else's work as your own without proper acknowledgment
- **D.** Saving a document

8. Which is a healthy technology habit?

- **A.** Using a screen all night
- **B.** Ignoring all physical activity
- **C.** Taking breaks during extended screen use
- **D.** Keeping every notification enabled while studying

B. Short-Answer Questions

1. Define online safety.
2. List five types of personal information that should be protected.
3. State four characteristics of a strong password.
4. What is multi-factor authentication?
5. Explain the difference between phishing and malware.
6. Define cyberbullying and give two examples.
7. Explain the difference between active and passive digital footprints.
8. State four ways to use online content responsibly.
9. List five healthy technology habits.
10. What steps should you take if you suspect that your account has been compromised?

C. Critical-Thinking Questions

1. A student receives a message offering a free tablet in exchange for their school login details. Explain how the student should respond.
2. Someone shares an embarrassing photograph of a classmate without permission. What problems could this cause, and what should a responsible student do?
3. A student uses the same password for their school account and gaming account. Explain the risk and recommend a better approach.
4. Why might deleting an online post not completely remove its effects?
5. An AI tool provides an answer for a homework assignment. How can a student use the tool responsibly while still demonstrating their own learning?

11.13 Homework

Complete the following in your notebook.

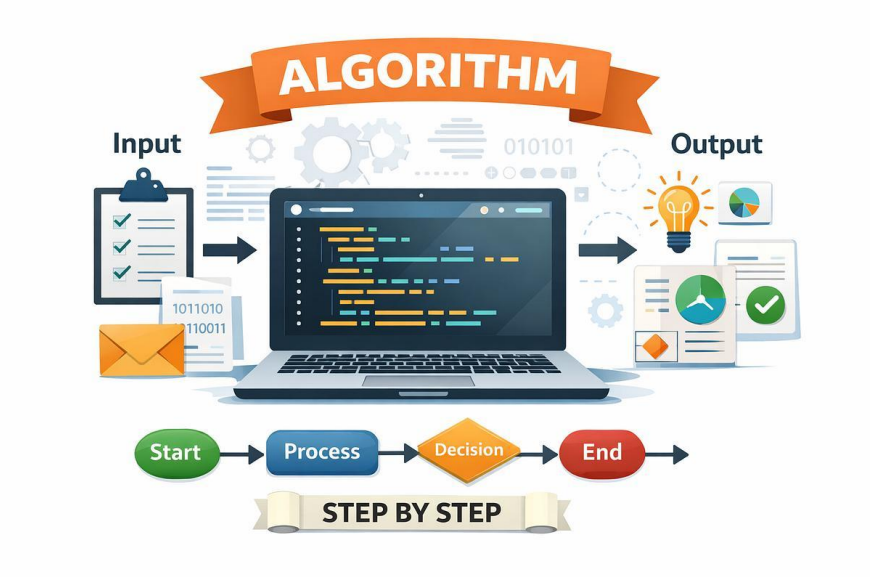
1. Write ten rules for staying safe online.
2. Explain phishing, malware, and cyberbullying in your own words.
3. Draw a diagram showing four steps to take when encountering an online threat.
4. Explain the importance of strong, unique passwords.
5. Describe three ways to build a positive digital footprint.
6. Write a short paragraph explaining why copyright and plagiarism matter in schoolwork.
7. Prepare a one-week personal plan for balancing screen time, homework, sleep, exercise, and family activities.

Quick Revision

Online safety	Protecting yourself, your information, and your devices.
Password security	Use long, unique passwords and enable multi-factor authentication when available.
Phishing	Deceptive messages or websites designed to trick users.
Malware	Software designed to cause harm or perform unauthorized activities.
Cyberbullying	Using digital technology to bully or harm others.
Digital footprint	The trail of information associated with online activities.
Digital citizenship	Using technology safely, respectfully, ethically, and responsibly.

Chapter 12: Computational Thinking — Solving Problems Step by Step

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain computational thinking and why it is useful.
- Break a large problem into smaller parts using decomposition.
- Identify similarities and repeated patterns.
- Use abstraction to focus on important information.
- Design algorithms to solve everyday problems.
- Represent algorithms using pseudocode and flowcharts.
- Recognize sequence, selection, and repetition in algorithms.
- Test solutions, identify errors, and improve their steps.

12.1 What Is Computational Thinking?

Computational thinking is a way of solving problems by organizing information and developing clear steps that can be followed by a person or a computer.

It does not mean that you must always use a computer. You can use computational thinking to organize your schoolwork, plan a journey, prepare a meal, or solve a mathematical problem.

For example, imagine that your teacher asks you to prepare a class presentation. Instead of trying to complete everything at once, you can divide the task into smaller parts, identify what information you need, organize the slides, and check the final presentation.

That is computational thinking in action.

The four main techniques

Decomposition	Break a large problem into smaller parts.
Pattern recognition	Find similarities and repeated features.
Abstraction	Focus on important details and ignore irrelevant ones.
Algorithm design	Create clear, ordered steps to solve a problem.

Diagram: Four key techniques used in computational thinking.

These techniques often work together. A programmer may break a problem into parts, recognize repeated patterns, focus on necessary information, and then design an algorithm.

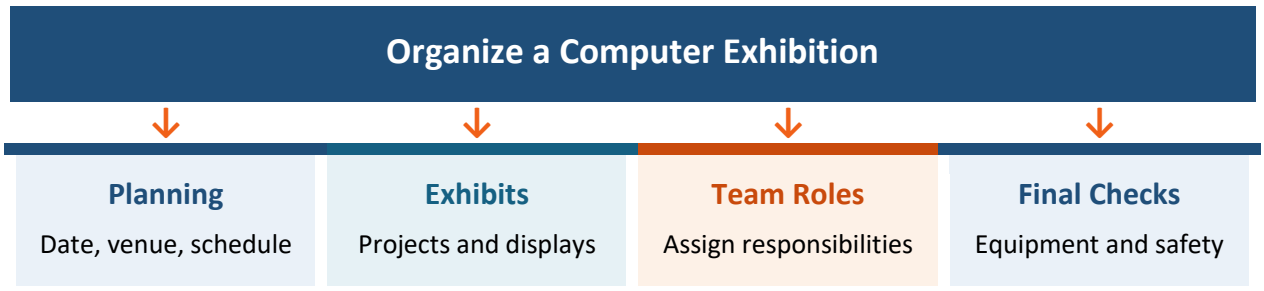
12.2 Decomposition — Breaking a Problem into Parts

Decomposition means dividing a complex problem into smaller, more manageable tasks.

Large problems can be difficult to understand when viewed as a whole. Smaller tasks are easier to plan, complete, and test.

Example: Organizing a school computer exhibition

Suppose your class is planning a computer exhibition. The complete task may appear complicated, but it can be divided into smaller jobs.



Example of decomposing one large task into four smaller work areas.

Each smaller task can be broken down further. For example, the Exhibits task might include choosing projects, preparing demonstrations, checking computers, and labelling displays.

Why is decomposition useful?

- It makes difficult problems easier to understand.
- It helps people divide work among team members.
- It reduces the chance of forgetting important tasks.
- It makes testing and correcting problems easier.
- It helps programmers develop and maintain software.

Everyday example

To prepare for school, you might divide the task into:

1. Check the timetable.
2. Pack the required books.
3. Prepare your stationery.
4. Check your school uniform.
5. Set an alarm for the morning.

> **Remember:** Each smaller task should contribute to solving the original problem.

12.3 Pattern Recognition — Finding Similarities

Pattern recognition means identifying similarities, repeated actions, or common features in information or problems.

Recognizing patterns can help us solve new problems using knowledge gained from earlier ones.

Example 1: Number patterns

Look at this sequence:

3, 6, 9, 12, 15, ...

Each number increases by 3.

The next number is 18.

Identify the pattern



Rule: Add 3 each time.

Example 2: Repeated classroom tasks

Imagine that every school day you:

- Check your timetable.
- Attend your lessons.
- Complete class activities.
- Pack your books at the end of the day.

These repeated actions form a pattern. A school-organizing application could use a similar sequence each day.

Example 3: Patterns in programming

Suppose a computer program must display the numbers 1 through 100. Writing 100 separate instructions would be inefficient. Recognizing the repeated action allows a programmer to use a loop, which repeats instructions.

Why is pattern recognition useful?

- It helps predict what comes next.
- It reduces repeated work.
- It helps identify errors and unusual results.
- It allows solutions to be reused in similar problems.
- It supports efficient computer programs.

> **Remember:** A useful pattern is supported by evidence. Do not assume that a pattern continues forever without checking the rule.

12.4 Abstraction — Focusing on What Matters

Abstraction means concentrating on the information that is important for solving a problem while leaving out details that are not needed.

In everyday life, we use abstraction without realizing it.

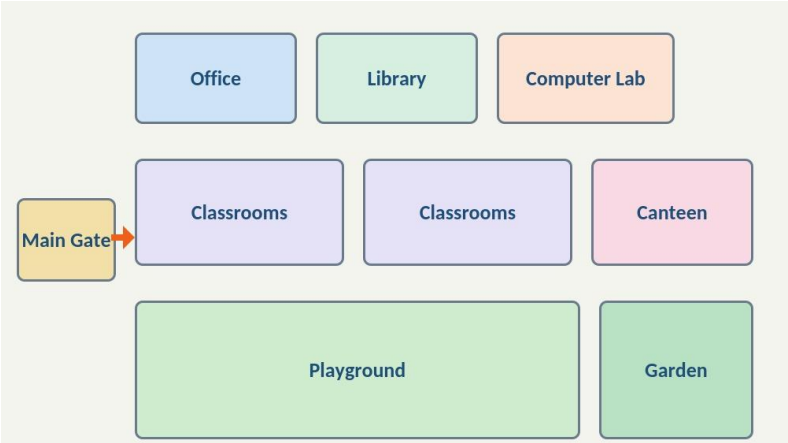
Example: A school map

Imagine that you need to find the computer laboratory in your school. A useful map might show:

- Classrooms
- Corridors
- Stairs
- The computer laboratory
- Entrances and exits

It probably does not need to show every desk, chair, pencil, or schoolbag.

The map keeps the information needed for navigation and leaves out unnecessary detail.



A simple map shows only the information needed to find your way.

Example: Student records

A school application may store many details about a student, but a teacher taking attendance may need only:

- Student name
- Student ID
- Class
- Attendance status

The teacher does not need every detail of the student's record to mark attendance.

Abstraction in computer games

A racing game may represent a real car using simplified shapes and a few properties, such as speed, position, and direction. The program does not need to simulate every mechanical part of a real car.

Why is abstraction useful?

- It reduces unnecessary complexity.
- It makes information easier to understand.
- It helps programmers focus on the requirements of a task.
- It allows systems to represent real-world situations simply.

> **Remember:** Abstraction is not simply removing information. It is keeping the information needed for a particular purpose.

12.5 Algorithms — Step-by-Step Solutions

An algorithm is a clear, ordered set of instructions used to solve a problem or complete a task.

Algorithms are used in cooking, mathematics, navigation, computer programs, and many other activities.

Example: An algorithm for making a cup of tea

For a safe, adult-supervised example involving hot water:

1. Collect the required ingredients and equipment.
2. Ask an adult to help heat the water safely.
3. Place a tea bag in a cup.
4. Pour the hot water carefully with adult supervision.
5. Allow the tea to brew.
6. Remove the tea bag.
7. Add any desired ingredients.
8. Allow the tea to cool to a safe temperature before drinking.

The instructions are arranged in an order that makes sense.

Characteristics of a good algorithm

A good algorithm should be:

- **Clear:** Each instruction should be easy to understand.
- **Ordered:** Steps should appear in the correct sequence.
- **Finite:** It should eventually finish.
- **Effective:** Its steps should help solve the problem.
- **Unambiguous:** Each instruction should have a clear meaning.
- **Correct:** It should produce the intended result when followed properly.

Example: An algorithm to find the larger of two numbers

Suppose the two numbers are 14 and 9.

1. Start.
2. Read the first number.
3. Read the second number.
4. Compare the two numbers.
5. If the first number is greater, display the first number.
6. Otherwise, display the second number.
7. Stop.

The result is 14.

This algorithm uses a decision because the next action depends on comparing the numbers.

12.6 Representing Algorithms with Pseudocode

Pseudocode is a simple, structured way to describe an algorithm using everyday language and programming-like instructions.

It is not a specific programming language. It helps programmers plan the logic before writing actual code.

Common pseudocode words include:

- START — begin the algorithm.
- INPUT — receive information.
- OUTPUT — display information.
- IF and ELSE — choose between alternatives.
- REPEAT — perform instructions again.
- STOP — end the algorithm.

Example: Check whether a student has passed

Assume the passing mark is 50 out of 100.

```
START
INPUT mark
IF mark >= 50 THEN
    OUTPUT "Pass"
ELSE
    OUTPUT "Needs Improvement"
ENDIF
STOP
```

If the mark is 72, the output is Pass.

If the mark is 38, the output is Needs Improvement.

The condition mark >= 50 means that the mark is greater than or equal to 50.

Try tracing the algorithm

Input mark	Condition mark >= 50	Output
85	True	Pass
50	True	Pass
49	False	Needs Improvement
25	False	Needs Improvement

Notice that a mark of exactly 50 results in Pass because the condition includes equality.

12.7 Flowcharts — Drawing an Algorithm

A flowchart is a diagram that represents an algorithm using standard shapes connected by arrows.

Flowcharts make it easier to understand the order of instructions and the decisions a program must make.

Common flowchart symbols

Oval — Start or Stop	Shows where the algorithm begins or ends.
Rectangle — Process	Represents an action, calculation, or instruction.
Diamond — Decision	Checks a condition and branches, often into Yes/No or True/False paths.
Parallelogram — Input/Output	Represents entering data or displaying results.
Arrow — Flow line	Shows the direction in which the steps are followed.

Flowchart example: Is a number even or odd?

A number is even if it can be divided by 2 with no remainder. Otherwise, it is odd.

Flowchart: Input a number, test whether the remainder after division by 2 is zero, and display the correct result.

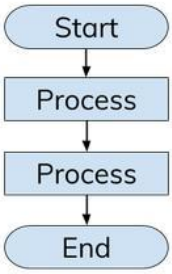
The term MOD means the remainder after division. For example:

- 8 MOD 2 = 0, so 8 is even.
- 7 MOD 2 = 1, so 7 is odd.

The decision symbol has two possible paths. Both paths eventually lead to the end of the algorithm.

12.8 Three Basic Control Structures

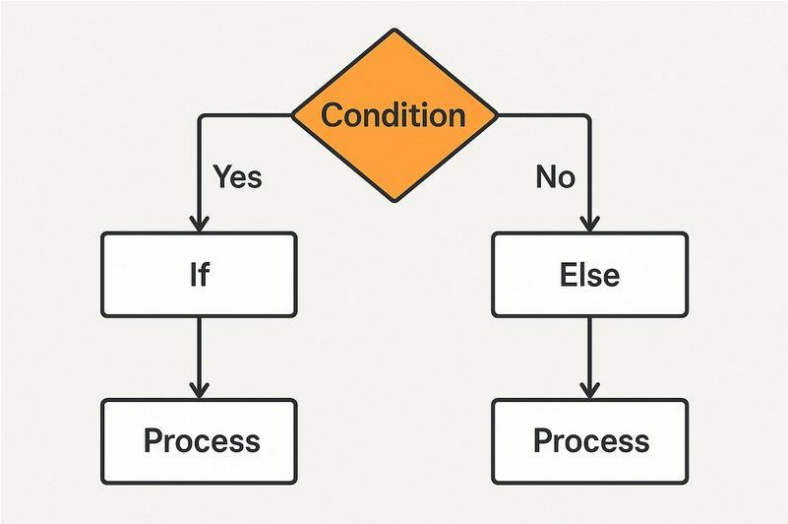
Many algorithms and computer programs use three basic control structures: sequence, selection, and repetition.



1. Sequence

Instructions are performed one after another in a particular order.

