LEARNER'S
RESOURCE PACK

Computing BASIC 7

NATIONAL COUNCIL FOR
CURRICULUM & ASSESSMENT
OF MINISTRY OF EDUCATION

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Contents

How to use this resource pack

The Learners Resource Pack provides helpful information that learners need to enable them take active part in lessons in class. It provides lots of information to the learner on what is expected of them in the course of monitoring their own progress on the various strands of the curriculum. It also contains sample assessment tasks and homework. These samples are just to guide the learner to fully participate and monitor their own progress. The sample assessment tasks and homework can in some or most cases change to suit the level of understanding of the class. Learners are to refer to this book only as a guide to their learning. There are other suggested references learners can refer to for further information on the various Sub-strands.

At all times, this Pack must be kept neat and intact.

Hints to the learner

1. What will you learn? (Structure of the curriculum for Computing)

The content of the curriculum has been structured into four columns namely: Strands, Sub-strands, Content standards and Indicators and exemplars.

Strands are the broad areas/sections of the computing content to be studied.

Sub-strands are the topics within each strand under which the content is organised.

Content standard refers to the pre-determined level of knowledge, skill and/or attitude that a learner attains by a set stage of education.

Indicator is a clear outcome or milestone that learners must exhibit in each year to meet the content standard expectation. The indicators represent the minimum expected standard in a year.

Exemplars refer to the support and guidance which clearly explains the expected outcomes of the given indicators, and suggest what forms teaching and learning activities could take to support facilitators in the delivery of the curriculum.

2. How will you be taught (i.e. group work, practical work)

You will be taught lessons through discussions, group works, practical work, project work and community engagement.

3. How will you be assessed?

Assessment is both formative and summative. Formative assessment is viewed in terms of Assessment *as* Learning and Assessment *for* Learning.

- Assessment as Learning: Assessment as Learning relates to engaging you (the learner) to reflect on the expectations of your learning. The information you provide the teacher forms the basis for refining teaching-learning strategies. You will be assisted by the teacher to play your roles and take responsibility of your own learning so as to improve your performance. You will have to set your own goals and monitor your progress.
- Assessment for Learning: It is an approach used to monitor learners' progress and achievements. This will occur throughout the learning process.
- The teacher will employ the Assessment for Learning strategy to seek and interpret evidence, which will serve as timely feedback to refine teaching strategies and improve their performance. You will be actively involved in the learning process and gain confidence in what you are expected to learn.
- Assessment of Learning: This is summative assessment. It describes the level you (the learner) have attained in the learning process, what you know and what you can do over a period of time.
- The focus is to evaluate your cumulative progress and achievement. You will therefore be assessed through homework, project work, oral presentation, portfolio development, debates, community engagement, conferencing, shared writing and process writing.

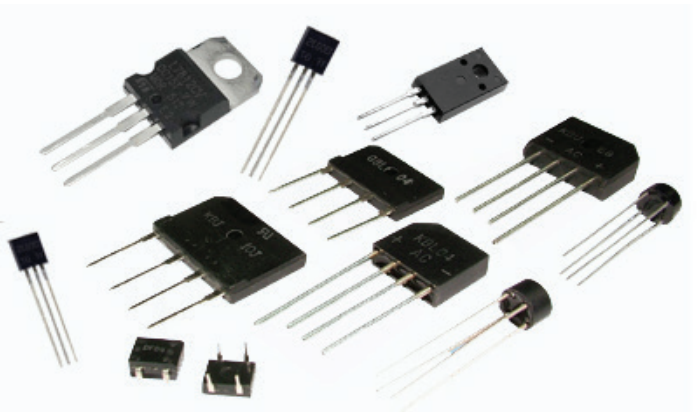
4. Strategies for effective learning

- Project-based learning
- Exploration
- Enquiry-based learning
- Procedural learning
- Experiential learning.

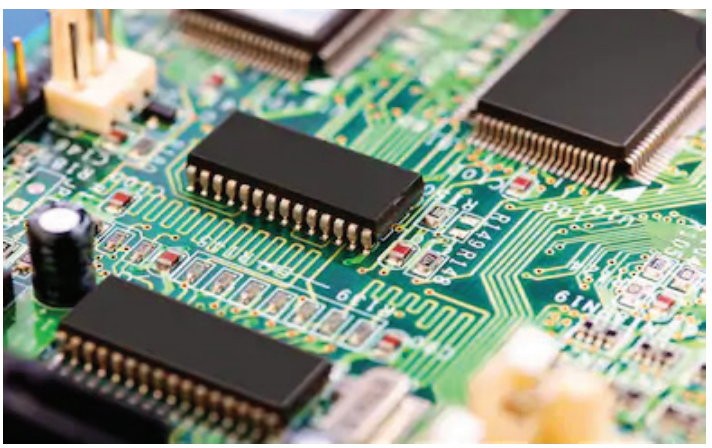
Strand 1 Introduction to Computing

Sub-strand 1 Components of Computers and Computer Systems	
Content standard	**B7.1.1.1**. Identify parts of a computer and technology tools and their uses
Indicator	**B7.1.1.1.1.** Discuss the second and third generations of computers
What you should know already	**Reminder about prior learning** Learners should remember the difference between the generation of computers and the major hardware components that characterise them. *(Refer to the indicator in Basic 6 B6.1.1.1.1. Learn about the Generation of Computers.)*
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** At the end of the lesson, learners should be able to differentiate between the second and third generations of computers based on the major changes that occurred.

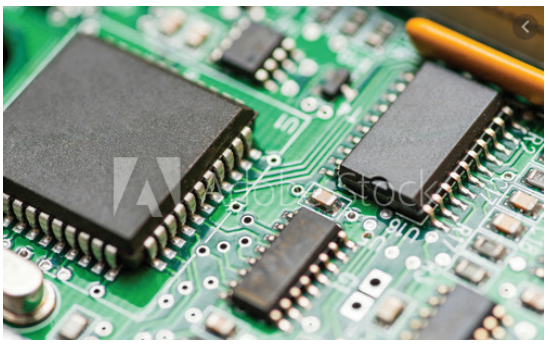
Second generation of computers: They came about as a result of the introduction of a major processing device called **transistor**. These second-generation computers are more **reliable** and **compact** than the first generation of computers.



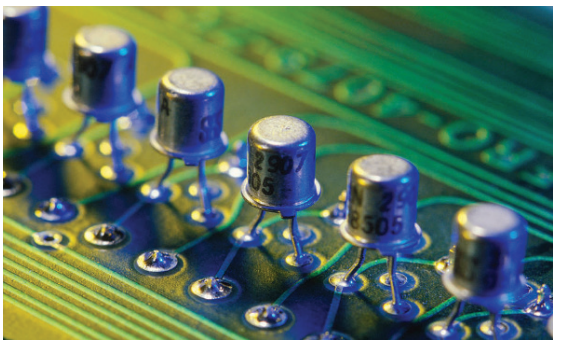
Third generation of computers: They are also smaller and faster than the second generation of computers due to the introduction of **Integrated Circuits** (**IC's**) to replace transistors. Likewise, IC's made computers smaller, more reliable and more efficient.



The language and vocabulary you will need to use	Transistors, Circuit Boards.
Ways to broaden your understanding	**Suggest how the learner can take responsibility in learning more about this standard, consolidating understanding, etc.** Watch videos on the history of computers from YouTube. (https://www.youtube.com/watch?v=xrUvFJWlYCY and https://www.youtube.com/watch?v=ApJSz_0rkiA) Read more on the history of computers.
Things to remember for future lessons	**Essential points to remember.** Learner should always remember the differences between the generations of computers and the major hardware components that characterise them.



A



B

Activity 1

From the photograph above,

1. Identify the types of motherboards labelled A and B in relation to the generations of computers.
2. State and explain the board that has the capacity to produce more reliable and efficient work.