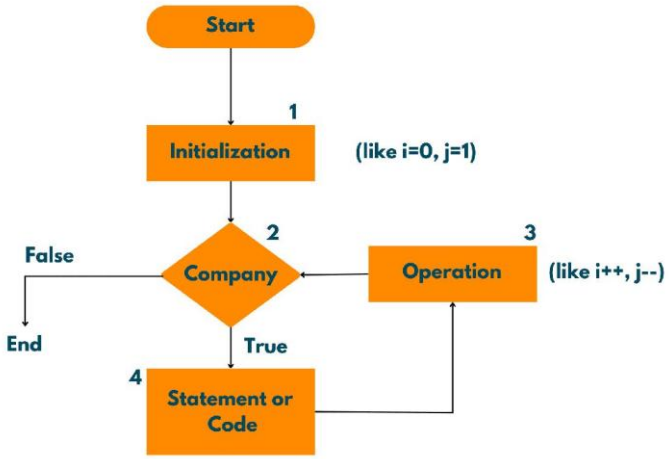
> **Example:** Enter a student's marks, calculate the total, and display the result.



2. Selection

The algorithm chooses a path based on a condition.

> **Example:** If a mark is at least 50, display "Pass"; otherwise, display "Needs Improvement."



3. Repetition

A set of instructions is repeated while a condition is satisfied or for a specified number of times.

Example: Display the numbers 1 through 10 using a loop.

A. Sequence example

```
START
INPUT length
INPUT width
area = length * width
OUTPUT area
STOP
```

The algorithm calculates the area of a rectangle. The inputs must be valid measurements, and the multiplication happens after both values are entered.

B. Selection example

```
START
INPUT temperature
IF temperature > 30 THEN
    OUTPUT "Hot"
ELSE
    OUTPUT "Not hot"
ENDIF
STOP
```

The program displays one of two messages depending on the temperature.

C. Repetition example

```
START
FOR number = 1 TO 5
    OUTPUT number
ENDFOR
STOP
```

The output is:

1, 2, 3, 4, 5

The FOR loop repeats the output instruction five times.

> **Important:** A loop must be designed carefully. If its stopping condition is never reached, it may continue indefinitely.

12.9 Variables, Inputs, and Outputs

Algorithms often use variables to store information temporarily.

A variable is a named storage location whose value can be used or changed during a program.

For example:

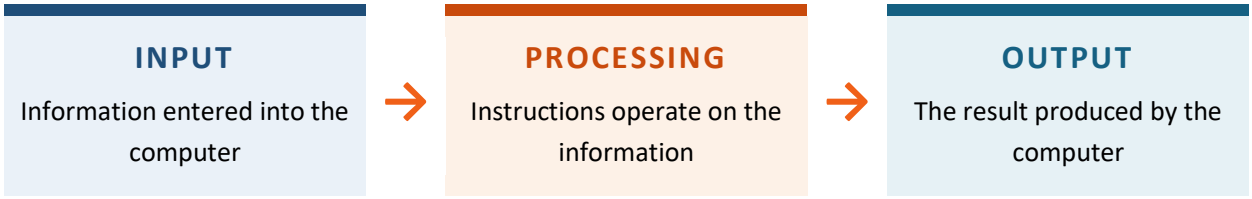
studentName = "Ali"

mark = 78

Here, studentName stores text, while mark stores a number.

Input, processing, and output

Many computer tasks follow this pattern:



Example: Enter two numbers, add them, and display their sum.

Consider an algorithm that adds two numbers:

```
START
INPUT firstNumber
INPUT secondNumber
total = firstNumber + secondNumber
OUTPUT total
STOP
```

If the inputs are 12 and 8, the output is 20.

12.10 Testing and Debugging Algorithms

A solution may look correct but still contain mistakes. Programmers therefore test their algorithms and correct any errors they discover.

A bug is an error in a program or algorithm that causes it to behave incorrectly.

Debugging is the process of finding and correcting such errors.

Common types of errors

- **Logical error:** The instructions run, but the result is wrong.
- **Syntax error:** Code breaks the rules of the programming language.
- **Runtime error:** A problem occurs while the program is running.

At this stage, focus especially on logical errors, which can often be found by tracing an algorithm manually.

Example: Find the error

A student writes this algorithm to calculate the total of two numbers:

```
START
INPUT A
INPUT B
total = A - B
OUTPUT total
STOP
```

The task is to add the numbers, but the algorithm subtracts them. This is a logical error.

The corrected instruction is:

total = A + B

Trace table

A trace table records the values of variables and outputs as an algorithm is followed step by step.

Consider:

```
START
number = 2
number = number + 3
number = number * 2
OUTPUT number
STOP
```

Step	Instruction	Value of number
1	Set number = 2	2
2	Add 3 to number	5
3	Multiply number by 2	10
4	Display the value	10

The final output is 10.

Notice that number = number + 3 means “take the current value of number, add 3, and store the result back in number.”

How to test an algorithm

1. Read the instructions carefully.
2. Choose suitable test inputs.
3. Trace each instruction in order.
4. Record variable values and outputs.
5. Compare the actual output with the expected output.
6. Correct any errors and test again.

Test more than one input when possible. For example, a pass/fail algorithm should be checked with a mark above 50, exactly 50, and below 50.

12.11 Classroom Activities

Activity 1: Decompose a Problem

Imagine that your class is preparing a school trip.

1. Write the main problem.
2. Divide it into at least five smaller tasks.
3. Identify which tasks must be completed first.
4. Explain how dividing the work makes planning easier.

Activity 2: Find the Pattern

Study this sequence:

4, 8, 12, 16, __, __

1. Identify the rule.
2. Write the next two numbers.
3. Create another number pattern for a classmate to solve.

Activity 3: Practise Abstraction

You are designing a simple school map to help visitors find the library.

List the information that the map must include and three details it can leave out. Explain why.

Activity 4: Design an Algorithm

Write pseudocode that accepts a student's age and displays:

- Eligible if the age is 11 or above.
- Not yet eligible if the age is below 11.

Test your algorithm with ages 10, 11, and 12.

Activity 5: Draw a Flowchart

Draw a flowchart that:

1. Starts the algorithm.
2. Accepts two numbers.
3. Calculates their sum.
4. Displays the sum.
5. Stops.

Use the correct flowchart symbols and connect them with arrows.

Activity 6: Debug the Algorithm

A student wants to calculate the average of two marks but writes:

```
START
INPUT A
INPUT B
average = A + B / 2
OUTPUT average
STOP
```

Identify the problem and write the corrected calculation. Test it using marks 60 and 80.

12.12 Review Questions

A. Multiple-Choice Questions

Choose the correct answer.

1. What is computational thinking?

- **A.** Typing quickly on a keyboard
- **B.** A structured approach to solving problems
- **C.** Memorizing computer parts
- **D.** Drawing pictures only

2. Which technique breaks a large problem into smaller tasks?

- **A.** Abstraction
- **B.** Repetition
- **C.** Decomposition
- **D.** Formatting

3. Identifying similarities between problems is called:

- **A.** Pattern recognition
- **B.** Debugging
- **C.** Output
- **D.** Processing

4. Which technique focuses on important details and ignores irrelevant information?

- **A.** Decomposition
- **B.** Abstraction
- **C.** Selection
- **D.** Repetition

5. What is an algorithm?

- **A.** A computer monitor
- **B.** A random collection of instructions
- **C.** A clear, ordered set of steps to solve a problem
- **D.** A type of printer

6. **Which flowchart shape represents a decision?**
   - **A.** Oval
   - **B.** Rectangle
   - **C.** Diamond
   - **D.** Parallelogram

7. **Which control structure repeats instructions?**
   - **A.** Sequence
   - **B.** Repetition
   - **C.** Selection
   - **D.** Input

8. **What is debugging?**
   - **A.** Creating a new keyboard
   - **B.** Finding and correcting errors
   - **C.** Printing an algorithm
   - **D.** Saving a file

9. **What is the output of this pseudocode?**

```
number = 4
number = number + 2
OUTPUT number
```

   - **A.** 2
   - **B.** 4
   - **C.** 6
   - **D.** 8

10. **Which of these is a logical error?**
    - **A.** A program calculates subtraction when addition is required.
    - **B.** A computer has no speakers.
    - **C.** A document is printed in colour.
    - **D.** A user opens a browser.

B. Short-Answer Questions

1. Define computational thinking.
2. Name the four main techniques of computational thinking.
3. Explain decomposition with a practical example.
4. What is pattern recognition? Give an example.

5. Explain abstraction using a school map.
6. List five characteristics of a good algorithm.
7. What is pseudocode, and why is it useful?
8. Name four common flowchart symbols and describe their uses.
9. Explain sequence, selection, and repetition.
10. What is the difference between a bug and debugging?
11. What is a trace table, and how does it help test an algorithm?

C. Critical-Thinking Questions

1. Your teacher asks you to create a program for calculating students' averages. Explain how you would use decomposition, pattern recognition, abstraction, and algorithm design to solve the problem.
2. A student draws a flowchart but leaves out the decision for checking whether a mark is passing. What problem could this cause?
3. Why should an algorithm be tested with different inputs, including boundary values such as 49, 50, and 51?
4. A program produces the correct answer for one example but the wrong answer for another. Explain how a trace table could help identify the error.

12.13 Homework

Complete the following in your notebook.

1. Define computational thinking and explain its four main techniques.
2. Write an algorithm for getting ready for school, using at least six steps.
3. Create a number pattern and explain its rule.
4. Write pseudocode that accepts two numbers and displays the larger number. If they are equal, display Equal.
5. Draw a flowchart representing the algorithm in Question 4.
6. Trace the following algorithm and record the final output.
7. START
8. A = 5
9. B = 3
10. A = A + B
11. B = A * 2
12. OUTPUT A

13. OUTPUT B

STOP

1. Identify and correct the error in this algorithm, which is intended to calculate the area of a rectangle.
2. INPUT length
3. INPUT width
4. area = length + width

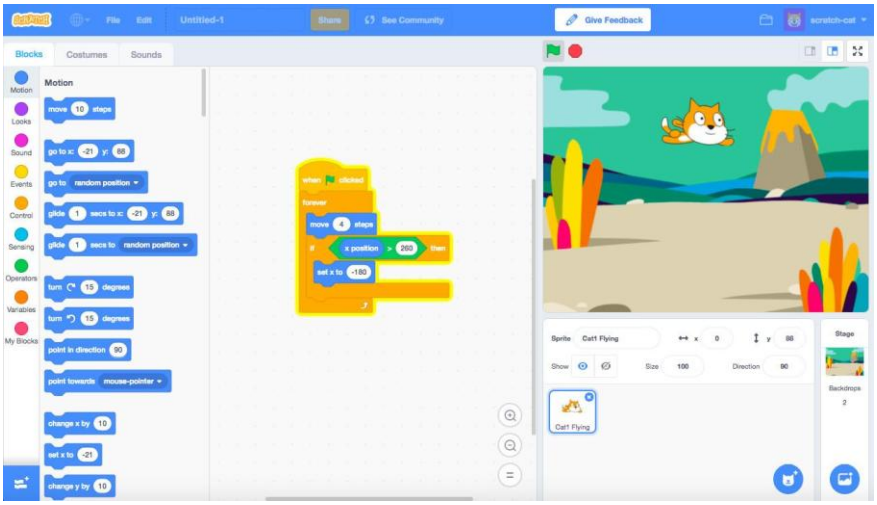
OUTPUT area

Quick Revision

Computational thinking	A structured approach to solving problems.
Decomposition	Divide a problem into smaller parts.
Pattern recognition	Find similarities and repeated features.
Abstraction	Focus on relevant information.
Algorithm	A clear, ordered set of steps to solve a problem.
Pseudocode	A structured, language-independent way to describe an algorithm.
Flowchart	A diagram that represents the steps and decisions in an algorithm.
Control structures	Sequence, selection, and repetition.
Debugging	Finding and correcting errors in an algorithm or program.

Chapter 13: Introduction to Programming with Scratch

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LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Explain what programming is and why it is important.
- Describe Scratch and its uses.
- Identify the main parts of the Scratch interface.
- Understand sprites, backdrops, and code blocks.
- Create a simple program using event and motion blocks.
- Use sequences, loops, and conditions.
- Add dialogue, sounds, and simple interactions.
- Test and debug Scratch projects.
- Save, organize, and present a programming project.

13.1 What Is Programming?

Programming is the process of creating instructions that tell a computer what to do.

A computer follows instructions provided by a program. Depending on the instructions, it may calculate numbers, display images, play sounds, process information, or control other devices.

Examples of programming include:

- Developing educational games.
- Creating animations and interactive stories.
- Building websites and mobile applications.
- Processing information in school management systems.
- Controlling robots and electronic devices.

What is a programming language?

A programming language is a formal way of writing instructions that a computer can process.

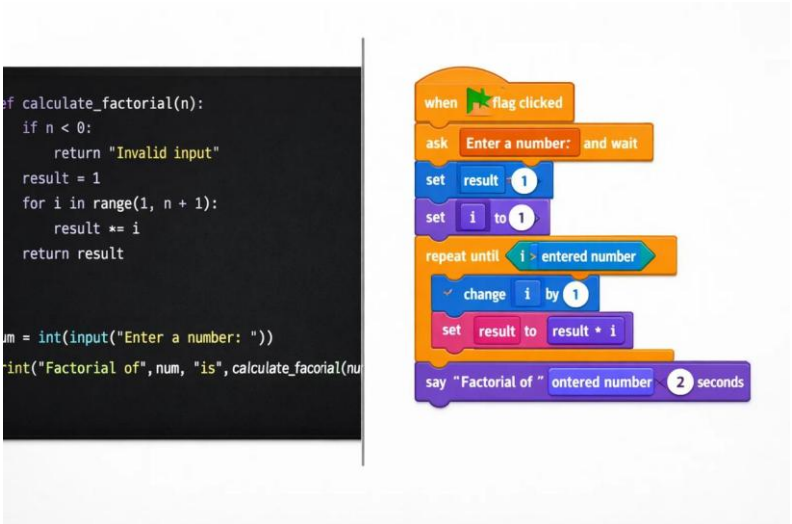
Examples include Scratch, Python, JavaScript, and C++.

Programming languages differ in how instructions are written, but they all help developers communicate a set of logical instructions to a computer.

What is visual programming?

In traditional text-based programming, instructions are typed using a programming language's rules. In visual programming, users can build programs by arranging graphical blocks or other visual elements.

Scratch is a visual programming environment designed to make programming concepts easier to learn.



13.2 Introduction to Scratch

Scratch is a visual programming environment developed by the MIT Media Lab's Scratch Team. It allows users to create interactive stories, animations, games, and other projects using code blocks.

Scratch is especially useful for beginners because users can connect blocks instead of typing every instruction.

You can explore Scratch at the official website:

Scratch — Official Website

What can you create with Scratch?

- An animated character that moves across the screen.
- A quiz that asks questions and checks answers.
- A game in which a player collects objects.
- An interactive story with dialogue.
- An animation showing the solar system.
- A simple educational program that teaches mathematics.

Why learn Scratch?

Scratch helps students practise computational thinking, creativity, problem-solving, sequencing, testing, and logical reasoning.

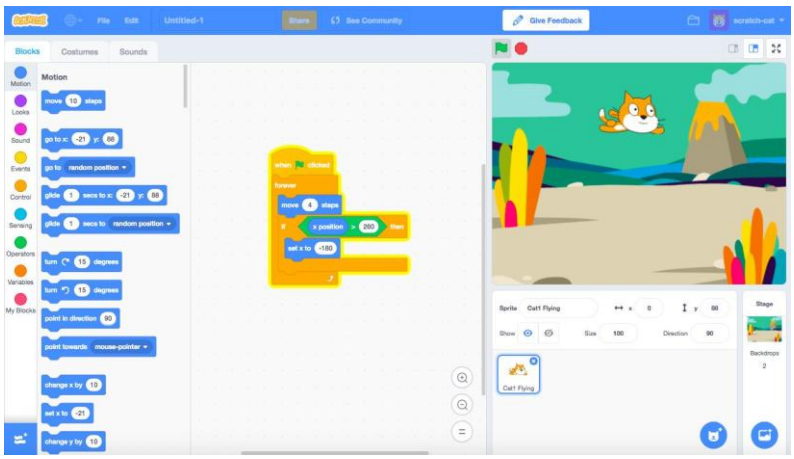
The programming concepts learned in Scratch can also help students understand text-based languages such as Python later.

13.3 Opening Scratch and Understanding the Interface

Scratch can be used through a web browser. Depending on the available version and device, an offline application may also be available.

To begin:

1. Open the official Scratch website.
2. Choose the option to create a project.
3. Explore the programming interface.
4. Select a sprite and a backdrop.
5. Connect blocks to build a program.
6. Run the program and observe the result.



Main parts of the Scratch interface

1. Blocks Palette

Contains programming blocks grouped into categories such as Motion, Looks, Sound, Events, Control, Sensing, Operators, Variables, and My Blocks.

2. Code Area

The workspace where you drag and connect blocks to create scripts.

3. Stage

The area where the project runs and sprites appear, move, and interact.

4. Sprite List

Displays the sprites in the project and lets you select the sprite you want to program.

5. Backdrop and Sprite Controls

Let you select or edit the stage backdrop, add sprites, and adjust their properties.

Other useful controls include the green flag to start a project and the stop button to stop running scripts.

13.4 Understanding Sprites and Backdrops

A sprite is a character or object in a Scratch project that can be programmed to perform actions.

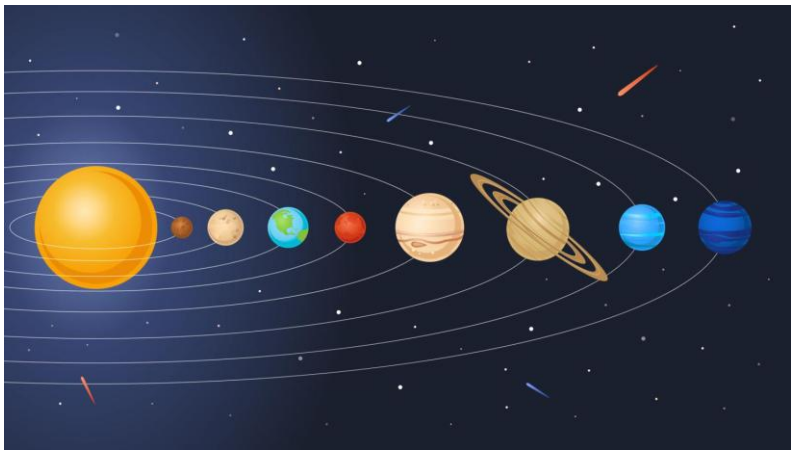
A sprite might be a cat, a person, a ball, a spaceship, or a character drawn by the student.

A backdrop is the background displayed on the Stage.

Example

Suppose you create an animation about the solar system:

- The Sun and planets can be sprites.
- The space background is the backdrop.
- Motion blocks can move the planets.
- Looks blocks can display labels or dialogue.
- Control blocks can repeat actions.



Working with sprites

You can:

- Choose a sprite from the library.
- Draw your own sprite.
- Upload a suitable image when supported.
- Change a sprite's size and position.
- Rename a sprite to make it easy to identify.
- Write separate scripts for different sprites.

Working with backdrops

You can select a backdrop from the library, draw one, or upload an appropriate image when supported.

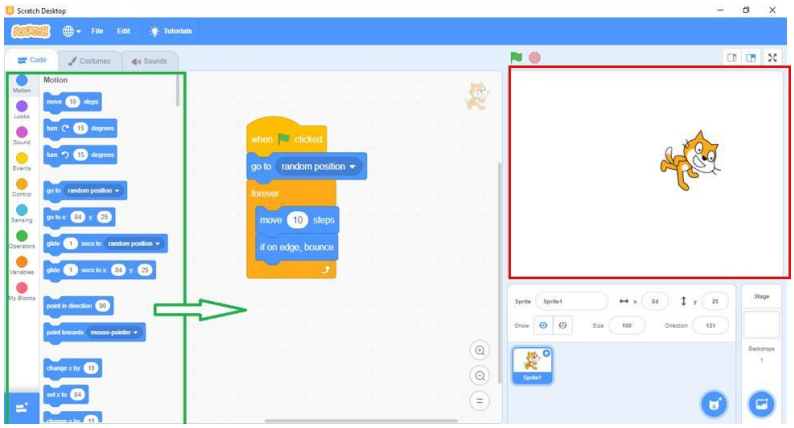
A suitable backdrop should make the project easier to understand. For example, a quiz could use a simple classroom background rather than a distracting image.

> **Remember:** A sprite is an object in the project; a backdrop is the background behind the sprites.

13.5 Understanding Scratch Code Blocks

Scratch programs are created by connecting blocks. Each block represents an instruction or part of an instruction.

Blocks are organized into categories to help users find the commands they need.



Important block categories

Category	Purpose	Example
Motion	Moves or turns a sprite	move 10 steps
Looks	Changes appearance or displays text	say Hello!
Sound	Plays sounds	play sound
Events	Starts a script when something happens	when green flag clicked
Control	Repeats actions or makes decisions	repeat 10
Sensing	Detects input or interaction	touching mouse-pointer?
Operators	Performs calculations and comparisons	5 + 3
Variables	Stores values that can change	change score by 1

Scratch blocks fit together in particular ways. For example, an event block can start a script, while motion and looks blocks provide the actions that follow it.

13.6 Creating Your First Scratch Program

Let’s create a simple program that makes a sprite move and speak.

Project 1: Move and Speak

Goal: When the green flag is clicked, the sprite moves 100 steps and displays a greeting.

Program instructions



Connect these three blocks vertically in the Code Area, in the order shown.

Step-by-step instructions

1. Open a new Scratch project.
2. Select a sprite, such as the default cat.
3. Open the Events category.
4. Drag the when green flag clicked block into the Code Area.
5. Open the Motion category and connect move 10 steps below the event block.
6. Change the number from 10 to 100.
7. Open the Looks category and connect a say Hello! for 2 seconds block underneath.
8. Change the message to Hello! Welcome to my project!
9. Click the green flag above the Stage.
10. Observe the sprite's movement and message.

What did you learn?

- The event block starts the program.
- The motion block moves the sprite.
- The looks block displays a message.
- The order of the blocks determines the order of the actions.

> **Important:** In Scratch, a script usually begins with a suitable event block so that it can start in response to an action, such as clicking the green flag or pressing a key.

13.7 Sequence in Scratch

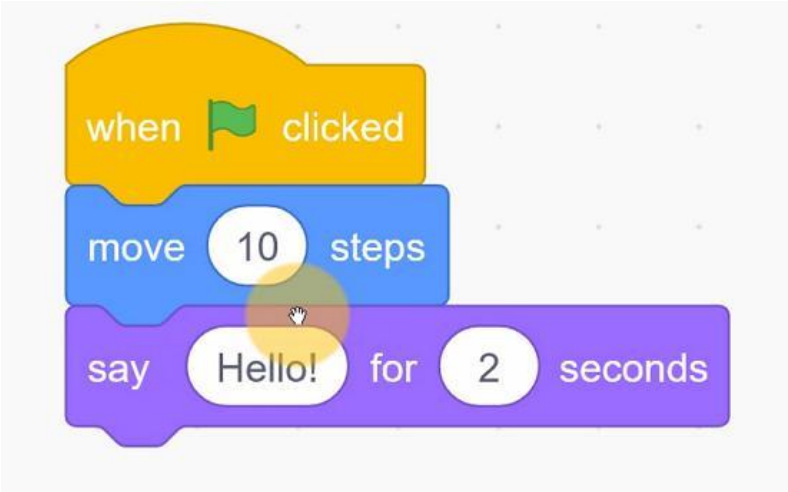
A sequence is an ordered list of instructions. Scratch executes connected blocks from top to bottom, following the program's control flow.

Consider this script:

```
when green flag clicked
move 50 steps
turn clockwise 90 degrees
move 50 steps
say "Finished!" for 2 seconds
```

The sprite first moves, then turns, moves again, and finally displays a message.

If you rearrange the blocks, the result may change.



Why does sequence matter?

Suppose a sprite must move to a door before announcing, “I have arrived.”

If the speaking block is placed first, the sprite will speak before moving. If the movement block comes first, the sequence better matches the intended result.

> **Remember:** Correct instructions in the wrong order can still produce an incorrect program.

13.8 Repetition Using Loops

A loop repeats one or more instructions. Loops make programs shorter and more efficient.

Without a loop, a programmer might need to add the same instruction many times. A loop allows the instruction to be repeated automatically.

Project 2: Make a Sprite Move Repeatedly

Goal: Move a sprite 10 steps, ten times.



The motion block goes inside the repeat block.

Place the repeat block under the green-flag event block and put the motion block inside it.

Instructions

1. Add the green-flag event block.
2. Select the Control category.
3. Drag a repeat 10 block under the event block.
4. Place a move 10 steps block inside the loop.
5. Click the green flag.
6. Observe the sprite's movement.

The sprite moves 10 steps each time the loop runs. Across ten repetitions, the total requested movement is 100 steps, assuming the sprite does not encounter other movement limits or scripts that alter its position.

Types of loops in Scratch

- **Repeat:** Executes the enclosed blocks a specified number of times.
- **Forever:** Continues executing the enclosed blocks until the script is stopped.
- **Repeat until:** Repeats the enclosed blocks until a specified condition becomes true.

Example: Make a sprite move continuously



This program moves the sprite continuously and makes it bounce when it reaches the Stage edge.

Safety of logic: A forever loop has no normal end on its own. Use it only when repeated behaviour is intended, and stop the script when necessary.

13.9 Making Decisions with Conditions

A condition is a test that can be true or false.

Scratch uses conditions to help a program decide what to do.

For example:

- Is the sprite touching the edge?
- Is the score greater than 10?
- Is the space key pressed?
- Is the answer correct?

The if block

An if block runs the instructions inside it only when its condition is true.

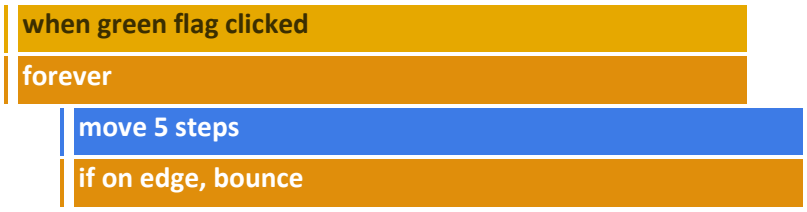
The if-else block

An if-else block chooses between two alternatives:

- If the condition is true, run the first set of instructions.
- Otherwise, run the second set.

Project 3: Touch the Edge

Goal: Make a sprite react when it touches the edge of the Stage.



Place this block inside the forever loop.

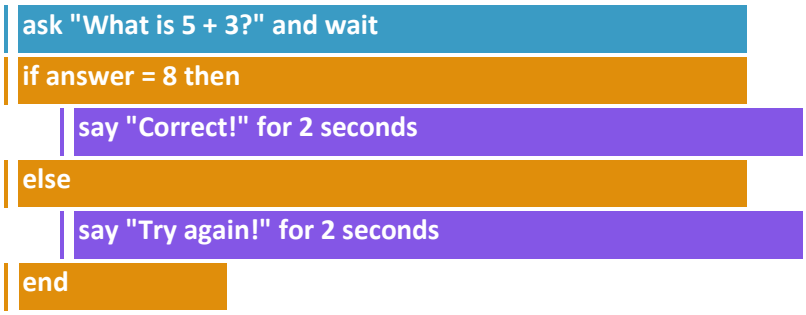
Instructions

1. Add when green flag clicked.
2. Add a forever block.
3. Place move 5 steps inside the forever block.
4. Add if on edge, bounce inside the loop, below the movement block.
5. Run the project.
6. Observe how the sprite changes direction when it reaches an edge.

This program uses repetition and a condition to control the sprite's behaviour.

Example: A simple quiz

Imagine a program that checks whether a student has entered the correct answer.



This example uses a sensing block to collect an answer and a conditional block to choose a response.

The answer value stores the user's latest response to the question block.

13.10 Events and Interactivity

An event is something that happens and can trigger a script.

Scratch can respond to events such as:

- Clicking the green flag.
- Pressing a keyboard key.
- Clicking a sprite.
- Receiving a broadcast message from another script.

Example: Control a sprite with the keyboard

A simple script can move a sprite when the right arrow key is pressed:

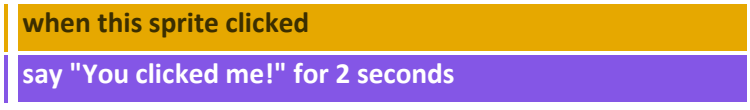


In Scratch, the x-coordinate controls horizontal position. Increasing x moves a sprite to the right; decreasing x moves it to the left.

Similarly:

- Increasing y moves a sprite upward.
- Decreasing y moves a sprite downward.

Example: Click a sprite to make it speak



This creates an interactive response. The sprite speaks when the user clicks it.

Why are events useful?

Events make projects interactive. Instead of running the same actions automatically, a program can respond to a user's choices and actions.

13.11 Looks, Sounds, and Animation

Scratch can change a sprite's appearance, display messages, and play sounds. These features make stories and games more engaging.

Looks blocks

Looks blocks can:

- Display speech or thought bubbles.
- Change a sprite's costume.
- Change size or visual effects.
- Switch the Stage backdrop.
- Show or hide sprites.

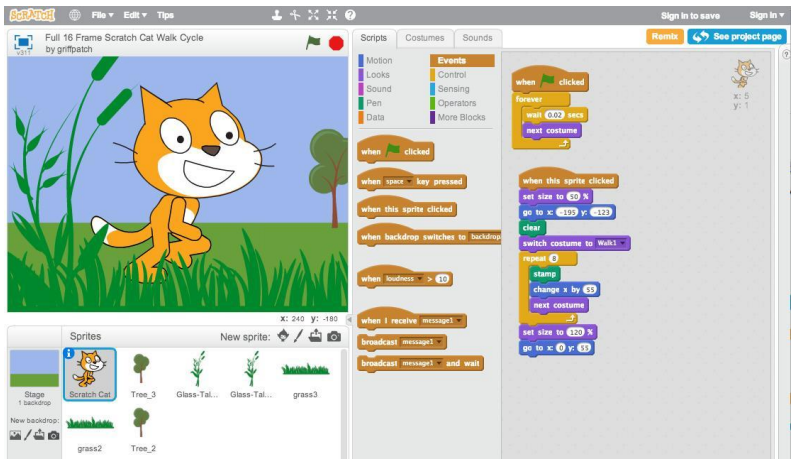
Sound blocks

Sound blocks can:

- Play a selected sound.
- Start or stop sounds.
- Change volume.
- Play a note using available sound features.

Costumes and animation

A costume is an appearance that a sprite can use. Switching between costumes can create the effect of movement.



Project 4: Create a Talking Character

Goal: Make a character greet the user, change its appearance, and play a sound.

Suggested script structure:

```
when green flag clicked
say "Welcome to my animation!" for 2 seconds
switch costume to next costume
play sound [selected sound] until done
say "Let's begin!" for 2 seconds
```

The exact sound name depends on the sounds available in your project.

Tips for effective animations

- Use suitable backgrounds and characters.
- Keep dialogue short and readable.
- Make sounds appropriate for the scene.
- Avoid unnecessary effects that distract from the main message.
- Test the timing of each action.

13.12 Variables and Scoring

A variable stores a value that a program can use or change.

For example, a quiz game might store the student's score in a variable named Score.

Variables can store numbers or text. In Scratch, they can be created from the Variables category.

Project 5: Create a Score Counter

Goal: Create a simple project that starts with a score of zero and increases the score when a sprite is clicked.

First, create a variable named Score for the appropriate sprites or the whole project, depending on your design.

Use a script similar to this:

```
when green flag clicked
set Score to 0
when this sprite clicked
change Score by 1
```

These are two separate scripts attached to the same sprite.