Teaching Resources

Textbooks on the history of computers, ICT dictionary, internet resources, e-books, etc.

Assessment Task

Explain at least two differences between the second and third generations of computers. Indicate the main hardware components that distinguish them.

Homework Task

In groups of 4 or 5, look for an old or non-functioning computer, television or radio and open it to identify the components on the motherboard. Then, draw well-labelled pictures of a transistor and an integrated circuit (IC).

Strand 1	**Introduction to Computing**
Sub - Strand 1	**Components of Computers and Computer Systems**
Content standard	**B7.1.1.1** Identify parts of a computer and technology tools and their uses
Indicator	**B7.1.1.1.2** Demonstrate understanding in the use of input devices (such as wireless keyboard, mouse, light pen, touchscreen)
What you should know already	**Reminder about prior learning** Learners must understand input, process, and output devices, and key terminologies or names used for devices. (Refer to lessons in Basic 6 indicator **B6.1.1.1.2** identify components of a computer system such as hardware, software and liveware.)
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skil*ls*** At the end of the lesson, the learner should be able to • Explain the meaning of input devices. *E.g. Input devices are devices that help users to send data to the computer or issue commands to the computer.* • Name and state the function of at least four input devices.

Examples include:

Keyboard: It is an input device that is used to key in alphanumeric symbols and issue commands into the computer. There are various types of keyboards. They include standard wired keyboards, wireless keyboards, among others. Keyboard layouts also include QWERTY and DaVinci Concept, each of which suits different environments.

Mouse: It is an input device that is used to direct the cursor on the monitor and control icons on the monitor. The mouse comes in different varieties including as mechanical, optical, opto-mechanical and wireless.

Barcode reader: It is a hardware input device capable of reading a barcode and printing out the details of a product or log information about that product into a database.

Strand 1	Introduction to Computing
	Note: There are other examples of input devices. Learners should explore on their own to discover more. Understand that when a barcode is scanned, the numeric code is then used to query a database to fetch details such as product name, price, manufacturer, etc. It can then automatically deduct the purchased item from the stock in the shop.
The language and vocabulary you will need to use	Input, PS-2 connector, USB-connector, pointing devices, scanner.
Ways to broaden your understanding	Watch videos on the types of input devices and how they are used. Study labelled pictures of input devices. Visit a hardware shop and list the input devices found there (watch https://www.youtube.com/watch?v=WZmc4jHu284)
Things to remember for future lessons	Know that input devices take information into the computer; the information is obtained from outside the computer system and brought into the computer.


A


B

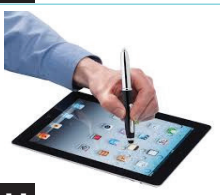

C


D

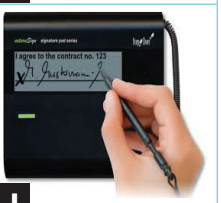

E


F


G


H


I


J

Activity 1

1. Identify the names of each of the input devices labelled A to J in the photographs above.
2. State the function(s) of each of the devices labelled.

Activity 2

1. For each device identified above, state the advantages and disadvantages of using that device as against one of the alternatives.
2. For B above, explain why using biometrics is more secure than passwords.

Teaching Resources

Books on computer hardware, Internet resources.

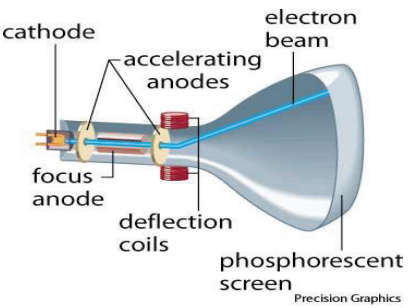
Assessment Task

1. Identify two (2) input devices that convert hard copy pictures or images into a digital format.
2. State two (2) input devices that are used for playing gaming programmes.
3. Briefly explain the purpose of input devices.

Homework Task

Draw three (3) input devices and state one function of each.

Strand 1	**Introduction to Computing**
Sub-Strand 1	**Components of Computers and Computer Systems**
Content standard	**B7.1.1.1. Identify parts of a computer and technology tools and their uses**
Indicator	**B7.1.1.1.3** Demonstrate understanding in the use of output devices (Cathode Ray Tube, LED Monitor, etc)

Strand 1	Introduction to Computing
What you should know already	As a learner, you should have prior knowledge from indicator "**B6.1.1.1.2** Identify components of a computer system: hardware, software and liveware.
What will you learn? What skills will you develop?	Learners should know the functionality of output devices such as: A cathode-ray tube: a device that uses a beam of electrons in order to produce an image on a screen. Cathode-ray tubes, also known commonly as CRTs, are widely used in a number of electrical devices such as computer screens and television sets.  Light-Emitting Diode (LED) monitor is a flat screen, flat-panel computer monitor or television. 
The language and vocabulary you will need to use	Hardware, output devices, peripheral devices, monitor, printer

Strand 1	Introduction to Computing
Ways to broaden your understanding	Read more or watch videos on output devices such as CRT and LED.
Things to remember for future lessons	Having a practical feel of a Cathode Ray Tube magnetic storage device.

Activity Instructions

1. Draw and label the following output devices and state their uses:
    - Cathode Ray Tube
    - LED Monitor and
    - Projector

Teaching Resources

Magnetic storage device, laptop/computer/tablet

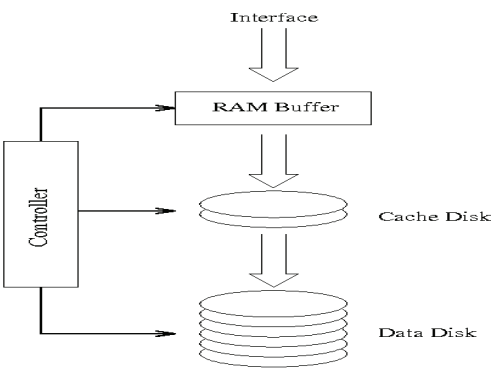
Assessment Task

Discuss the uses and benefits of CRT and LED.

Homework Task

Draw a CRT and LED. Label the parts and explain the function of each part.

Strand 1	Introduction to Computing
Sub-Strand 1	**Components of Computers and Computer Systems**
Content standard	**B7.1.1.1** Identify parts of a computer and technology tools and their uses
Indicator	**B7.1.1.1.4** Describe storage devices: full-sized external hard drives, hard drive speed, disk caching

Strand 1	Introduction to Computing
What you should know already	You are expected to have prior knowledge of hard drives and removable storage icons in the file explorer.
What will you learn? What skills will you develop?	You will be able to: Show actual internal workings of a magnetic HDD using this link (https://animagraffs.com/hard-disk-drive/) Understand that magnetic storage devices are storage mediums commonly used for large volumes of data (e.g., video, image or remote sensing data) e.g. hard disk drives.  Understand that a **disk cache** is a cache memory that is used to speed up the process of storing and accessing data from the host hard disk. It enables faster processing of reading/writing, commands and other input and output processes between the hard disk, the memory and computing components. 

Strand 1	Introduction to Computing
The language and vocabulary you will need to use	Hard Disk Drive (HDD), floppy disk, magnetic tape, read, write, bytes
Ways to broaden your understanding	1. Read more or watch videos on magnetic storage devices and disk caching. 2. Read books on computer technology tools.
Things to remember for future lessons	Instances in which magnetic storage devices are used. How data is written to and read from magnetic storage devices. The purpose of a disk cache.

Activity Instructions

1. Explain the uses of the following: Hard Disk Drive (HDD), floppy disk, magnetic tape. Follow the class session.

Teaching Resources

Magnetic storage device, laptop/computer/tablet.