How it works

1. When the green flag is clicked, the score resets to zero.
2. Each time the sprite is clicked, the score increases by one.
3. The variable monitor can display the current score on the Stage.

This is a simple example of how variables make interactive projects possible.

Where are variables useful?

- Tracking game scores.
- Counting correct quiz answers.
- Recording the number of collected objects.
- Keeping track of attempts.
- Storing a user's selected option.

> **Remember:** Reset variables at the appropriate time. Otherwise, an old score may remain when a new game begins.

13.13 Testing and Debugging Scratch Projects

A program may not behave as expected on the first attempt. Testing and debugging help programmers find and correct problems.

Common Scratch problems

Problem	Possible cause	What to check
Nothing happens when the green flag is clicked	The script lacks a suitable starting event	Check the event block
The sprite moves too far	The movement value or loop count is too large	Adjust the values
A message appears too early	Blocks are in the wrong order	Review the sequence
The score keeps increasing unexpectedly	The click script or another loop runs more often than intended	Inspect all scripts that change the score
The answer is marked incorrect	The condition or comparison may be wrong	Check the question, answer, and operator
The sprite does not appear on the Stage	It may be hidden or positioned outside the visible area	Check visibility and position

A simple debugging process

1. Run the project.
2. Observe the problem.
3. Identify which script may be responsible.
4. Check the blocks and their order.
5. Change one thing at a time.
6. Run the project again.
7. Confirm that the fix works in different situations.

Example: Find the problem

A student wants the sprite to say “Hello!” when the green flag is clicked, but the script contains only:

say "Hello!" for 2 seconds

The instruction itself is valid, but it will not automatically run from the green flag without an appropriate event block.

Correction: Attach the say block underneath when green flag clicked.

13.14 Saving and Managing Scratch Projects

Saving your work helps protect it and allows you to continue later.

Depending on whether you use an online Scratch account or an offline editor, the available saving options may differ.

Good project-management habits

- Give your project a meaningful title.
- Use clear names for sprites and variables.
- Save your work regularly using the available save option.
- Follow your teacher's instructions for submitting the project.
- If downloading or exporting is available, save the file in the correct school folder.
- Do not share account passwords.
- Use only images and sounds that are appropriate and permitted for your project.

Suggested project folder structure

```
Grade 6 Computer Studies
└── Scratch Projects
    ├── First Animation
    ├── Quiz Game
    └── Final Project
```

Example organization. The actual file types and saving methods depend on the Scratch editor being used.

13.15 Mini Project: Create an Interactive Mathematics Quiz

Now combine the skills learned in this chapter to create a simple mathematics quiz in Scratch.



Project objective

Create a quiz that asks a mathematics question, checks the answer, displays feedback, and keeps a score.

Project requirements

Your project should include:

- A suitable sprite and backdrop.
- A green-flag event to start the quiz.
- A question using an ask-and-wait block.
- A conditional block to check the answer.
- Correct and incorrect feedback.
- A score variable.
- A clear title and suitable presentation.

Suggested algorithm

1. Start the quiz.
2. Set the score to zero.
3. Ask a mathematics question.
4. Check the answer.
5. If the answer is correct, increase the score and display a positive message.
6. Otherwise, display a helpful message.
7. Display the final score.
8. End the quiz.

Example pseudocode

```
START
SET Score TO 0
ASK "What is 6 x 7?" AND WAIT
IF answer = 42 THEN
    CHANGE Score BY 1
    SAY "Correct!" FOR 2 SECONDS
ELSE
    SAY "Try again next time!" FOR 2 SECONDS
ENDIF
SAY "Your score is:" AND Score
STOP
```

This is pseudocode describing the logic. In Scratch, build the corresponding instructions using blocks from the Events, Variables, Sensing, Control, and Looks categories.

For a more advanced version, add three questions, reset the score at the beginning, and display the final result.

Project evaluation checklist

Student project checklist

- ☐ The project has a meaningful title and suitable backdrop.
- ☐ A green-flag event starts the quiz.
- ☐ The score is initialized to zero.
- ☐ The program asks a question and receives an answer.
- ☐ The correct and incorrect answers produce different responses.
- ☐ The score changes correctly.
- ☐ The final score is displayed.
- ☐ The project has been tested and saved.

13.16 Classroom Activities

Activity 1: Explore the Scratch Interface

Open Scratch and identify the Stage, Code Area, Blocks Palette, Sprite List, and green flag. Write the purpose of each component in your notebook.

Activity 2: Animate a Character

Create a sprite that moves, turns, and displays a greeting. Arrange the blocks in the correct sequence and test the animation.

Activity 3: Use a Loop

Make a sprite move repeatedly using a repeat block. Change the number of repetitions and explain how the behaviour changes.

Activity 4: Create an Interactive Sprite

Program a sprite to respond when clicked or when a keyboard key is pressed. Add an appropriate message or movement.

Activity 5: Debug a Script

Create a script with one intentional mistake, such as an incorrect movement value or a missing event block. Exchange projects with a classmate and identify the problem.

13.17 Review Questions

A. Multiple-Choice Questions

Choose the correct answer.

1. What is programming?

- **A.** Cleaning a computer screen
- **B.** Creating instructions for a computer
- **C.** Drawing only pictures
- **D.** Printing a document

2. What is Scratch?

- **A.** A spreadsheet application
- **B.** A web browser
- **C.** A visual programming environment
- **D.** A computer operating system

3. What is a sprite in Scratch?

- **A.** A character or object in a project
- **B.** A type of keyboard
- **C.** A spreadsheet cell
- **D.** A browser tab

4. Which block category contains movement instructions?

- **A.** Looks
- **B.** Sound
- **C.** Motion
- **D.** Events

5. What is the purpose of the green-flag event block?

- **A.** To delete a project
- **B.** To start a script when the green flag is clicked
- **C.** To change a backdrop automatically in every project
- **D.** To stop all computer applications

6. **Which control structure repeats instructions?**
   - **A.** Sequence
   - **B.** Selection
   - **C.** Loop
   - **D.** Input

7. **What does an if-else block do?**
   - **A.** Saves a project
   - **B.** Chooses between two paths based on a condition
   - **C.** Changes the computer's password
   - **D.** Deletes a sprite

8. **What is a variable used for?**
   - **A.** Storing a value that can be used or changed
   - **B.** Connecting a monitor
   - **C.** Printing a photograph
   - **D.** Opening a browser

9. **Which Scratch feature can respond to a keyboard press?**
   - **A.** A suitable event block
   - **B.** A backdrop alone
   - **C.** The project title
   - **D.** A costume name alone

10. **What is debugging?**
    - **A.** Adding random blocks
    - **B.** Finding and correcting errors
    - **C.** Changing the screen brightness
    - **D.** Deleting all scripts

B. Short-Answer Questions

1. Define programming.
2. What is Scratch, and why is it suitable for beginners?
3. Name five parts of the Scratch interface.
4. Explain the difference between a sprite and a backdrop.
5. What are code blocks? Name four Scratch block categories.
6. Explain sequence with an example.
7. What is a loop? Name two types of loops used in Scratch.

8. Explain how an if-else block works.
9. What is a variable? Give one example of its use in a game.
10. List four steps involved in testing and debugging a Scratch project.

C. Practical and Critical-Thinking Questions

1. Design a Scratch script that moves a sprite 50 steps and then displays Welcome!.
2. Explain how you could make a sprite move continuously while bouncing off the Stage edges.
3. A quiz game always displays Correct!, regardless of the answer. Identify which part of the program you would investigate.
4. A game score starts at 15 instead of zero when a new game begins. Explain how to correct the problem.
5. Describe how you would create an interactive quiz with three questions and a final score.
6. Explain why testing a Scratch project with different inputs is important.

13.18 Homework

Complete the following tasks.

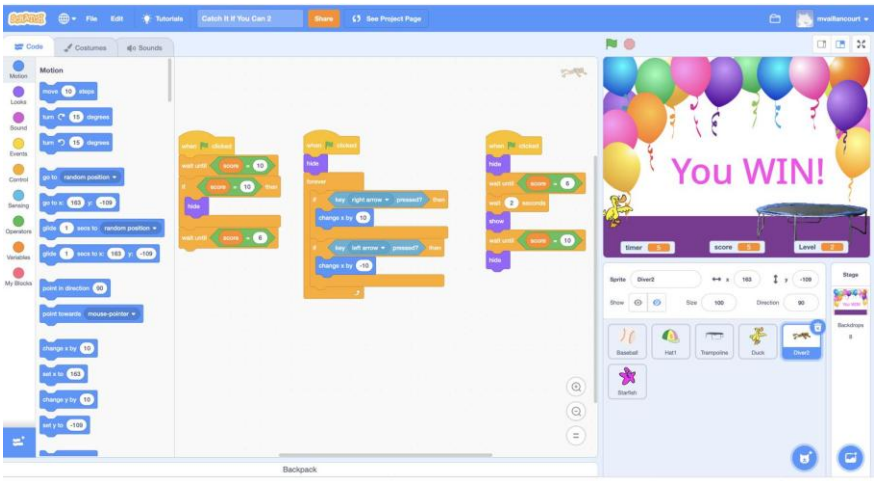
1. Define programming, Scratch, sprite, backdrop, and variable.
2. Draw a labelled diagram of the main parts of the Scratch interface.
3. Write the names and purposes of six Scratch block categories.
4. Describe the difference between sequence, selection, and repetition.
5. Write pseudocode for a program that asks a user for a number and reports whether it is greater than 10.
6. Create a Scratch project in which a sprite moves when the right arrow key is pressed.
7. Create a simple animation with at least two messages and one costume change.
8. Prepare a short paragraph describing a programming problem you encountered and how you corrected it.

Quick Revision

Programming	Creating instructions that a computer can process.
Scratch	A visual programming environment for creating interactive projects.
Sprite	A character or object that can be programmed.
Backdrop	The background of the Stage.
Sequence	Instructions performed in an order.
Loop	A structure that repeats instructions.
Condition	A test that evaluates as true or false.
Variable	A named value that a program can use or change.
Debugging	Finding and correcting program errors.

Chapter 14: Advanced Scratch Programming — Games, Variables, and Interactions

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

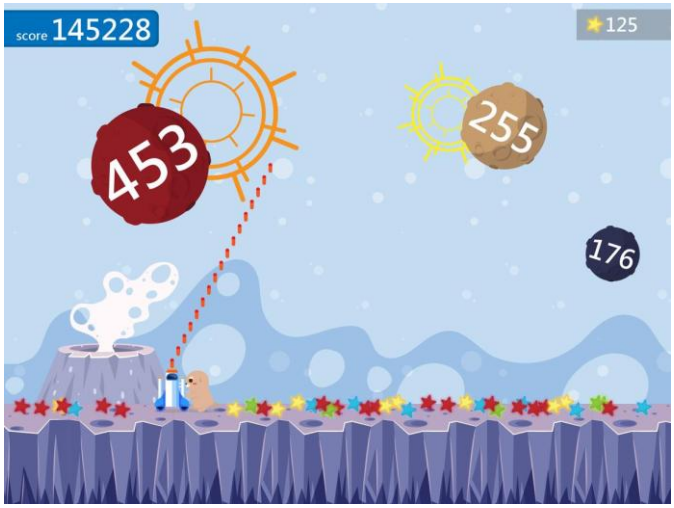
- Use variables to manage scores, timers, and other game information.
- Use conditions and loops to control game behaviour.
- Detect collisions between sprites.
- Use keyboard input to control a player.
- Use broadcasts to coordinate scripts and sprites.
- Create interactive games with clear objectives and rules.
- Test, debug, and improve a Scratch game.
- Design a complete game using good programming practices.

14.1 From Simple Scripts to Interactive Games

In Chapter 13, you learned to make sprites move, speak, and respond to events. Now you will combine these skills to create more advanced projects.

An interactive game responds to a player's actions. It may track points, detect collisions, increase difficulty, or display a message when the game ends.

For example, in a collecting game, the player controls a character that collects objects. Each successful collection increases the score. When the player reaches a target score, the game displays a winning message.



Main components of a simple game

- **Player:** The sprite controlled by the user.
- **Objective:** What the player must achieve.
- **Controls:** The keys or actions used to play.
- **Rules:** What is allowed and what causes success or failure.
- **Score:** A value that records progress.
- **Feedback:** Messages, sounds, or visual effects that show what happens.
- **End condition:** The event that finishes the game.

A well-designed game should have clear instructions, predictable controls, and meaningful feedback.

14.2 Planning a Game Before Programming

Before connecting blocks, decide what your game should do.

Consider this example: Collect the Stars.

Game design plan

Objective	Collect five stars to win.
Controls	Use the arrow keys to move the player.
Scoring	Add one point each time the player touches a star.
Winning rule	Stop the game and display a winning message when the score reaches five.

Break the game into smaller tasks

1. Create the player sprite.
2. Create the collectible star sprite.
3. Add keyboard controls.
4. Create and initialize the score variable.
5. Detect when the player touches a star.
6. Increase the score and reposition the star.
7. Check whether the player has won.
8. Test the game and correct errors.

This is an example of decomposition, the computational-thinking technique introduced in Chapter 12.

14.3 Using Variables in Games

A variable stores a value that can change while a program runs.

In Scratch, variables can store information such as:

- Score — points collected.
- Lives — the player's remaining attempts.
- Time — time remaining in a challenge.
- Level — the current game level.

To create a variable:

1. Select the Variables category.
2. Click the option to make a variable.
3. Enter a clear name, such as Score.
4. Choose whether it should be available to all sprites or only the selected sprite, depending on your project.
5. Use blocks such as set Score to 0 and change Score by 1.

Example: Reset and increase the score

```
when green flag clicked
set Score to 0
```

This script resets the score when a new game starts.

A separate script can increase the score when a player collects an object:

```
when this sprite clicked
change Score by 1
```

This example increases the score when the sprite is clicked. Collision-based scoring will be used later in the chapter.

> **Important:** Reset game variables at the beginning of a new game. Otherwise, the previous score or number of lives may carry over.

14.4 Keyboard Controls and Sprite Movement

Keyboard controls allow a player to control a sprite using keys such as the arrow keys or WASD.

In Scratch, you can use event blocks for key presses or check key states inside a loop.

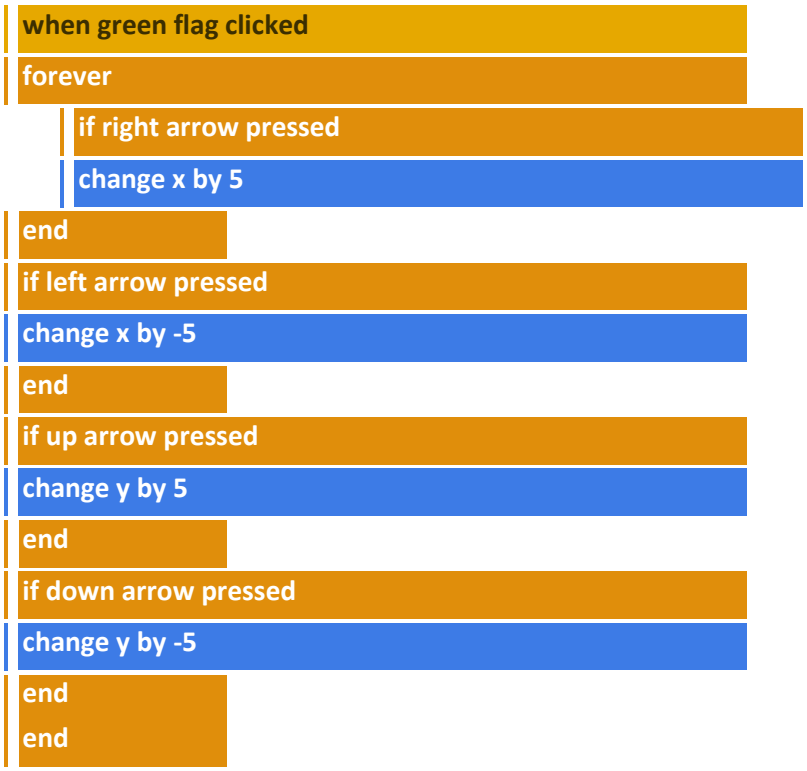
Example: Move right

```
when right arrow key pressed
change x by 10
```

The x coordinate controls horizontal position. Increasing x moves a sprite right; decreasing x moves it left.

Example: Four-direction movement

For continuous movement, you can use a loop and sensing blocks:



This is a pseudocode-style representation of the block structure. In Scratch, build it using a forever block containing four if blocks, each with its corresponding key-sensing block and movement instruction.

Improve movement

- Start with a small movement value.
- Test each direction.
- Check whether the sprite moves too quickly.
- Decide whether the player should be allowed to leave the Stage.
- Use suitable collision or boundary rules if needed.

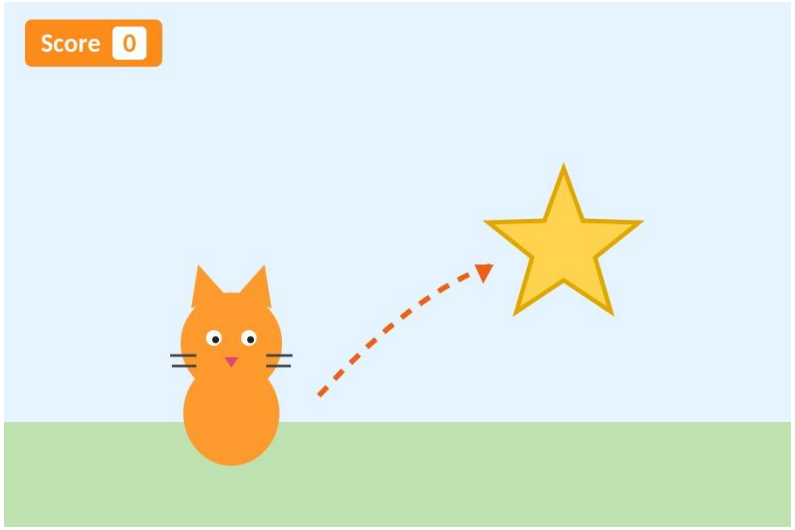
14.5 Detecting Collisions Between Sprites

A collision occurs when two game objects touch or overlap. In Scratch, a program can detect this using a Sensing block such as touching [sprite]?.

Collision detection is useful for collecting objects, avoiding obstacles, scoring points, and triggering events.

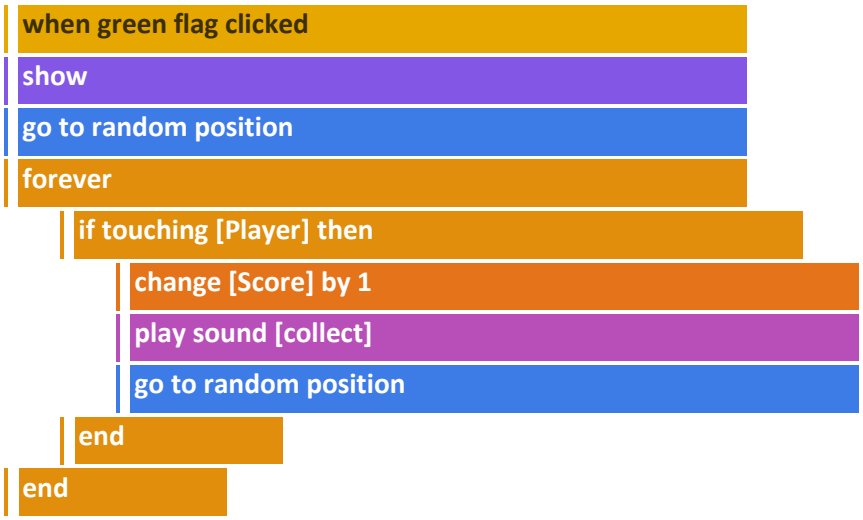
Example: Collecting a star

The player moves around the Stage. When the player touches the star, the score increases and the star moves to a new position.



Star sprite script

The following describes the block structure for the star sprite:



Build this using Scratch's Events, Looks, Motion, Control, Sensing, Variables, and Sound blocks.

How it works

1. The green flag starts the script.
2. The star appears at a random position.
3. The loop continuously checks whether the star touches the player.
4. If they touch, the score increases by one.
5. A sound plays, and the star moves to a new position.

A common mistake

If the star and player remain touching after the score increases, the loop may add many points rapidly before the star moves away.

To reduce this problem, make sure the star moves to a new position promptly after collection. You can also use a short delay or a broadcast-based design where appropriate.

> **Remember:** Collision detection is useful only when the program checks the correct sprites and responds appropriately.

14.6 Conditions and Winning Rules

A game needs rules that determine what happens when a player achieves a goal or fails a challenge.

For example, the player may win after collecting five stars.

Example: Check the score

if Score >= 5 then

broadcast [You Win]

end

This logic checks whether the score has reached five or more. If the condition is true, it sends a broadcast message named You Win.

In Scratch, place the if block inside an appropriate loop or event-driven script so the condition is checked during gameplay.

Why use >= 5 instead of = 5?

The operator >= means “greater than or equal to.” It still detects a win if the score somehow becomes 6 or more before the condition is checked.

However, the game should also prevent unnecessary extra scoring once it has ended.

14.7 Broadcasts: Making Sprites Communicate

A broadcast sends a message to other scripts in the same Scratch project. Scripts can respond to that message using a when I receive [message] event block.

Broadcasts help coordinate different parts of a game.

For example:

- The player collects the final star.
- The scoring script broadcasts You Win.
- The player script stops movement.
- A message sprite displays “Congratulations!”
- The game can stop or switch to a victory backdrop.

How a broadcast coordinates a game

Score reaches 5	The winning condition becomes true.
Broadcast: You Win	The message is sent to the project.
Message sprite	Shows the winning message.
Player script	Stops movement or gameplay.

Diagram: One broadcast can trigger several scripts at the same time.

Example: Winning message sprite

On a separate sprite used for messages:



This sprite starts hidden and appears when it receives the winning message.

Why are broadcasts useful?

- They allow sprites to respond to the same event.
- They help separate game logic into manageable scripts.
- They can coordinate game starts, level changes, and endings.
- They make larger projects easier to organize.

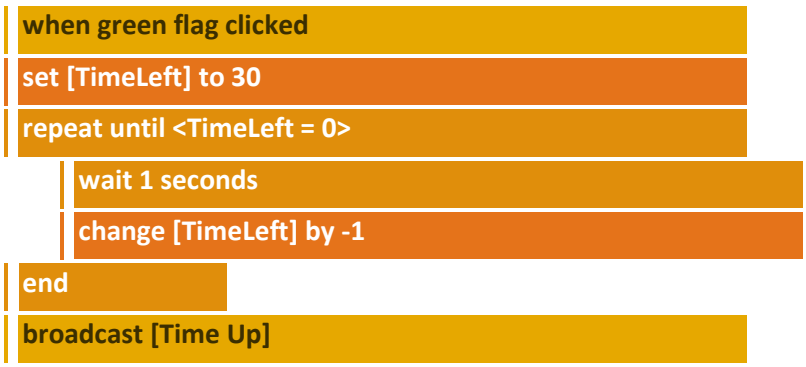
14.8 Timers, Lives, and Increasing Difficulty

More advanced games may include a countdown timer, limited lives, or different difficulty levels.

A. Countdown timer

A timer can create a challenge in which a player must collect objects before time runs out.

For example, you might create a variable called TimeLeft, set it to 30, and decrease it once per second.



This is a simplified example. In a complete game, you should also stop the countdown when the player wins and prevent the timer from becoming negative.

B. Lives

A Lives variable can record how many attempts a player has remaining.

For example:



When the player touches an obstacle, the game may decrease Lives by one. If the number of lives reaches zero, the game ends.

C. Increasing difficulty

A game may become harder as the score increases. For example:

- Objects move faster.
- More obstacles appear.
- The player has less time.
- The target score increases.

Difficulty should increase gradually. If a game becomes too difficult too quickly, it may stop being enjoyable.

14.9 Creating a Complete Game

Now apply the concepts from this chapter to design a simple game.

Project: Collect the Stars



Goal: Control a player sprite and collect five stars to win.

Game components

Component	Purpose
Player sprite	Moves using the arrow keys
Star sprite	Appears at a random position
Score variable	Counts collected stars
Collision detection	Detects when the player touches a star
Winning condition	Checks whether the score has reached five
Broadcast	Announces the end of the game
Message sprite	Displays the winning message

Suggested development sequence

1. Select a backdrop and add the player sprite.
2. Add the star sprite.
3. Create the Score variable.
4. Set the score to zero when the green flag is clicked.
5. Program the player controls.
6. Program the star’s random starting position.
7. Detect when the player touches the star.
8. Increase the score and reposition the star.
9. Check whether the score reaches five.

10. Broadcast You Win and display the winning message.
11. Test the game and fix any errors.

Pseudocode for the game

```
START GAME
SET Score TO 0
PLACE Star AT RANDOM POSITION
REPEAT WHILE GAME IS ACTIVE
    READ PLAYER CONTROLS
    MOVE PLAYER
    IF PLAYER TOUCHES STAR THEN
        INCREASE Score BY 1
        MOVE STAR TO RANDOM POSITION
    ENDIF
    IF Score >= 5 THEN
        BROADCAST "You Win"
        END GAME
```

ENDIF

END REPEAT

This pseudocode describes the logic, not exact Scratch block syntax. The game will need separate scripts for the player, star, and message sprite.

Design tips

- Use clear instructions before the game begins.
- Keep controls simple.
- Make collected objects easy to see.
- Ensure the score updates correctly.
- Avoid unnecessary sounds and visual effects.
- Provide feedback when the player wins.
- Test different situations, including starting a new game.

14.10 Testing, Debugging, and Improving a Game

Testing checks whether the game behaves as intended. Debugging identifies and corrects problems.

A game may contain several scripts that interact, so testing only one feature is not enough.

Game testing checklist

- ☐ Does the green flag reset the score?
- ☐ Does the player move in the correct direction?
- ☐ Does touching a star increase the score by exactly one?
- ☐ Does the star move after collection?
- ☐ Does the winning message appear at the correct time?
- ☐ Does the game stop or prevent further scoring after winning?
- ☐ Can a new game begin with a fresh score?
- ☐ Do the scripts behave correctly in different situations?

Common problems and solutions

Problem	Possible solution
Score does not reset	Add set Score to 0 to the game-start script
Score increases too quickly	Check the collision loop and reposition the star promptly
Winning message never appears	Check the score condition and broadcast name
Player moves too quickly	Reduce the movement value
Timer continues after winning	Stop the timer script when the game ends
Old message remains visible	Hide it at the start and show it only when needed

Improve the game through feedback

Ask a classmate to play your game and answer these questions:

1. Are the instructions clear?
2. Are the controls easy to use?
3. Is the game too easy or too difficult?
4. Are the score and messages accurate?
5. What is one improvement that would make the game better?

Use the feedback to improve the project.

14.11 Classroom Activities

Activity 1: Build a Score Counter

Create a Score variable. Set it to zero when the green flag is clicked, and increase it when the player collects an object. Test whether the score resets correctly.

Activity 2: Program Player Movement

Create a sprite that moves in four directions using the arrow keys. Adjust the movement values until the controls feel comfortable.

Activity 3: Use Broadcasts

Create a message sprite that remains hidden at the start. Broadcast You Win when the score reaches five, and make the message sprite appear when it receives that message.

Activity 4: Add a Countdown

Add a TimeLeft variable that starts at 30 and decreases once per second. Display a time-up message when the countdown finishes.

Activity 5: Test and Debug

Exchange games with a classmate. Test the controls, scoring, and winning condition. Record at least one problem and explain how you corrected it.

14.12 Review Questions

A. Multiple-Choice Questions

Choose the correct answer.

1. What is a variable used for in a game?

- **A.** Changing the monitor's brightness
- **B.** Storing information such as a score
- **C.** Printing a document
- **D.** Opening a web browser

2. Which block can detect whether one sprite is touching another?

- **A.** say Hello!
- **B.** move 10 steps
- **C.** touching [sprite]?
- **D.** set Score to 0

3. What does a broadcast do in Scratch?

- **A.** Deletes every sprite
- **B.** Sends a message that other scripts can respond to
- **C.** Automatically saves every file
- **D.** Changes the computer's settings

4. Why should a score be reset when a new game starts?

- **A.** To make the sprite invisible
- **B.** To ensure the new game starts with the correct score
- **C.** To stop the keyboard working
- **D.** To change the backdrop permanently

5. Which condition checks whether a score has reached at least five?

- **A.** Score < 5
- **B.** Score = 0
- **C.** Score >= 5
- **D.** Score < 0

6. **Which feature is most suitable for tracking remaining attempts?**
   - **A.** A backdrop
   - **B.** A Lives variable
   - **C.** A costume name
   - **D.** A sound effect

7. **What is collision detection used for in a collecting game?**
   - **A.** Detecting when the player touches an object
   - **B.** Changing the project title
   - **C.** Saving the project to a folder
   - **D.** Selecting a backdrop

8. **What should happen when the player wins?**
   - **A.** The game should continue scoring without limits
   - **B.** The score should always become zero
   - **C.** The game should provide clear feedback and handle the end condition
   - **D.** The player controls should become faster automatically

B. Short-Answer Questions

1. What is a variable? Name three variables that might be used in a game.
2. Explain how keyboard controls can move a sprite.
3. What is collision detection, and why is it useful?
4. Explain the purpose of a winning condition.
5. What is a broadcast, and how can it coordinate different sprites?
6. Why should game variables be initialized at the beginning?
7. Explain how a countdown timer can make a game more challenging.
8. List five tests you would perform before submitting a Scratch game.

C. Practical and Critical-Thinking Questions

1. Design the logic for a game in which a player collects three objects to win.
2. A player touches a collectible once, but the score increases by ten points. What might be causing the problem?
3. A winning message appears, but the player can continue collecting objects. Explain how you would improve the game.
4. Explain how broadcasts can make a large Scratch project easier to organize.
5. Describe how you would add a timer and three lives to a collecting game without allowing the score to become incorrect.
6. A classmate says that a game works because it ran correctly once. Explain why more testing is necessary.

14.13 Homework

Complete the following tasks in your notebook and Scratch editor.

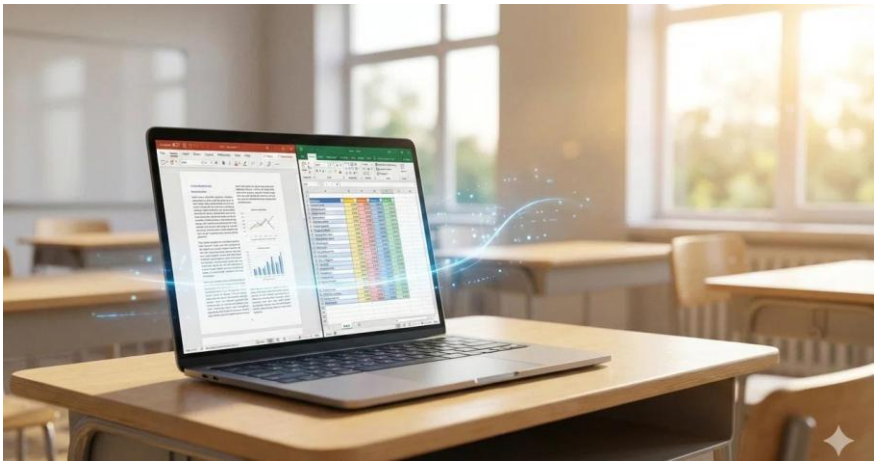
1. Define variable, collision detection, broadcast, and winning condition.
2. Draw a flowchart showing the main logic of a game in which the player collects objects.
3. Write pseudocode for a game that awards one point whenever the player collects an object.
4. Explain how you would use a Score variable and a Lives variable.
5. Create a Scratch project that uses keyboard controls, collision detection, and a score counter.
6. Add a winning condition and a message that appears when the target score is reached.
7. Test the project with a new game, a successful collection, and a completed game.
8. Write a short evaluation describing one strength and two possible improvements to your game.