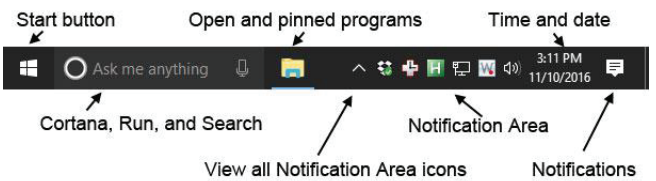
Assessment Task

1. Learners should identify five (5) features on the HDD.

Homework Task

Learners should discuss how the hard disk stores data and be able to do a presentation on this.

Strand 1	Strand 1: Introduction to Computing
Sub-strand 1	**Components of Computers and Computer Systems**
Content standard	**B7.1.1.2** Demonstrate the use of the features of the Windows Desktop

Strand 1	Strand 1: Introduction to Computing
Indicator	**B7.1.1.2.1** Discover the new Windows Operating System (Start screen, use of tiles, taskbar buttons, preview thumbnails
What you should know already	You should be conversant with **B6.1.2.1.1** and be able to explore the use of the desktop background, changing the themes, colours and user account (e.g. classic, icons and taskbar of the background).
What will you learn? What skills will you develop?	At the end of the lesson, learners will be able to: Demonstrate the use of the features of the Windows desktop such as the start screen, tiles, task buttons, preview thumbnails.  Windows 10 Taskbar Overview 
The language and vocabulary you will need to use	Taskbar, thumbnails, start screen, tiles
Ways to broaden your understanding	Explore the interface of any smart mobile phone. Learners should make use of common graphical user interface tips like the tooltip to learn more.

Strand 1	Strand 1: Introduction to Computing
Things to remember for future lessons	Learners should understand the major function of the taskbar in allowing users to locate and launch programs through Start and the Start menu, or view any program that is currently open.

Activity Instructions

State two (2) uses of the following: Taskbar, Thumbnails, Start Screen, Tiles

Teaching Resources

Computer, laptop, cardboard, markers, projector

Assessment Task

In groups of five (5), discuss and present the functions of the taskbar, thumbnails, start screen, and tiles.

Homework Task

Identify the various parts of the Windows taskbar.

Strand 1	Introduction to Computing
Sub-strand 1	**Components of Computers and Computer Systems**
Content standard	**B7.1.1.2.** Demonstrate the use of the features of the Windows Desktop
Indicator	**B7.1.1.2.2** Practise file management techniques (file and folder management).
What you should know already	**B6.1.2.1.5.** Demonstrate the use of the File Explorer window and locations of the computer through the file explorer. **B6.1.2.1.6.** Locate the hard drives and other removable storage icons in the File explorer.

What will you learn? What skills will you develop?

At the end of the lesson, learners will be able to

Demonstrate an understanding of techniques used in the management of files. This should include organising files in folders and subfolders.

Demonstrate the naming conventions and types of files extensions and their importance.

- **File-naming conventions when saving files**
  - Case sensitivity – upper and lower case are different (true in Linux and Unix variations, not in Windows)
  - Maximum length (Windows 260 characters)
  - Spaces allowed
  - Digits allowed
  - \ / : * ? " < > | not allowed
  - File names not allowed (con, nul, prn)

- File extensions provide clues to the file contents.

OS uses extensions to determine which application created the file and the internal format of the file

Extension	Type of Document	Application
.doc or .docx	Word processing document	Microsoft Word
.xls or .xlsx	Workbook	Microsoft Excel
.ppt or .pptx	PowerPoint presentation	MS PowerPoint
.accdb	Database	Microsoft Access
.gif, .jpg, .png	Images	Windows Image Viewer
.mp4, .mp3	Videos, audio	Windows Media
.zip	Compressed file	WinZip
.pdf	Portable Document Format	Adobe Acrobat
.htm or .html	Web page	Hypertext Markup Language

The language and vocabulary you will need to use	File extension, file path, folder, sub-folder, directories, sub-directories.
Ways to broaden your understanding	• Watch videos on the features of the Windows operating system relating to the desktop.
Things to remember for future lessons	Without a file management or file system, all files would have no organisation and it would be impossible for a file with the same name to exist.

Activity Instructions

State five (5) naming conventions and types of files extensions and their importance.

Teaching Resources

Computer, laptop, cardboard, markers, projector

Assessment Task

In groups of five (5), identify possible applications that produce the following file extensions: docx, xls, pdf, jpg and ppt.

Homework Task

Learners to describe how to locate a file in a folder using windows file management.

Strand 1	**Introduction to Computing**
Sub-strand 2	**Technology in the Community**
Content standard	**B7.1.2.1.** Demonstrate the use of technology in the community

Indicator	**B7.1.2.1.1.** Describe and give examples of at least five technology tools for learning in each subject e.g. spreadsheets, Encarta, virtual museum, scrabble, presentation, scratch etc.)
What you should know already	**B6.1.3.1.6.** Demonstrate how to collect data (e.g. listening to radio, reading newspapers, interviews use of questionnaires etc.) **B6.1.3.1.9.** Demonstrate data presentation in different forms.
What will you learn? What skills will you develop?	**At the end of the lesson, learners will be able to** • Explore the various technology tools that can be used
The language and vocabulary you will need to use	Technology tools, scratch, presentation, spreadsheet**.**
Ways to broaden your understanding	• Explore the various technology tools that can be used for learning.
Things to remember for future lessons	Tools are needed to process data collected into information

Activity Instructions

Identifying any three (3) technology tools that aid learning.

Teaching Resources

Computer, laptop, cardboard, markers, projector

Assessment Task

Discover the use of any three (3) technology tools and present findings to class as a group.

Homework Task

Demonstrate the use of any of the tools discussed.

Strand 1	Introduction to Computing
Sub-strand 2	**Technology in the Community**
Content standard	**B7.1.2.1.** Demonstrate the use of Technology in the community
Indicator	**B7.1.2.1.2** Demonstrate the use of at least three (3) technology tools identified in the community
What you should know already	**B7.1.2.1.1** Describe and give examples of at least five (5) technology tools for learning in each subject e.g. spreadsheets, Encarta, virtual museum, scrabble, presentation, scratch etc.
What will you learn? What skills will you develop?	**At the end of the lesson, learners will be able to** • Describe and give examples of at least five (5) technology tools for learning in each subject (e.g. spreadsheets, Encarta, virtual museum, scrabble, presentation, scratch etc.) • Discover the use of any three (3) technology tools and present their findings to class as a group
The language and vocabulary you will need to use	Technology tools, scratch, presentation, spreadsheet
Ways to broaden your understanding	• Explore the various technology tools that can be used for learning.
Things to remember for future lessons	There are benefits of using technology tools in learning.

Activity Instructions

Identifying any three (3) technology tools that aid learning.

Teaching Resources

Computer, laptop, cardboard, markers, projector

Assessment Task

Discover the use of any three (3) technology tools and present findings to class as a group.

Homework Task

Demonstrate the use of any of the tools discussed.

Strand 1	**Introduction to Computing**
Sub-strand 2	**Technology in the Community**
Content standard	**B7.1.2.1** Demonstrate the use of technology in the community
Indicator	**B7.1.2.1.3** Discuss the benefits of using technology tools in learning/education
What you should know already	**B7.1.2.1.2** Demonstrate the use of at least three (3) technology tools identified in the community
What will you learn? What skills will you develop?	**At the end of the lesson, learners will be able to** • Discuss the benefits of using technology tools in learning (e.g. using spreadsheet to draw graphs)
The language and vocabulary you will need to use	Technology tools, scratch, presentation, spreadsheet.
Ways to broaden your understanding	Identify the potential benefits of using technology tools in their schools.

Things to remember for future lessons	Tools are needed to process data collected into information

Activity Instructions

Identifying any three (3) technology tools that aid learning.

Teaching Resources

Computer, laptop, cardboard, markers, projector

Assessment Task

Discover the use of any three (3) technology tools and present findings to class as a group.