Quick Revision

Variables	Store changing information such as score, time, and lives.
Keyboard controls	Allow the player to control sprites through key events or key-sensing blocks.
Collision detection	Checks whether sprites touch or overlap.
Conditions	Determine which actions occur when a rule is true or false.
Broadcasts	Send messages that can trigger scripts in different parts of a project.
Game testing	Checks controls, scoring, collisions, timers, and end conditions.

Chapter 15: Integrated Computer Studies Project and Practical Revision

Digital Foundations · Student Textbook



LEARNING OBJECTIVES

By the end of this chapter, students will be able to:

- Apply skills from Microsoft Word, Excel, and PowerPoint to a single project.
- Conduct online research using reliable sources.
- Use computational thinking to plan and solve a practical problem.
- Apply programming concepts through Scratch.
- Organize files and manage a project systematically.
- Demonstrate safe, ethical, and responsible use of technology.
- Test, evaluate, and improve their digital work.
- Prepare for the Grade 6 Computer Studies practical and theory assessments.

15.1 Why Do We Need an Integrated Project?

In earlier chapters, you learned how to use different computer applications and solve problems using computational thinking. In real life, tasks often require several of these skills together.

For example, a student preparing a science exhibition might:

- Research a topic using the internet.
- Write a report in Microsoft Word.
- Record measurements and calculate results in Excel.
- Present findings using PowerPoint.
- Create an interactive demonstration using Scratch.

An integrated project combines skills from different areas to solve one meaningful problem.

How the applications work together

1. Internet Research

Find and verify information.

2. Word

Prepare a report.

3. Excel

Organize and analyse data.

4. PowerPoint

Present the findings.

5. Scratch

Create an interactive project.

Diagram: A sample workflow combining research, productivity applications, and programming.

Not every project needs all these applications. Choose tools according to the task and your teacher's requirements.

15.2 The Integrated Project: A Greener School

In this chapter, you will plan a project called A Greener School.

Your goal is to investigate how your school can reduce waste, conserve resources, and encourage environmentally responsible habits.

You will prepare a report, analyse sample data, create a presentation, and optionally develop a Scratch awareness quiz.

Project question

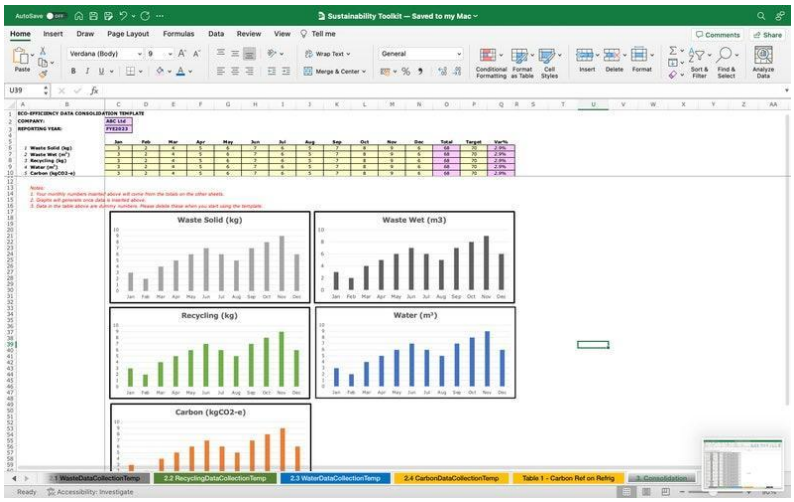
How can our school reduce waste and use resources more responsibly?

Project deliverables



Deliverable 1 — Microsoft Word report

Write a short report describing the problem, your findings, and suggested solutions.



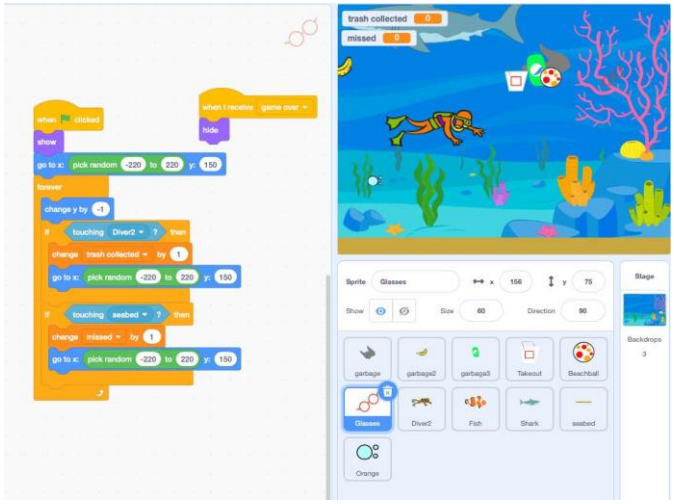
Deliverable 2 — Microsoft Excel workbook

Organize waste data, calculate totals and averages, and create a chart.



Deliverable 3 — PowerPoint presentation

Present your findings and recommendations in a concise slide deck.



Deliverable 4 — Scratch quiz (optional or teacher-assigned)

Create an interactive quiz that teaches classmates how to reduce waste.

You may use teacher-provided sample data if you cannot collect real school data. Never invent measurements and present them as actual observations.

15.3 Step 1: Plan the Project Using Computational Thinking

Before opening any application, break the project into smaller tasks.

Decomposition

Divide the project into these stages:

1. Define the environmental problem.
2. Research possible solutions.
3. Collect or receive data.
4. Analyse the data.
5. Prepare the report.
6. Create the presentation.
7. Build and test the Scratch quiz, if required.
8. Review and submit the final work.

Pattern recognition

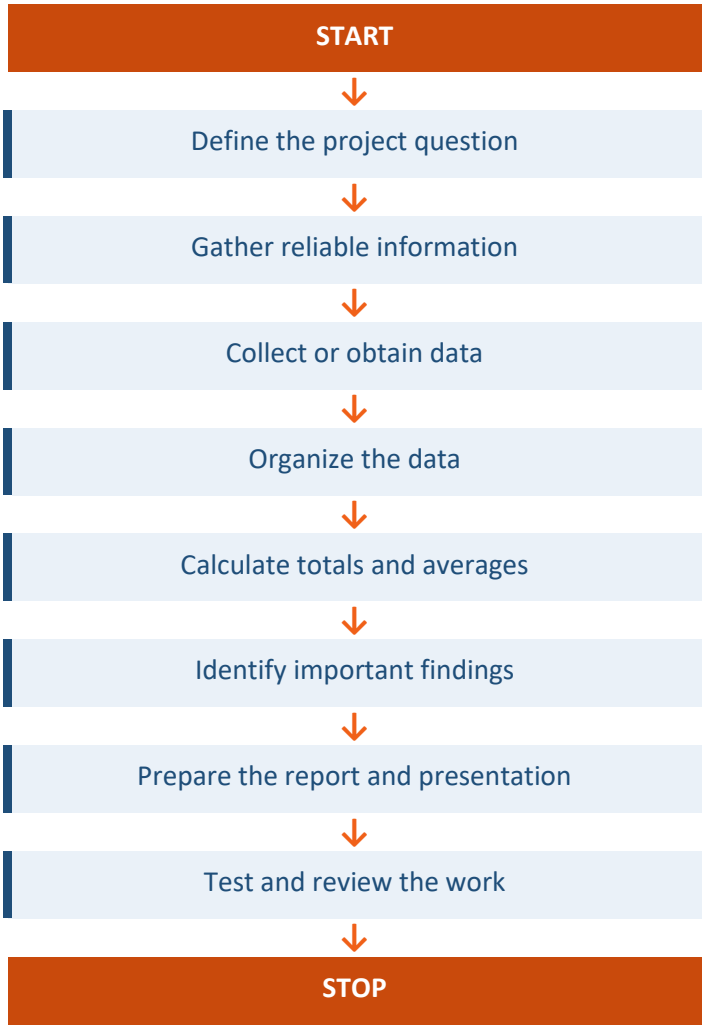
Look for repeated trends in the data. For example, if plastic waste is consistently high across several days, the school may need to review how plastic is used.

Abstraction

Focus on the information needed to answer the project question. You do not need to record unrelated details about every student or every classroom activity.

Algorithm design

Write a simple plan:



This plan gives you a clear sequence of actions.

15.4 Step 2: Conduct Reliable Online Research

Use the research skills from Chapter 10 to find information about waste reduction, recycling, saving electricity, and conserving water.

Suggested search queries

- ways schools can reduce plastic waste
- benefits of recycling paper at school
- practical methods to save water in schools
- energy-saving habits for students

Evaluate your sources

Before using information, check:

- **Author:** Who produced the information?
- **Accuracy:** Is it supported by evidence?
- **Currency:** Is it recent enough for the topic?
- **Purpose:** Is it intended to inform, educate, or sell something?
- **Agreement:** Do other reliable sources support the main claims?

Use trustworthy educational resources, government websites, recognized environmental organizations, or suitable reference materials.

Record your sources

Keep a source list containing the title, author or organization, URL, and access date if required by your teacher.

Write findings in your own words, acknowledge sources, and use images only when reuse is permitted. Do not copy an entire webpage into your report.

15.5 Step 3: Prepare the Report in Microsoft Word

Use the formatting and document-design skills from Chapters 5 and 6.

Suggested report structure

A Greener School

A report on reducing waste and conserving resources

Student name, class, and submission date

1. Introduction

Explain the environmental issue and why it matters.

2. Research Findings

Summarize reliable information about waste, recycling, and resource conservation.

3. Data and Observations

Present the figures collected or supplied for the project.

4. Recommendations

Suggest practical ways the school can improve.

5. Conclusion

Summarize the most important findings.

6. References

List the sources used in the report.

Formatting requirements

- Use a clear title and meaningful section headings.
- Choose a readable font and suitable font size.
- Use consistent spacing and alignment.
- Insert a table or chart when it improves understanding.
- Add page numbers if required.
- Check spelling, grammar, and punctuation.
- Save the file with a meaningful name, such as Greener_School_Report.docx.

Sample paragraph

Our school can reduce waste by encouraging reusable water bottles, placing clearly labelled recycling bins in suitable locations, and avoiding unnecessary printing. Students and staff can help by sorting waste correctly and using resources carefully. Regular monitoring can show whether these actions are making a difference.

Use this as a model, then write your own report using your research and findings.

15.6 Step 4: Analyse Data in Microsoft Excel

Excel helps you organize numerical information, calculate results, and identify patterns.

For this activity, use the following sample data showing the number of discarded plastic bottles collected from one school area over five days.

Sample plastic bottle count

Illustrative data for practice only — not actual school measurements.

Day	Bottles collected
Monday	24
Tuesday	18
Wednesday	30
Thursday	20
Friday	8
Total	100

Enter the data

Open Excel and enter the following information:

- Cell A1: Day
- Cell B1: Bottles Collected
- Cells A2:A6: the five days.
- Cells B2:B6: the corresponding counts.

Use formulas

Enter these formulas into suitable cells:

Task	Formula	Result
Total bottles	=SUM(B2:B6)	100
Average per day	=AVERAGE(B2:B6)	20
Highest daily count	=MAX(B2:B6)	30
Lowest daily count	=MIN(B2:B6)	8

Create a chart

1. Select the day names and bottle counts.
2. Choose Insert and select a suitable column or bar chart.
3. Add the chart title Plastic Bottles Collected by Day.
4. Make sure the day names and values are easy to read.
5. Place the chart in your workbook or copy it into your report or presentation if required.

Plastic Bottles Collected by Day

Illustrative sample counts for a five-day school activity.



Interpret the results

Answer these questions using the sample data:

1. Which day had the highest bottle count?
2. Which day had the lowest count?
3. What was the total number of bottles?
4. What was the average daily count?
5. Suggest one action the school could take to reduce the number of discarded bottles.

> **Important:** A chart helps people see patterns, but it does not explain the cause of those patterns. Additional evidence may be needed to explain why counts change.

15.7 Step 5: Create a PowerPoint Presentation

Use the presentation skills from Chapter 9 to communicate the project's findings.

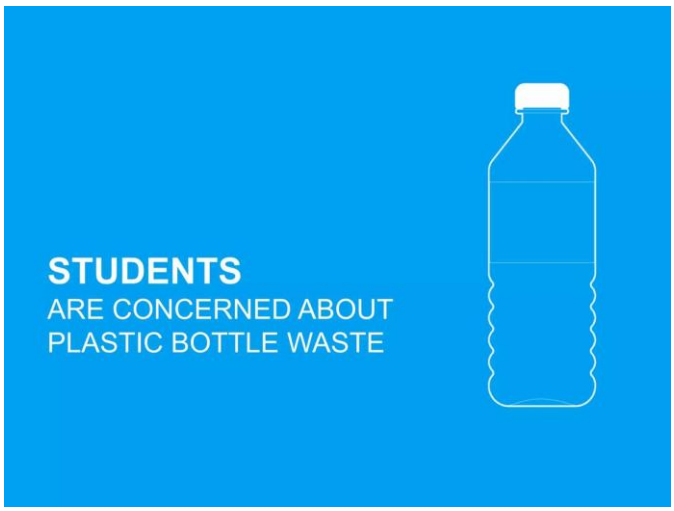
A good presentation focuses on the most important information rather than copying every paragraph from the report.

Suggested six-slide structure



Slide 1 — Title

A Greener School, student name, class, and a suitable image.



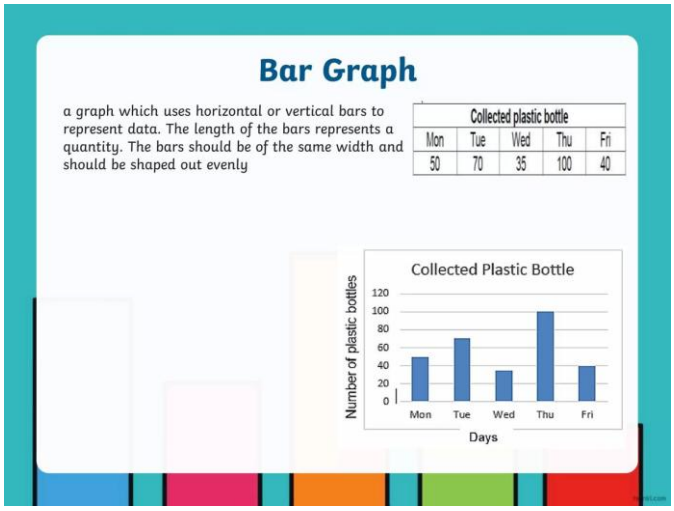
Slide 2 — The Problem

Explain why reducing waste and conserving resources matter.



Slide 3 — Research Findings

Present two or three important facts with source credits.



Slide 4 — Data and Results

Show the Excel chart and explain what it tells us.



Slide 5 — Recommendations

Suggest realistic actions students and staff can take.



Slide 6 — Conclusion

Summarize the main finding and end with a clear call to action.

Presentation design rules

- Use a consistent theme and readable text.
- Keep each slide focused on one main idea.
- Prefer short bullet points over long paragraphs.
- Use charts and images that support the message.
- Add appropriate credits for sources and images.
- Use transitions and animations sparingly.
- Practise speaking clearly instead of reading every word from the screen.

Save the presentation with a meaningful name, such as Greener_School_Presentation.pptx.

15.8 Step 6: Create an Interactive Scratch Quiz

Use the programming concepts from Chapters 13 and 14 to create a short quiz about environmental responsibility.

Project objective

The quiz asks questions, checks answers, keeps score, and displays a final result.



Suggested quiz questions

1. Which action helps reduce plastic waste?
2. A. Use a reusable water bottle.
3. B. Use a new disposable bottle every time.
4. C. Throw bottles on the ground.

Correct answer: A.

1. What should you do before recycling an item?
2. A. Check the local recycling instructions.
3. B. Put every type of waste in the same bin.
4. C. Leave the item wherever you like.

Correct answer: A.