Homework Task

Demonstrate the use of any of the tools discussed.

Strand 1	**Strand 1: Introduction to computing**
Sub-strand 3	**Health and safety in using ICT tools**
Content standard	**B7.1.3.1** Demonstrate how to apply health and safety measures in the use of ict tools
Indicator	**B7.1.3.1.1** Describe current regulatory requirements and potential computing-related disorders
What you should know already	**B6.7.1.1.1** Identify major health hazards associated with the use of ICT tools. **B6.7.1.1.2.** Outline solutions for the health-related problems in using ICT.

What will you learn? What skills will you develop?	**At the end of the lesson, learners will be able to** • Describe current regulatory requirements and potential computing-related disorders. • Mention the health risks of prolonged use of computing devices. • Identify unhealthy body postures and other hazards in using computing devices. • Provide preventive measures to reduce health and safety risks. • Distinguish between health issues and safety issues. Safety issues would include trip hazards, keeping liquids close to electronic devices, overloading plug sockets, contact with bare electrical wires, etc. Learners will exhibit problem solving, digital literacy and critical thinking skills.
The language and vocabulary you will need to use	Health hazards, unhealthy body posture, ergonomics, repetitive-strain injuries, eyestrain, back/neck pain.
Ways to broaden your understanding	• Learners should study unhealthy sitting postures that may result in injury to the body.
Things to remember for future lessons	• A hazard describes anything or situation that could be harmful to the user as they use a computer. • For example, prolonged and improper use of the keyboard and mouse can cause repetitive strain injury. Additionally, using the wrong body posture can lead to body pain and other health issues over time.

Activity Instructions

1. Identify three (3) potential health hazards associated with the use of ICT in our schools.
2. Suggest ways of mitigating the hazards identified above.

Teaching Resources

Pictures showing sitting postures, marker boards, videos.

Assessment Task

In groups of five (5), enumerate the possible health hazards of prolonged use of computing devices.

Homework Task

Suggest five (5) preventive measures to reduce health and safety risks associated with the use of computers.

Strand 2 Productivity Software

Sub-strand 1	Introduction to Word Processing
Content standard	**B7.2.1.1** Demonstrate how to use Microsoft Word (Editing)
Indicator	**B7.2.1.1.1** Explain the importance of word processing software
What you should know already	***Reminder about prior learning*** You are expected to have prior knowledge on letter writing. Give issues involved in editing and correcting errors made whilst writing official letters.
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners will give the meaning of word processing • This software is used to create and to edit documents such as letters, reports, essays, etc. • Learners will explore common examples of word processing softwares packages (e.g. MS-Word, Corel WordPerfect, AbiWord, Google Docs, LibreOffice Writer, NotePad, WordPad, etc.)
The language and vocabulary you will need to use	Formatting, package, google docs, ms word, editing, open source
Ways to broaden your understanding	• Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc. • Read more on the uses of word processors. • Brainstorm to elicit examples of some common word processing software.

Things to remember for future lessons	Brief statements of essential points that must be remembered. Uses of word processing softwwares. Common examples of word processing softwares.

Activity Instructions

Follow the class session.

Teaching Resources

Computer with Microsoft Word, mouse or touchscreen input device.

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Do further reading and research on importance and more examples word processing softwares

Sub-strand 1	Introduction to Word Processing
Content standard	**B7.2.1.1** Demonstrate how to use Microsoft Word (Editing)
Indicator	**B7.2.1.1.2** Demonstrate how to insert, select, delete, and move the text
What you should know already	***Reminder about prior learning*** **B6.3.1.1.1** Demonstrate how to use the File menu and Insert, Design, and Layout ribbons **B6.3.1.1.2** Demonstrate how to use icons in the Text group in the Insert ribbon

What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners practise Spelling and Grammar check. • Learners explore Ignore, Ignore All, Add, Change and Change All options in the Spelling and Grammar icon.
The language and vocabulary you will need to use	Proofing and language, spelling & grammar, thesaurus
Ways to broaden your understanding	• Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc • Join a group study of 3-5 learners. • Learners generate random text using =rand () command. • Practise techniques learnt • Engage in a think-pair-share activity on how to do spell and grammar check in a passage
Things to remember for future lessons	Brief statements of essential points that must be remembered **Do further reading on how to use text-decoration, change text case, text size and colour tools.**

Activity Instructions

Follow the class session.

Teaching Resources

Read and practise spell check, content translation and language setting in MS-Word.

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Read further on how to use text-decoration, change text case, text size and colour commands.

Sub-strand 1	Introduction to Word Processing
Content standard	**B7.2.1.1** Demonstrate how to use Microsoft Word (Editing)
Indicator	**B7.2.1.1.3** Demonstrate how to find and replace content and undo edited changes
What you should know already	***Reminder about prior learning*** Learners should be familiar with indicator **B7.2.1.1.1** Demonstrate how to insert, select, delete, and move text
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners explore the use of the Find and Replace tool. • Learners explore the use of the Editing group in the Home ribbon.
The language and vocabulary you will need to use	Find and replace
Ways to broaden your understanding	• Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc. • Produce a one-page document which summarises the 2nd and 3rd generation of computers. • Practise finding text. • Practise Find and Replace text using key words. • Practise Replace and Replace All using key words.

Things to remember for future lessons	Brief statements of essential points that must be remembered. The procedure for finding and replacing text in a document.

Activity Instructions

Follow the class session

Teaching Resources

Computer with Microsoft Word, mouse or touchscreen input device.

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Do further reading on how to Find and Replace text and Undo edited changes.

Sub-strand 1	**Introduction to Word Processing**
Content standard	**B7.2.1.1** Demonstrate how to use Microsoft Word (Editing)
Indicator	**B7.2.1.1.4.** Demonstrate how to spell check, content translation, language setting
What you should know already	***Reminder about prior learning*** Learners should recall indicator **B7.2.1.1.2.** Demonstrate how to Find and Replace text and undo edited changes.
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners will explore the use of icons in the Proofing group. • Learners will explore the use of the Language group in the Review ribbon.

The language and vocabulary you will need to use	Proofing and language, spelling & grammar, thesaurus
Ways to broaden your understanding	• Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc • Generate random text using = rand () command. • Practise spelling and grammar check. • Explore Ignore, Ignore All, Add, Change and Change All options in the Spelling and Grammar icon. • Discuss the meaning of a red, blue and green wavy line under a text. • Practise how to set language preferences.
Things to remember for future lessons	Brief statements of essential points that must be remembered. How to use spelling and grammar check. How to set language preferences.

Activity Instructions

Follow the class session.

Teaching Resources

Computer with Microsoft Word, mouse or touchscreen input device.

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Do further reading on how to use text-decoration, change text case, text size and colour commands.

Sub-strand 1	Introduction to Presentation Software
Content standard	**B7.2.1.1** Demonstrate how to use Microsoft PowerPoint (Editing)
Indicator	**B7.2.1.1.1** Explain the importance of presentation software
What you should know already	***Reminder about prior learning*** You are expected to have prior knowledge on presenting field information or research work. Give issues involved in editing and correcting errors made whilst writing official letters.
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners will give the meaning of presentation softwares. • Presentation software is a tool used to create visual presentations • Learners will explore common examples of presentation softwares. (Microsoft Office PowerPoint, Apple Keynote and Google Docs presentation.
The language and vocabulary you will need to use	Text, graphic, colors, backgrounds, slides, layouts, picture.
Ways to broaden your understanding	• Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc. • Read more on the uses and importance of presentation software Brainstorm to elicit examples of some common presentation software.

Things to remember for future lessons	Brief statements of essential points that must be remembered. Uses of presentation softwares. Common examples of presentation softwares.

Activity Instructions

Follow the class session.

Teaching Resources

Computer with Microsoft PowerPoint, mouse or touchscreen input device

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Do further reading and research on importance and more examples presentation softwares.

Sub-strand 2	Introduction to Word PowerPoint
Content standard	**B7.2.2.1** Demonstrate how to use Microsoft PowerPoint (Editing)
Indicator	**B7.2.2.1.2** Explore features of MS PowerPoint's interface
What you should know already	***Reminder about prior learning*** Learners should be familiar with the following: **B6.2.1.1.2** Demonstrate how to use icons in the Text group in the Insert ribbon **B6.2.1.1.3** Be able to give a 5-slide presentation in MS-PowerPoint using the tools of the ribbons studied.
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners will launch MS-PowerPoint and explore the templates available. • Learners will be able to type text in a placeholder. • Learners will explore how to use the Thesaurus button.
The language and vocabulary you will need to use	Review tabs, language, spelling & grammar, thesaurus.
Ways to broaden your understanding	*Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc* Learn how to use templates and icons in the Review tab.
Things to remember for future lessons	Brief statements of essential points that must be remembered How to launch MS-PowerPoint. How to type text in a placeholder. How to use the Symbol icon in the Insert tab. How to insert the degree, cent, lambda, alpha and beta symbols.

Activity Instructions

Follow the class session.

Teaching Resources

Computer with Microsoft PowerPoint, mouse or touchscreen input device, projector.

Assessment Task

Generate random text [(using =rand (10,10)] to practise techniques learnt.

Homework Task

Do further reading on the use of Special characters under the Insert tab within the Symbols group.

Strand 2	**Productivity Software**
Sub-strand 2	**Introduction to Presentation**
Content standard	**B7.2.2.1** Demonstrate how to use Microsoft PowerPoint (Editing)
Indicator	**B7.2.2.1.3** Demonstrate how to use Special Characters. 7-slide presentation in MS-PowerPoint using the tools of the Editing group.
What you should know already	***Reminder about prior learning*** **B7.2.2.1.2** Explore the features of MS PowerPoint's interface.
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners will explore the use of the Symbols icon under the Insert tab.
The language and vocabulary you will need to use	Microsoft PowerPoint, Insert tab, Symbols.

Ways to broaden your understanding	• Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc • Practise how to type text in a placeholder. • Practise using the Symbols icon in the Insert tab. • Practise how to insert the degree, cent, lambda, alpha, beta symbols.
Things to remember for future lessons	How to create a multi-slide presentation and format it for a specific purpose. Read further on how to use text-decoration, change text case, text size and colour tools.

Activity Instructions

Follow the class session.

Teaching Resources

Computer with Microsoft PowerPoint, mouse or touchscreen input device, projector.

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Present a prepared project or exercise using the editing section of the ribbons studied.

Sub-strand 3	Introduction to Electronic Spreadsheet
Content standard	**B7.2.1.1** Demonstrate how to use the spreadsheet (Editing)
Indicator	**B7.2.1.1.1 Explain the importance of electronic spreadsheet**
What you should know already	***Reminder about prior learning*** You are expected to have prior knowledge on calculating data in table format. Give issues involved in editing and correcting errors made whilst collecting and sorting data into table forms.
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners will give the meaning of spreadsheet. • The spreadsheet software is used to maintain budget, financial statements, grade sheets and sales records. • Learners will explore common electronic spreadsheet software packages (e.g. MS Excel, Lotus 1-2-3, LibreOffice Calc, Google Sheets etc.).
The language and vocabulary you will need to use	Formatting, package, tables, charts, calculate
Ways to broaden your understanding	Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc. Read more on the uses of spreadsheet softwares. Brainstorm to elicit of some common examples.

Things to remember for future lessons	Brief statements of essential points that must be remembered. Uses of electronic spreadsheet software. Common examples of the spreadsheet software.

Activity Instructions

Follow the class session.

Teaching Resources

Computer with Microsoft Excel, mouse or touchscreen input device.

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Do further reading and research on importance and more examples spreadsheet packages.

Strand 2	**Productivity Software**
Sub-strand 3	**Introduction to Electronic Spreadsheet**
Content standard	**B7.2.3.1.** Demonstrate how to use the Spreadsheet (Editing Worksheets)
Indicator	**B7.2.3.1.2.** Explore features of MS-Excel interface.
What you should know already	***Reminder about prior learning*** Recall indicator **B6.5.3.1.4**. Modifying an MS-Excel worksheet. Guide learners to modify worksheet by adding the age of learners in the class to the list of learners created in an earlier class.

What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners explore the techniques of inserting, selecting, deleting and moving data in groups. • Learners practise how to insert, select, delete and move data using a sample data set.
The language and vocabulary you will need to use	Inserting, selecting, deleting and moving data.
Ways to broaden your understanding	*Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc* The following exercise will help you deepen your understanding. Launch MS-Excel and use the autofill to enter days of the week and numbers from 1 -10. Select numbers 1-5. Move text using cut-and-paste technique or copy-and-paste, then delete previous text. Practise moving parts of the list of names of the week.
Things to remember for future lessons	Brief statements of essential points that must be remembered. How to select and move data. How to use other techniques for moving text.

Activity Instructions

Follow the class session.

Teaching Resources

Computer with Microsoft Excel, mouse or touchscreen input device, projector.

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Do further reading on how to set the cell data type (General, Number, Currency, etc.).

Strand 2	**Productivity Software**
Sub-strand 3	**Introduction to Electronic Spreadsheet**
Content standard	**B7.2.3.1** Demonstrate how to use the Spreadsheet (Editing Worksheets)
	B7.2.3.1.3 Demonstrate how to set the cell datatype (General, Number, Currency, etc.).
What you should know already	***Reminder about prior learning*** **B7.2.3.1** Demonstrating how to use the Spreadsheet (Editing Worksheets)
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners will explore options in the Number group in the Home ribbon. • Learners will practise how to format cells with General, Number, Currency, and Text data types.
The language and vocabulary you will need to use	Cell, data type.

Strand 2	Productivity Software
Ways to broaden your understanding	The following exercise will help you deepen your understanding • Launch MS-Excel and use the autofill to enter days of the week and numbers from 1 to 10. • Select numbers 1-5. • Click on the down arrow in the Number group. • Select Number in the Number tab. • Select numbers 6-10. • Sum up the numbers by using the sum formula. • Then select Currency in the Number tab. • Select the days of the week. • Then select Text in the Number tab.
Things to remember for future lessons	Brief statements of essential points that must be remembered How to use other techniques for formatting cell type data.

Activity Instructions

Follow the class session.

Teaching Resources

Computer with Microsoft Excel, mouse or touchscreen input device, projector.

Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Do further reading on how to Align Text, Merge & Wrap, Borders and Shades.

Strand 2	Productivity Software
Sub-strand 3	**Introduction to Electronic Spreadsheet**
Content standard	**B7.2.3.1** Demonstrate how to use the Spreadsheet (Editing Worksheets)
Indicator	**B7.2.3.1.4** Demonstrate how to Align Text, Merge & Wrap, Borders and Shades.
What you should know already	***Reminder about prior learning*** Recall indicator **B7.2.3.1.2** Demonstrating how to set the cell, data type (General, Number, Currency, etc.).
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Learners explore options in the Alignment group in the Home ribbon. • Learners practise Align Text, Merge & Wrap, Borders and Shades.
The language and vocabulary you will need to use	Align Text, Merge & Wrap, Borders and Shades.

Ways to broaden your understanding	*Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc* **The following exe.rcise will help you deepen your understanding:** • Launch MS-Excel and use the autofill to enter days of the week and numbers from 1 to 10. • Explore the functions of the icons in the Alignment group (i.e. Top Align, Middle Align, Bottom Align, Align Left, Centre, Align Right, Orientation, Word Wrap, Merge and Centre). • Click the down arrow in the Alignment group. • Click on the Alignment tab. • Explore the options in the Alignment tab. • Click the down arrow in the Alignment group • Click on the Border tab. • Explore the options in the Border tab.
Things to remember for future lessons	Brief statements of essential points that must be remembered. Using other techniques to Align Text, Merge & Wrap, Borders and Shades in a cell.