1. Which habit helps save electricity?
2. A. Leave unused lights on.
3. B. Turn off lights when they are not needed.
4. C. Keep every device running all day.

Correct answer: B.

Plan the algorithm

```
START
SET Score TO 0
ASK Question 1
IF answer is correct
INCREASE Score BY 1
ENDIF
ASK Question 2
IF answer is correct
INCREASE Score BY 1
ENDIF
ASK Question 3
IF answer is correct
INCREASE Score BY 1
ENDIF
DISPLAY Score
STOP
```

Build the Scratch project

1. Choose a suitable backdrop and a sprite.
2. Create a variable called Score.
3. Reset the score to zero when the green flag is clicked.
4. Ask each question using an ask-and-wait block.
5. Use an if-else block to check the answer.
6. Increase the score for correct answers.
7. Display feedback after each question.
8. Show the final score at the end.
9. Test correct answers, incorrect answers, and a new game.

This project brings together variables, events, input, conditions, sequence, and output.

15.9 Step 7: Organize and Submit Your Files

A project is easier to assess when its files are clearly named and organized.

Create a folder called Grade6_Greener_School_Project and store your work in it.

Grade6_Greener_School_Project

`Greener_School_Report.docx`	Microsoft Word report
`Greener_School_Data.xlsx`	Excel workbook and chart
`Greener_School_Presentation.pptx`	PowerPoint slides
`Greener_School_Quiz.sb3`	Scratch project, if exported and required

Example folder structure. Follow your teacher's instructions for filenames, formats, and submission method.

Final checks before submission

- Open each file and confirm that it works.
- Check that the report contains its references.
- Verify Excel formulas and chart labels.
- Run the PowerPoint slide show.
- Test the Scratch quiz from the beginning.
- Check filenames and remove unnecessary duplicate files.
- Submit only the required files through the approved school method.

15.10 Digital Responsibility During the Project

While completing the project, apply the online safety principles from Chapter 11.

- Use reliable sources and verify important claims.
- Do not copy text or images without following the relevant rules.
- Protect passwords and private school information.
- Do not publish classmates' photographs without permission.
- Use school-approved tools and accounts.
- Do not invent data or misrepresent sample data as real observations.
- Use AI tools only according to school rules and verify their outputs.
- Treat classmates respectfully when sharing feedback or working in a group.

A successful project is not only technically correct. It must also be honest, safe, well-organized, and respectful of others' work.

15.11 Project Assessment Rubric

Use this rubric to understand how your project may be assessed.

Assessment area	Marks
Research quality and source acknowledgment	10
Word report structure and formatting	10
Excel formulas, analysis, and chart	15
PowerPoint design and communication	10
Scratch quiz functionality, if assigned	15
File organization and testing	5
Explanation, reflection, and responsible technology use	5
Total when Scratch is included	70

If Scratch is not assigned, the teacher can remove those 15 marks and adjust the total to 55 marks.

The teacher may adapt the weighting based on the available lessons, devices, software, and assessment requirements.

15.12 Theory Revision: Key Concepts from Chapters 1–14

Use this section to revise the main concepts studied throughout the textbook.

Computer Fundamentals	Review computer systems, hardware, software, input and output devices, storage, and responsible computer use.
Microsoft Word	Review document creation, formatting, paragraph alignment, tables, pictures, page layout, and professional document design.
Microsoft Excel	Review workbooks, worksheets, cells, formulas, functions, cell references, charts, sorting, filtering, and data interpretation.
Microsoft PowerPoint	Review slides, layouts, themes, images, charts, transitions, animations, presenter notes, and presentation skills.
Internet and Digital Citizenship	Review browsers, search engines, URLs, online research, source evaluation, passwords, phishing, privacy, copyright, and cyberbullying.
Computational Thinking and Scratch	Review decomposition, pattern recognition, abstraction, algorithms, pseudocode, flowcharts, sequences, loops, conditions, variables, broadcasts, and debugging.

15.13 Theory Practice Test

A. Multiple-Choice Questions

Choose the correct answer.

1. Which device is commonly used to enter text into a computer?

- **A.** Monitor
- **B.** Keyboard
- **C.** Speaker
- **D.** Projector

2. Which application is most suitable for creating a formatted written report?

- **A.** Microsoft Word
- **B.** Microsoft Excel
- **C.** Scratch
- **D.** A media player

3. Which Excel formula adds the values in cells B2 through B6?

- **A.** =ADD(B2:B6)
- **B.** =SUM(B2:B6)
- **C.** =TOTAL(B2-B6)
- **D.** =PLUS(B2:B6)

4. What is the purpose of a PowerPoint transition?

- **A.** To calculate totals
- **B.** To control how one slide changes to the next
- **C.** To check spelling in every application
- **D.** To create an Excel formula

5. Which software is used to create programs by connecting visual code blocks?

- **A.** Microsoft Word
- **B.** Microsoft Excel
- **C.** Scratch
- **D.** A web browser

6. Which term refers to a set of instructions for solving a problem?

- **A.** Algorithm
- **B.** Backdrop
- **C.** Workbook
- **D.** Browser

7. Which flowchart symbol represents a decision?

- **A.** Oval
- **B.** Rectangle
- **C.** Diamond
- **D.** Parallelogram

8. Which is a search engine?

- **A.** Microsoft Word
- **B.** Google Search
- **C.** Scratch
- **D.** Microsoft PowerPoint

9. **What should you do if you receive a suspicious message asking for your password?**
   - **A.** Send your password immediately
   - **B.** Forward it to everyone
   - **C.** Avoid the link and report the message to a trusted adult or appropriate staff member
   - **D.** Publish the password online

10. **What is a variable in Scratch?**
   - **A.** A background image
   - **B.** A named value that can be used or changed
   - **C.** A type of keyboard
   - **D.** A browser address

B. Short-Answer Questions

1. Explain the difference between hardware and software.
2. State three features of a well-formatted Word document.
3. Explain the difference between a formula and a function in Excel.
4. What is the difference between a transition and an animation in PowerPoint?
5. Explain the difference between a browser and a search engine.
6. Name four techniques of computational thinking.
7. Explain the difference between sequence, selection, and repetition.
8. What is plagiarism, and how can a student avoid it?
9. Explain what a variable and a broadcast do in Scratch.
10. List four steps involved in debugging a computer program.

C. Practical Thinking Questions

1. You need to prepare a report with a chart and a presentation. Which applications would you use, and what would each application do?
2. An Excel total does not update as expected. Name three things you would check.
3. A PowerPoint slide contains too much text. Explain how you would improve it.
4. A Scratch game keeps adding points when the player touches one object. Explain how you would investigate the problem.
5. You find conflicting information on two websites. Describe how you would decide which information is more reliable.

15.14 Practical Examination Practice

The following tasks can be used for individual practice or as a mock practical examination.

Task 1 — Microsoft Word	Create a one-page document titled Five Ways to Protect the Environment. Include a heading, five numbered recommendations, a table with two columns, and a suitable image with appropriate credit. Format the page professionally.
Task 2 — Microsoft Excel	Enter five days of sample waste data. Calculate the total, average, maximum, and minimum using formulas. Create a chart with a suitable title and labels.
Task 3 — Microsoft PowerPoint	Create a four-slide presentation about saving electricity. Include a title slide, three practical recommendations, a relevant visual, and a conclusion. Use a consistent theme.
Task 4 — Scratch	Create a program in which a sprite moves with the arrow keys, collects an object, increases a score, and displays a winning message when the score reaches three.
Task 5 — Internet Research	Find two reliable sources about reducing school waste. Record their titles and URLs, summarize three facts in your own words, and explain why the sources appear trustworthy.

15.15 Suggested Mock Examination

Use this assessment plan for revision. The teacher may adjust the duration and marks according to the school's assessment requirements.

Grade 6 Computer Studies

Suggested mock assessment

Section	Content	Marks
Section A — Theory	MCQs and short-answer questions	30
Section B — Office Applications	Word, Excel, and PowerPoint	40
Section C — Programming	Algorithms, Scratch, testing, and debugging	20
Section D — Digital Citizenship	Online safety and responsible technology use	10
Total		100

Suggested duration: 90–120 minutes, depending on whether the practical section is completed on a computer.

15.16 Final Revision Checklist

Use this checklist to identify the topics you have revised. It is a study aid, not a substitute for completing the practical exercises.

My revision progress

- [ ] 0 / 12

Computer fundamentals

- [ ] Identify common input, output, processing, and storage devices.
- [ ] Explain the difference between hardware and software.

Microsoft Word

- [ ] Format text, paragraphs, tables, and page layouts.
- [ ] Prepare a clear report with appropriate headings and images.

Microsoft Excel

- [ ] Enter data and use formulas and functions.
- [ ] Create charts and interpret results.

Microsoft PowerPoint

- [ ] Create organized slides using consistent design.
- [ ] Use pictures, charts, transitions, and animations appropriately.

Internet and digital citizenship

- [ ] Search effectively and evaluate online sources.
- [ ] Recognize online threats and follow privacy and copyright rules.

Computational thinking and Scratch

- [ ] Explain decomposition, pattern recognition, abstraction, and algorithms.
- [ ] Use sequences, loops, conditions, variables, broadcasts, and debugging.
- [ ] Reset revision checklist

Final Message to Students

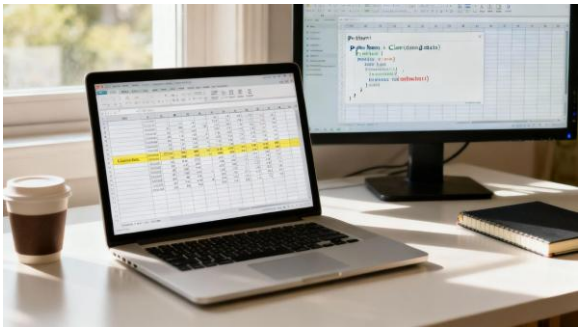
Computer Studies is not only about remembering commands. It is about using technology to solve problems, communicate ideas, analyse information, create useful projects, and make responsible decisions.

Keep practising. Test your work, learn from errors, and improve your solutions.

Chapter 16: Revision, Practical Examination and Final Challenge

Digital Foundations · Student Textbook





CHAPTER THEME

Review what you have learned, demonstrate your practical skills, and solve a real-world problem using technology.

By this stage, you have explored computer fundamentals, file management, word processing, spreadsheets, presentations, internet research, computational thinking, and Scratch programming. This chapter brings those skills together through revision exercises, examination practice, and a final challenge.

1. Learning objectives

By the end of this chapter, you should be able to:

- Explain important computer studies concepts using correct terminology.
- Manage files and folders carefully and save work in the correct location.
- Create and format professional documents in Microsoft Word.
- Use Excel formulas, functions, and charts to organize and analyse data.
- Design clear and effective PowerPoint presentations.
- Research information online and evaluate whether sources are reliable.
- Explain computational thinking and write simple algorithms.
- Create and test a Scratch program using sequences, loops, conditions, variables, and events.
- Follow safe, responsible, and respectful digital practices.
- Complete a practical task independently and present your work clearly.

2. Your Grade 6 learning journey

Computer fundamentals and file management	Understand computers, hardware, software, storage, folders, and responsible file handling.
Microsoft Word	Create structured documents with headings, formatting, tables, images, and page layouts.
Microsoft Excel	Organize data, calculate results, use functions, and create charts.
PowerPoint and online research	Communicate ideas visually and find information from trustworthy sources.
Computational thinking and Scratch	Break problems into steps and build interactive programs.

3. Essential knowledge revision

3.1 Computer fundamentals

Term	Meaning
Hardware	Physical parts of a computer, such as a keyboard, monitor, and processor.
Software	Programs and instructions that tell a computer what to do.
Operating system	Software that manages computer hardware, files, and applications.
Input device	A device used to enter data, such as a keyboard or mouse.
Output device	A device that presents information, such as a monitor or printer.
Storage	The place where files and data are kept.
RAM	Temporary working memory used while programs are running.
File	A named collection of information stored on a device.
Folder	A container used to organize files and other folders.

> **Remember:** RAM is temporary working memory. Saving a file to a storage device allows you to keep it after the computer is switched off.

3.2 Microsoft Word

Word is used to create and format documents such as reports, letters, notices, and assignments.

Revise these skills:

- Typing and editing text.
- Using headings, fonts, font sizes, and paragraph alignment.
- Creating bulleted and numbered lists.
- Inserting tables and pictures.
- Adjusting margins and page orientation.
- Using spelling and grammar tools.
- Saving, reopening, and printing or exporting documents.

Good document design: Use consistent headings, readable fonts, appropriate spacing, and relevant images. Avoid unnecessary colours and decorative effects.

3.3 Microsoft Excel

Excel organizes information in rows and columns. Each box is called a cell, identified by a column letter and row number, such as B4.

Common functions include:

Function	Purpose	Example
SUM	Adds values	=SUM(B2:B6)
AVERAGE	Calculates the mean	=AVERAGE(B2:B6)
MAX	Finds the largest value	=MAX(B2:B6)
MIN	Finds the smallest value	=MIN(B2:B6)
COUNT	Counts cells containing numbers	=COUNT(B2:B6)

A formula normally begins with =. A cell reference such as B2 points to a particular cell.

> **Example:** If cells B2 to B6 contain 10, 20, 15, 25, and 30, then =SUM(B2:B6) returns 100.

3.4 Microsoft PowerPoint

PowerPoint is used to communicate information through slides.

A good presentation should have:

- A clear title and logical sequence.
- Short bullet points instead of long paragraphs.
- Readable text and strong contrast.
- Relevant pictures, diagrams, or charts.
- Consistent colours and fonts.
- Correct spelling and properly credited sources.

The presenter should explain the ideas rather than simply read every word from the screen.

3.5 Internet research and digital citizenship

Revise these principles:

1. Use specific search terms to find relevant information.
2. Check who created a webpage and whether the information is current.
3. Compare important facts with more than one trustworthy source.
4. Record the sources used in a project.
5. Never copy another person's work and present it as your own.
6. Keep passwords private and use strong, unique passwords.
7. Do not share personal information with unknown people online.
8. Report suspicious messages, cyberbullying, or unsafe content to a trusted adult or teacher.

3.6 Computational thinking

Computational thinking helps you solve problems systematically.

Decomposition	Break a large problem into smaller tasks.
Pattern recognition	Identify similarities and repeated features.
Abstraction	Focus on important details and ignore irrelevant ones.
Algorithm design	Write clear, ordered steps to solve a problem.

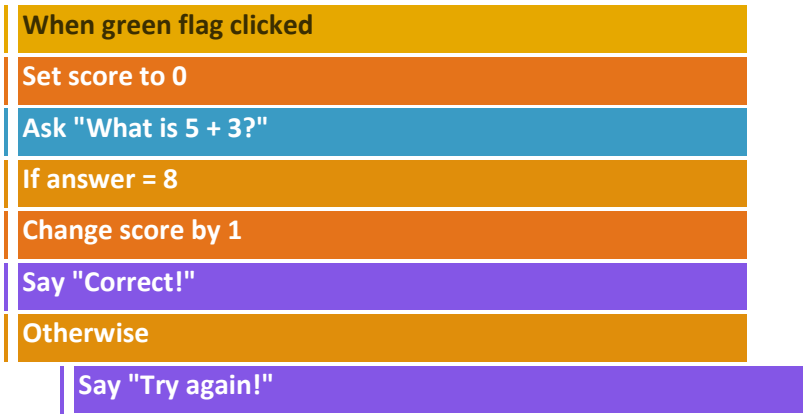
3.7 Scratch programming

Scratch is a block-based programming environment. Programs are created by joining blocks together.

Know the purpose of these concepts:

- **Event:** Starts an action, such as clicking the green flag.
- **Sequence:** Instructions carried out in order.
- **Loop:** Repeats instructions.
- **Condition:** Makes a decision, such as checking whether an answer is correct.
- **Variable:** Stores a value that can change.
- **Broadcast:** Sends a message that other scripts can respond to.
- **Debugging:** Finding and correcting errors in a program.