Activity Instructions

Follow the class session

Teaching Resources

Computer with Microsoft Excel, mouse or touchscreen input device, projector.

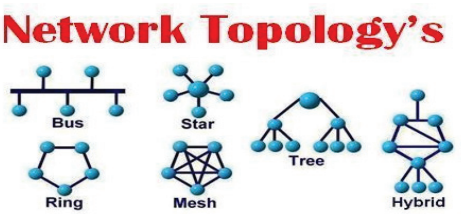
Assessment Task

Practise the techniques learnt with a sample text.

Homework Task

Do further reading on how to adjust margins and set page orientation.

Strand 3 Communication Network

Sub-strand 1	Computer Networks
Content standard	**B7.3.1.1.** Identify the concept of computer networking for global communications
Indicator	**B7.3.1.1.1** Draw diagrams to illustrate features of the network topologies (Bus, Star, Ring, Mesh)
What you should know already	***Reminder about prior learning*** Have basic knowledge in making phone calls and sharing information using bluetooth.
What will you learn? What skills will you develop?	Learners will be able to 1. Explore key hardware for setting up a network system (such as **server, client, hub, switch, cable, etc.**). **Server** – it is a computer program that runs or operates to serve the request of clients. **Client** – it is a server network that handles the requests of its clients and the services of the servers to transfer information. **Router** – a device that transfers data between computer networks. **Switch** – a device that can connect multiple nodes together within a LAN. **Hub** – it allows several USB devices to connect to a single node. • Observe the diagrams of various set-ups to explain network topologies. Network Topologies 

Sub-strand 1	Computer Networks
What will you learn? What skills will you develop?	**Bus** – The bus topology has a single cable to which every device on the network connects. **Star** - In a star topology, each device in the network connects to a central hub, which distributes messages from one node to another. **Ring** - A ring topology forms when you connect a network's nodes in a circle. **Mesh** - in mesh topology, multiple connections are made.
The language and vocabulary you will need to use	Bus, star, ring, point to point, mesh, hub, nodes, client**.**
Ways to broaden your understanding	*Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc* • Read or watch videos on network topologies online.
Things to remember for future lessons	Brief statements of essential points that must be remembered Reduce the learning difficulty by using real situation examples. E.g. understanding that TV receives signals from a TV Station. Share pictures from one phone to another to deepen understanding of networks and information transfer.

Activity Instructions

In groups of five (5) (depending on class population), examine a stand-alone computer and a networked computer.

Teaching Resources

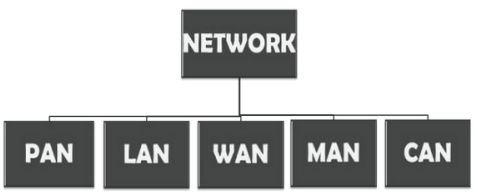
Internet Dictionary to check meaning of keywords such as bus, star, ring.

Assessment Task

Present in groups diagrams of a well-elaborated network.

Homework Task

Join a group study of 3-5 learners. Use play dough and sticks, form the types of network topologies.

Strand 3	**Communication Network**
Sub-Strand 1	**Computer Networks**
Content standard	**B7.3.1.1** Identify the concept of computer networking for global communications.
Indicator	**B7.3.1.1.2** Describe types of networks (LAN, MAN, WAN)
What you should know already	***Reminder about prior learning*** Have basic knowledge in making phone calls and sharing information using bluetooth.
What will you learn? What skills will you develop?	Learners will be able to • Explore types of networks using real life situations (i.e. family networks, friends' networks, etc.). • Describe types of networks from the example given above.  **LAN – [Local Area Network]** This network interconnects devices in a limited area and the infrastructure is owned by the business. **WAN – [Wide Area Network]** It is a network that spans over a large distance or it describes a network in which the computers to be connected to each other are at widely dispersed locations such that a local area network cannot be used. The infrastructure is supported by a telecommunications provider.

Strand 3	Communication Network
The language and vocabulary you will need to use	Bus, star, ring, point to point, mesh, hub, nodes, client
Ways to broaden your understanding	Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc Read or watch downloaded videos on the types of networks.
Things to remember for future lessons	Brief statements of essential points that must be remembered Observing computer connections in the café, school or any institution, and sharing pictures from one phone to another to illustrate information transfer from one point to another.

Activity Instructions

Follow the class session

Teaching Resources

Internet dictionary to check meaning of keywords such as LAN, MAN, WAN.

Strand 3	COMMUNICATION NETWORK
Sub-Strand 1	**Computer Networks**
Content standard	**B7.3.1.1** Identify the concept of computer networking for global communications.
Indicator	**B7.3.1.1.3** Discuss the entrepreneurship opportunities in networking computing devices.

Strand 3	COMMUNICATION NETWORK
What you should know already	***Reminder about prior learning*** Have basic knowledge in making phone calls and sharing information using bluetooth.
What will you learn? What skills will you develop?	Learners will be able to: Discuss the benefits of using networking facilities in their institutions and other places (school, business, health & wellness, etc.). benefits: 1. Share resources from one computer to another. 2. Create files and store them in one computer, access those files from the other computer(s) connected over the network. 3. Connect a printer, scanner or a fax machine to one computer within the network and enable other computers of the network to use all connected resources available over the network.
The language and vocabulary you will need to use	Bus, star, ring, point to point, mesh, hub, nodes, client.
Ways to broaden your understanding	Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc. Visit an institution within your community to witness and observe the benefits of computer networks.

Activity Instructions

Follow the class session.

Teaching Resources

Internet dictionary or Encarta to check the meaning of keywords such as ring, point to point, mesh, hub, nodes.

Strand 3	**Communication Networks**
Sub-strand 2	**Internet and Social Media**
Content standard	**B7.3.2.1** Demonstrate the use of Social Networking and Electronic Mail.
Indicators	**B7.3.2.1.1** Identify the various types and uses of Social Media sites such as those for social networking (Facebook, LinkedIn), microblogging (Twitter, Tumblr), WhatsApp.
What you should know already	As a learner, you must understand the need to socialise or stay in contact with loved ones.
What will you learn? What skills will you develop?	*Key learning/core competencies, subject-specific skills* ***Identify the various types and uses of Social Media sites. [social networking (Facebook, LinkedIn), microblogging (Twitter, Tumblr)]*** **Social media** Social media covers all services that promote the creation, sharing and exchange of content produced by users. **Types of social media** ***Social networking*** – This is an online platform that people use to build a network of people who have similar interests. They include *Facebook, LinkedIn, Google+, among others.* ***Microblogging*** – This is a platform that allows users to share small content items such as short sentences, images or video links. They include *Twitter, Pinterest, Tumblr and Instagram.*

Strand 3	Communication Networks
What will you learn? What skills will you develop?	***Uses of Social media*** Communication Collaboration Research E-commerce As a learner, you should be able to think critically, be a team player and acquire communication skills.
The language and vocabulary you will need to use	Facebook, LinkedIn, Microblogging (Twitter, Tumblr), WhatsApp.
Ways to broaden your understanding	1. Create at least three social media accounts and manage them. 2. Explore other ways one can use social media apart from using it for communication, research, e-commerce and collaboration.
Things to remember for future lessons	Brief statements of essential points that must be remembered For future lessons, you must remember • The concept of social media. • The types of social media. • The uses of social media.

Teaching Resources

Books on the concept of Social media, and videos on the use of Social media.

Assessment Task

1. Describe the unique features of four (4) social networks.
2. In groups, report on how you intend to use three (3) specific social media.

Homework Task

1. Working in groups, create three (3) social media accounts and manage them.

Strand 3	Communication Networks
Sub-strand 2	**Internet and Social Media**
Content standard	**B7.3.2.1** Demonstrate the use of Social Networking and Electronic Mail
Indicator	**B7.3.2.1.2** Demonstrate the use of the following features of Electronic mail: Attachment and Address book
What you should know already	Have a basic knowledge in composing e-mail**.** *(refer to indicator B5.6.7.1.4.)*
What will you learn? What skills will you develop?	Demonstration of the use of the following features of Electronic mail: Attachment and Address book. ***Email recipient*** Understanding keywords such as "From, To, CC, BCC" and when/how to use them in different situations. ***Attachment in e-mails*** These are files or folders that are sent along with a mail. An attachment to every mail has a size limit. A file beyond the size limit has to be sent in bits or sent using cloud storage like Google Drive, OneDrive, etc. Files can be videos, text, images or audio. Executable files may be blocked by some e-mail service providers. **How to add an attachment to an e-mail** 1. Create a new e-mail. (This must be done with the consent of your parents.)

Strand 3	Communication Networks
What will you learn? What skills will you develop?	2. Click the e-mail attachment icon for your client, for example "Attach," "Attach Files" or "Attach a File," to open a file browser window where you can select your files. 3. Locate where the file is stored on the PC. 4. Depending on the service provider, the button can be "Insert" or "Open." **Address Book** Web mail address book is a useful tool to store e-mail addresses and other contact information for people you often e-mail. **How to access Address Book** Open Gmail Select the ***Apps icon***, which is located in the upper-right corner of the Gmail screen. Select ***Contacts*** to open a new window that displays all your e-mail addresses. As a learner, you should be able to think critically, be a team player and acquire communication skills.
The language and vocabulary you will need to use	Attachment, document, file, file size, address book, navigation, file location.
Ways to broaden your understanding	1. Compose at least ten (10) e-mails to share the resources you use in the classroom with classmates. 2. Store at least thirty (30) e-mail addresses of your classmates in your address book.
Things to remember for future lessons	For future lessons, you must remember • How to attach files or folders to an e-mail. • How to access web mail address book.

Teaching Resources: Video tutorials on how to attach files to an e-mail.

Assessment Task

1. Send three files to a friend through e-mail.

Homework Task

1. Store thirty (30) e-mail addresses of classmates in your address book.
2. Compose ten (10) e-mails to share the resources you use in the classroom with classmates.

Strand 3	**Communication Network**
Sub-strand 3	**Information Security**
Content standard	**B7.3.3.1** Recognise data threats and means of protection
What you should know already	***Reminder about prior learning*** Recall indicator **B7.3.1.1** Identifying the concept of computer networking for global communications.
Indicator	**B7.3.3.1.1** Discuss the key principles of information security (confidentiality, integrity and availability).
What will you learn? What skills will you develop?	Key learning/core competencies, subject-specific skills • Communication and collaboration. • Problem-solving and critical thinking skills.
The language and vocabulary you will need to use	Confidentiality, integrity, availability.

Strand 3	Communication Network
Ways to broaden your understanding	Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc. • Explore ways of preventing loss of personal data.
Things to remember for future lessons	• Brief statements of essential points that must be remembered. • For future lessons, you must remember the various ways data can be compromised to affect its integrity.

Activity Instructions

Follow the class session.

Teaching Resources: Internet dictionary to check the meaning of keywords such as bus, star and ring.

Assessment Task

Join a study group of 3-5 learners for discussion.

Homework Task

Watch video documentary on data encryption and decryption methods.

Strand 3	Communication Network
Sub-Strand 3	**Information Security**
Content standard	**B7.3.3.1** Recognise data threats and means of protection
What you should know already	***Reminder about prior learning***

Strand 3	Communication Network
Indicator	**B7.3.3.1.2** Explore the legal issues relating to intellectual property rights (e.g. copyright, patent, trademark, piracy, copyright infringement).
What will you learn? What skills will you develop?	*Key learning/core competencies, subject-specific skills* • Communication and collaboration. • Problem-solving and critical thinking skills
The language and vocabulary you will need to use	Copyright, patent, trademark, piracy, copyright infringement
Ways to broaden your understanding	*Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc* • Do further reading on copyright provisions. • Explore the need for copyright protections.
Things to remember for future lessons	Brief statements of essential points that must be remembered Remember that any digital invention and innovation can be protected through copyright in Ghana.

Activity Instructions

Follow the class session

Teaching Resources

English Dictionary to check the meaning of keywords.

Assessment Task

Join a study group of 3-5 learners for collaborative lesson discussion.

Homework Task

Read copyright and privacy documents attached to books and electronic gadgets.

Strand 3	**COMMUNICATION NETWORK**
Sub-Strand 3	**Information Security**
Content standard	**B7.3.3.1** Recognise data threats and means of protection
What you should know already	***Reminder about prior learning*** **B7.3.3.1** Recognise data threats and means of protection.
Indicator	**B7.3.3.1.3** Evaluate information security forensic auditing and criminal laws against offenders.
What will you learn? What skills will you develop?	**Key learning/core competencies, subject-specific skills** • Communication and collaboration • Digital literacy and fluency • Problem-solving and critical thinking skills
The language and vocabulary you will need to use	Data forensics, information auditing, cyber law

Strand 3	COMMUNICATION NETWORK
Ways to broaden your understanding	Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc. • Ask questions on cyber laws such as online impersonation and cyber bullying. • Enter your full name in google search engine to find out if any information related to you can be found online.
Things to remember for future lessons	One must be security conscious when surfing the internet

Activity Instructions

Follow the class session

Teaching Resources

English Dictionary to check the meaning of keywords and laptop.

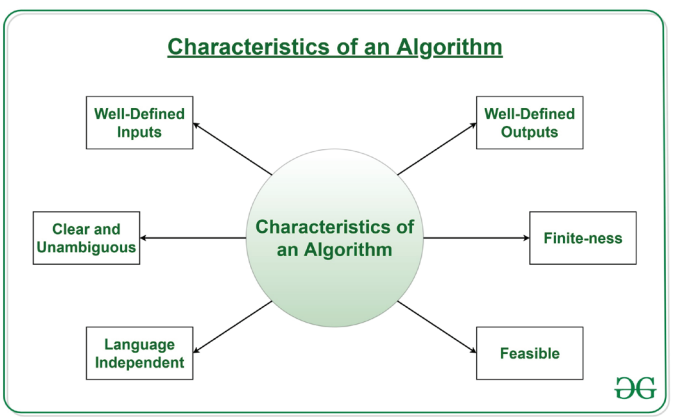
Assessment Task

Join a study group and discuss how group members can prevent themselves from cyber-crimes and cyber bullying.

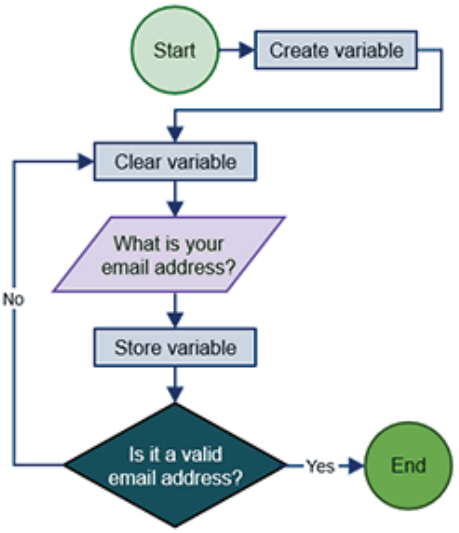
Homework Task

Seek parental approval to explore selected online video documentaries on information security.