Example algorithm:



This is an algorithm written in pseudocode. In Scratch, each instruction must be represented by the appropriate blocks.

4. Theory revision: Multiple-choice questions

Choose the best answer for each question.

Practice quiz

1. Which of the following is an input device?

- **A.** Monitor
- **B.** Keyboard
- **C.** Speaker
- **D.** Projector

2. Which type of memory temporarily holds data being used by programs?

- **A.** RAM
- **B.** DVD
- **C.** Hard disk
- **D.** Printer

3. What is the main purpose of an operating system?

- **A.** To decorate documents
- **B.** To manage hardware and software resources
- **C.** To create only presentations
- **D.** To browse only websites

4. Which file name is most suitable for a final school report?

- **A.** abc.docx
- **B.** New Document 7
- **C.** Greener_School_Report.docx
- **D.** Untitled

5. Which Word feature organizes information into rows and columns?

- **A.** Font colour
- **B.** Table
- **C.** WordArt
- **D.** Page colour

6. Which symbol usually begins an Excel formula?

- **A.** #
- **B.** &
- **C.** =
- **D.** %

7. Which Excel function calculates the average?

- **A.** SUM
- **B.** MAX
- **C.** AVERAGE
- **D.** COUNT

8. What does =MAX(B2:B6) return?

- **A.** The smallest value
- **B.** The largest value
- **C.** The sum of the values
- **D.** The number of cells

9. Which chart is often suitable for comparing quantities across categories?

- **A.** Bar or column chart
- **B.** A text paragraph
- **C.** A page border
- **D.** A file icon

10. What is a good PowerPoint design practice?

- **A.** Use long paragraphs on every slide
- **B.** Use many unrelated animations
- **C.** Use readable text and consistent formatting
- **D.** Use a different font for every sentence

11. What should you do when two websites provide conflicting information?

- **A.** Believe the first website automatically
- **B.** Compare source quality and check other reliable sources
- **C.** Copy both without checking
- **D.** Choose the most colourful website

12. What is plagiarism?

- **A.** Saving a document
- **B.** Giving credit to a source
- **C.** Presenting someone else's work as your own
- **D.** Checking spelling

13. Which computational thinking skill breaks a large task into smaller tasks?

- **A.** Decomposition
- **B.** Printing
- **C.** Formatting
- **D.** Broadcasting

14. What is an algorithm?

- **A.** A computer screen
- **B.** A sequence of steps for solving a problem
- **C.** A type of monitor
- **D.** A folder name

15. Which Scratch feature stores a changing score?

- **A.** Variable
- **B.** Backdrop
- **C.** Costume
- **D.** Sound effect

16. What is debugging?

- **A.** Adding pictures to Word
- **B.** Finding and correcting errors in a program
- **C.** Changing a computer's wallpaper
- **D.** Printing slides

17. Which action best protects an online account?

- **A.** Sharing a password with classmates
- **B.** Using the same simple password everywhere
- **C.** Using a strong, unique password
- **D.** Posting the password in a group chat

18. What should you do with a suspicious link sent by an unknown person?

- **A.** Open it immediately
- **B.** Forward it to everyone
- **C.** Avoid opening it and report it to a trusted adult
- **D.** Enter your password to check it

19. Why should you save work regularly?

- **A.** To increase the screen brightness
- **B.** To reduce the risk of losing recent work
- **C.** To make files disappear
- **D.** To stop all software updates

20. What is the purpose of testing a program?

- **A.** To check whether it works as intended
- **B.** To make the file name longer
- **C.** To replace all variables
- **D.** To remove the algorithm

5. Short-answer revision

Write your answers in your notebook before reviewing them with your teacher.

1. Explain the difference between hardware and software. Give two examples of each.
2. Why is it important to organize files into folders?
3. State four formatting features available in Microsoft Word.
4. What is the difference between a formula and a function in Excel?
5. Explain what the formula =SUM(C2:C7) does.

6. Give three rules for designing an effective PowerPoint presentation.
7. State three ways to check whether an online source is reliable.
8. Explain decomposition and give an example from a school project.
9. What is the difference between a loop and a condition in Scratch?
10. Explain why plagiarism is wrong and how you can avoid it.
11. What is debugging, and why should a program be tested?
12. Give three actions you should take to protect yourself online.

6. Practical examination preparation

A practical examination tests what you can actually do on a computer. Read every instruction carefully, complete the task, and check your work before submitting it.

Practical Task A — File management

Task: Create an organized project folder

Create a main folder named Grade6_Computer_Exam. Inside it, create these subfolders:

Grade6_Computer_Exam

Word

Excel

PowerPoint

Scratch

Save each practical task in its matching folder, using meaningful file names.

Practical Task B — Microsoft Word

Create a one-page document titled “Technology for a Greener School.”

Requirements:

- Add a centred title with a larger font.
- Write two short paragraphs explaining how technology can support environmental protection.
- Add a bulleted list of three practical actions students can take.
- Insert a relevant picture or a simple table.
- Add your name, class, and date.
- Use consistent formatting and save the file as Greener_School_Report.docx in the Word folder.

Check before submitting: Is the title clear? Is the text readable? Are spelling and punctuation correct? Did you save the document in the correct folder?

Practical Task C — Microsoft Excel

Enter the following illustrative practice data. These figures are examples for examination preparation, not actual school measurements.

Day	Bottles collected
Monday	12
Tuesday	18
Wednesday	15
Thursday	20
Friday	10

Complete these tasks:

1. Enter the data into cells A1:B6.
2. In A7, type Total; in B7, calculate the total using a formula.
3. In A8, type Average; in B8, calculate the average.
4. In A9, type Maximum; in B9, find the highest value.
5. In A10, type Minimum; in B10, find the lowest value.
6. Format the headings clearly and adjust column widths.
7. Create a column chart comparing the five days.
8. Save the workbook as Bottle_Collection.xlsx in the Excel folder.

Use these formulas:

Cell	Formula
B7	=SUM(B2:B6)
B8	=AVERAGE(B2:B6)
B9	=MAX(B2:B6)
B10	=MIN(B2:B6)

Expected results: Total = 75, Average = 15, Maximum = 20, Minimum = 10.

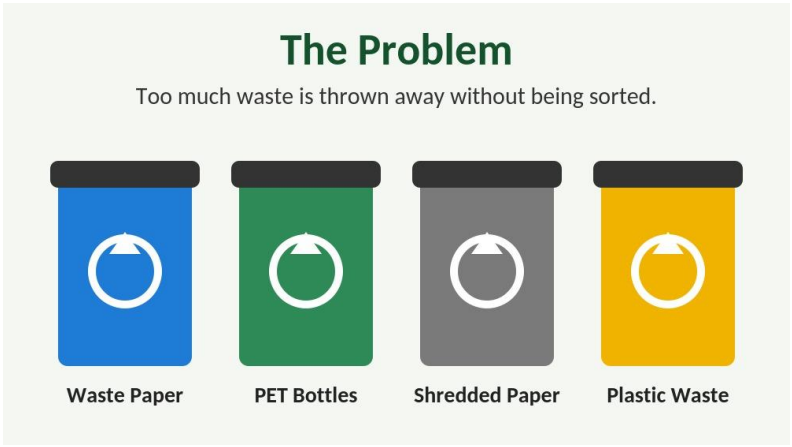
Practical Task D — Microsoft PowerPoint

Create a presentation titled “Our Greener School.” Make six slides:



Slide 1 — Title

Presentation title, your name, and class.



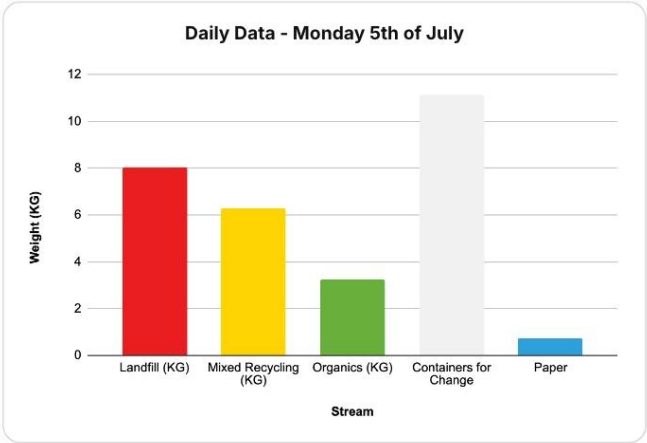
Slide 2 — The problem

Explain a school environmental problem.



Slide 3 — Our solution

Suggest practical ways to reduce waste.



Slide 4 — Our data

Insert your Excel chart or summarize the data.



Slide 5 — Action plan

Describe what students and teachers can do.



Slide 6 — Conclusion

Summarize your message and thank the audience.

Use a consistent theme, short text, relevant visuals, and readable fonts. Rehearse a short explanation for each slide. Save the file as Greener_School_Presentation.pptx in the PowerPoint folder.

Practical Task E — Scratch programming

Create a simple Environmental Quiz.

Your program should:

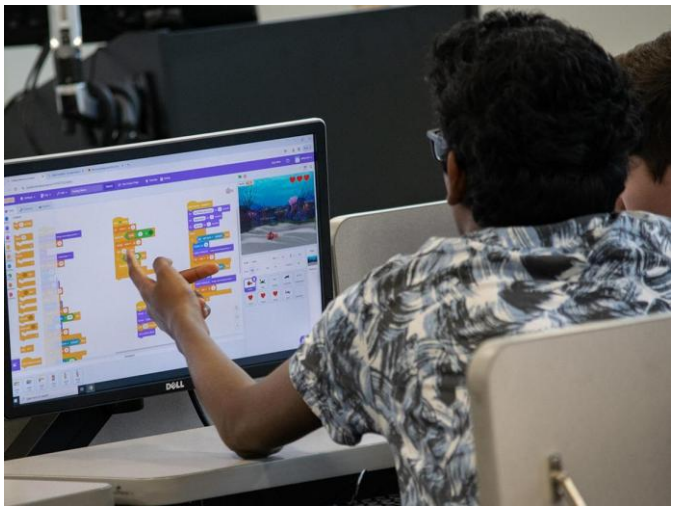
- Begin when the green flag is clicked.
- Ask the player three environmental questions.
- Check whether each answer is correct.
- Use a variable named score.
- Increase the score for each correct answer.
- Display the final score at the end.

Example questions:

- “Which bin should recyclable paper go into?” — Paper recycling bin.
- “Should we leave classroom lights on when they are not needed?” — No.
- “What should we do with a reusable water bottle?” — Reuse it.

Use the Scratch blocks you have learned. Test correct answers, incorrect answers, and the final score. Save the project as Environmental_Quiz.sb3 in the Scratch folder.

7. Final challenge — The Digital Solutions Showcase



You have been appointed a member of the Ignite Genesis School Digital Solutions Team. Your task is to design a small digital project that helps the school solve a real problem.

Choose one project:



Option A — A Greener School

Create a report, analyse recycling data, present recommendations, and build an environmental quiz.



Option B — A Smarter Library

Create a book catalogue, organize sample data in Excel, prepare a presentation, and program a Scratch book quiz.



Option C — Save Every Drop

Research water conservation, prepare a report, analyse sample water-use data, and create an interactive awareness project.

Your project requirements

Complete the following stages in order.

1. Plan the solution. Identify the problem, your intended audience, and three actions that could help.
2. Research. Find useful information using reliable sources. Record the titles and links of your sources.
3. Create a Word report. Explain the problem, proposed solution, and expected benefits.
4. Analyse data in Excel. Create a small, clearly labelled dataset. Use at least three appropriate formulas or functions and one chart.
5. Present your findings. Prepare five to six PowerPoint slides using clear headings, readable text, and relevant visuals.
6. Build a Scratch program. Include an event, a sequence, a condition, a loop, or a variable as appropriate to your program.
7. Test and improve. Check calculations, correct program errors, verify sources, and improve the presentation.
8. Demonstrate your work. Present your solution to your teacher or classmates and explain how each application helped.

Project completion tracker

My project checklist

- ☐ Plan the problem and solution
- ☐ Research and record reliable sources
- ☐ Complete and save the Word report
- ☐ Complete the Excel workbook and chart
- ☐ Create and rehearse the PowerPoint presentation
- ☐ Build and test the Scratch program
- ☐ Check file names and folder organization
- ☐ Present the finished project

8. Suggested practical examination rubric

Your teacher may use the following 100-mark rubric for the final challenge.

Assessment area	Marks
Planning, computational thinking, and research	10
Word report: structure and formatting	15
Excel: data, formulas, accuracy, and chart	20
PowerPoint: organization and visual communication	15
Scratch: logic, functionality, and testing	20
File organization and digital responsibility	10
Final demonstration and explanation	10
Total	100

The teacher should assess the quality of your work, accuracy, independence, and understanding—not just whether a file exists.

If Scratch is not part of the examination, the teacher should provide an adjusted assessment with a clearly stated total.

9. Mock examination

This sample examination can be used for revision before the final assessment.

Grade 6 Computer Studies

Mock examination • Suggested duration: 90 minutes

Section	Content	Marks
Section A — Theory	MCQs, terminology, short answers, and digital safety	20
Section B — Word and Excel	Create a formatted report and analyse a small dataset	30
Section C — PowerPoint	Build a short presentation from given information	15
Section D — Scratch	Create, test, and explain a simple interactive program	25
Section E — File management	Save and organize files correctly	10
Total		100

Examination rules

1. Read all instructions before starting.
2. Save your work at the beginning and at regular intervals.
3. Use the requested file names and folders.
4. Check that formulas return the correct results.
5. Test your Scratch program using different inputs.
6. Use only permitted resources during the examination.
7. Submit all required files before the deadline.

10. Short-answer guide for self-assessment

Use these model points to check the short-answer questions in Section 5.

Question	Expected answer points
1	Hardware is physical equipment; software is programs. Examples: keyboard and monitor; Word and Excel.
2	Folders make files easier to find, manage, and organize.
3	Examples include font formatting, alignment, headings, lists, tables, margins, and pictures.
4	A formula is an expression used for a calculation; a function is a built-in operation such as SUM.
5	Adds the values in cells C2 through C7.
6	Use readable text, consistent design, concise content, and relevant visuals. Any three suitable points.
7	Check the author, publication date, evidence, and confirmation from other trustworthy sources. Any three suitable points.
8	Decomposition divides a problem into smaller tasks; for example, splitting a school project into research, report, data analysis, and presentation.
9	A loop repeats instructions; a condition checks whether something is true or false and controls what happens next.
10	Plagiarism misrepresents another person’s work; avoid it by writing in your own words and acknowledging sources.
11	Debugging means finding and correcting errors; testing checks that a program behaves as intended.
12	Use strong passwords, protect personal information, avoid suspicious links, and report unsafe behaviour. Any three suitable points.

Equivalent correct explanations should also receive credit.

11. Final reflection

Before you finish Grade 6 Computer Studies, think about what you can now do independently.

My learning reflection

- ☐ I can explain the difference between hardware and software.
- ☐ I can organize folders and save files correctly.
- ☐ I can create a clear, formatted Word document.
- ☐ I can use Excel formulas and make a chart.
- ☐ I can design and deliver a PowerPoint presentation.
- ☐ I can find and acknowledge reliable online sources.
- ☐ I can break a problem into steps and plan an algorithm.
- ☐ I can create and debug a Scratch program.
- ☐ I can follow safe and responsible digital practices.
- ☐ I can explain my project and demonstrate how it works.

12. Message to the student

You have reached the end of your Grade 6 Computer Studies textbook. Remember that computer studies is not simply about learning buttons, menus, or commands. It is about using technology to think clearly, solve problems, communicate ideas, and create useful solutions.

A successful student does not need to know every answer immediately. A successful student asks questions, tests ideas, learns from mistakes, and keeps improving.

As you move forward, continue practising, stay curious, protect yourself online, respect other people’s work, and use your skills responsibly.

Your next step is not just to use technology—it is to use technology to make a positive difference.

IGNITE GENESIS SCHOOL

Igniting Knowledge. Engineering the Future.

End of Grade 6 Computer Studies

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GET IN TOUCH

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