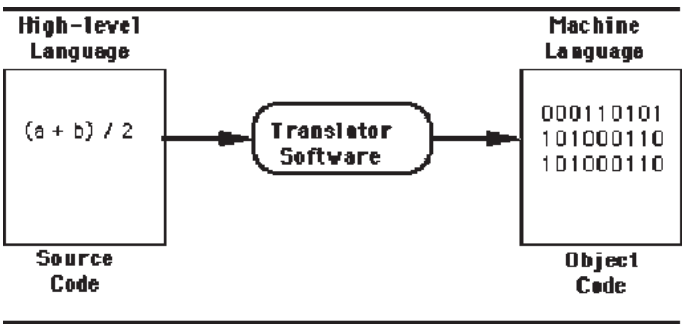
Strand 4 Computational Thinking

Sub-strand 1	Introduction to Programming
Content standard	**B7.4.1.1** Show an understanding of the concept of programming
Indicator	**B7.4.1.1.1** Demonstrate the use of correct terminology in describing programming concepts
What you should know already	***Reminder about prior learning*** Have basic knowledge in scratch, VB., Net, from Basic 5 (refer to indicator B5.5.1.3.6 in Basic 5: Discuss programming languages and their use).
What will you learn? What skills will you develop?	Learners should be able to 1. List and explain the following terminologies under programming: **Algorithm** is a step-by-step procedure to solve logical and mathematical problems. A recipe is a good example of an algorithm. It outlines what must be done, step-by-step. It takes inputs (ingredients) and produces an output (the finished meal). 

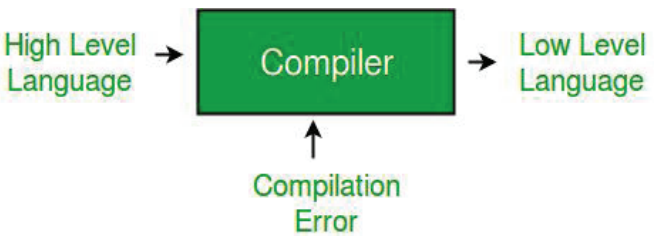
What will you learn?
What skills will you develop?



Source Code is the list of human-readable instructions that a programmer writes.



Compiler is a special program that processes statements written in a particular programming language and turns them into machine language or "code" that a computer's processor uses.



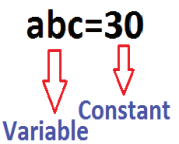
Data Type of a value is an attribute that tells what kind of **data** that value can have.

Common data types

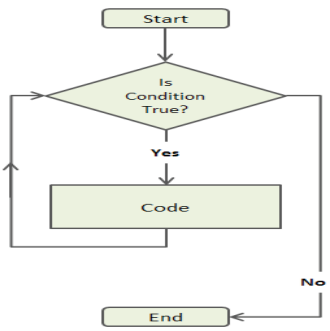
Data type:	Example value:
Integer	35462216
Floating-point	0.002756
Char	H
String	Hello, World!
Boolean	true

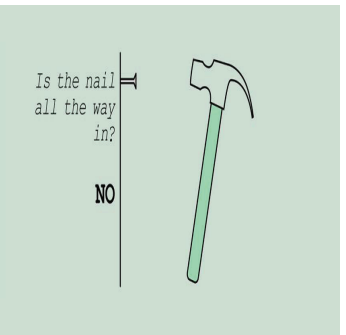
Variable is a value that can change depending on conditions or on information passed to the program.

Constant is a value that cannot be altered by the program during normal execution.



Loops, like selections, ask questions. However, the difference is that loops **ask the same question** over and over and over again until a **certain task is complete**.





	For example, take the act of hammering a nail. Even though you may not realise it, you are constantly asking yourself, "Is the nail all the way in?" When the answer is **no**, you **hammer the nail again.** You continue to repeat this question until the answer is **yes**, and then you **stop**. Loops allow programmers to efficiently code repetitive tasks instead of having to write the same actions over and over again. 1. Define the following yourself: Conditional, Array, Function, Class. 2. Develop a puzzle or any game that will aid understanding of the terminologies. ***As a learner, you should be able to think critically, be a team player and acquire communication skills.***
The language and vocabulary you will need to use	Algorithm, source code, compiler, data type, variable, constant, conditional, array, loop, function, class.
Ways to broaden your understanding	*Suggest how the learner can take responsibility for learning more about this standard, consolidating understanding, etc* 1. Practise more of the programming games. 2. Read books related to programming. 3. Watch videos on programming.
Things to remember for future lessons	• Brief statements of essential points that must be remembered. • Always relate your learning to real life situations. Read and practise more games with the terminologies.

Activity Instructions

Follow the class session.

Teaching Resources: Programming textbooks, English Dictionary, programming software such as scratch, laptop/computer/tablet.

Assessment Task

In groups of five (5), explain the various terminologies under programming. Group members can do this orally.

Homework Task

In your various groups, develop a puzzle using the terminologies under programming.

Strand 4	**Computational Thinking**
Sub-Strand 1	**Introduction to Programming**
Content standard	**B7.4.1.1** Show an understanding of the concept of programming
Indicator	**B7.4.1.1.2** Demonstrate understanding in the use of data types (e.g., float, integer, string, char, etc.)
What you should know already	As a learner, you should have prior knowledge of float, integer, string, char, varchar, etc. as types of data. [This can be referenced from ***B6.1.3.1.1.*** Identify types of data. (Integers, double, characters, float, etc.)]
What will you learn? What skills will you develop?	Learners should be able to: 1. Explain briefly the meaning of data type from what they learnt in the previous indicator.

What will you learn? What skills will you develop?	2. Identify the various data types such as Float, Integer, String and Char, and be able to define them as follows: a. Float is a term used in various programming languages to define a variable with a fractional value. b. String is a data type used in programming, such as an integer and floating-point unit, but is used to represent text rather than numbers. c. Char is short for character, which is a data type that holds one character (letter, number, etc.) of data. 3. Develop key questions around daily activities to identify the data type. Example, the first name of your best friend is written as a string data type. **NB: These are all suggested definitions. Learners should read wide on their own to broaden their knowledge.**
The language and vocabulary you will need to use	Float, integer, string, char
Ways to broaden your understanding	Practise more of the programming games. Read books related to programming. Watch videos on programming.
Things to remember for future lessons	Always relate your learning to real life situations. Read and practise more games with the terminologies discussed.

Activity Instructions

Follow the class session.

Teaching Resources

Programming textbooks, English Dictionary, programming software such as scratch, laptop/computer/tablet.

Assessment Task

In groups of five (5), explain the various terminologies under programming. Group members can do this orally.

Homework Task

In your various groups, develop a puzzle using the terminologies under programming.

Strand 4	**Computational Thinking**
Sub-Strand 1	**Introduction to Programming**
Content standard	**B7.4.1.1** Show an understanding of the concept of programming
Indicator	**B7.4.1.1.3** Demonstrate the ability to use the constants and variables used in programming
What you should know already	Demonstrate basic knowledge from indicator **B7.4.1.1.1**
What will you learn? What skills will you develop?	Learners should be able to build on the knowledge acquired from indicator **B7.4.1.1.1.** As a learner, you should be able to: • Discuss the usefulness of constants in defining values that are used many times within a function or program. • Understand that in programming, constants are used to store information that we know is never going to change.

Strand 4	Computational Thinking
What will you learn? What skills will you develop?	• Understand variables in programming as any characteristics, number or quantity that can be measured or counted. E.g. age, sex, country of birth, class grades, eye colour, etc. ***NB: These are all suggested definitions. Learners are advised to read wide on their own to broaden their knowledge.***
The language and vocabulary you will need to use	Constants, variables.
Ways to broaden your understanding	Read more from the internet or from books about variables and constants. Do the activities that will be given by your facilitator/ teacher. Watch videos on programming.
Things to remember for future lessons	Always relate your learning to real life situations. Read and practise more games with the terminologies discussed.

Activity Instructions

Follow the class session.

Teaching Resources

Programming textbooks, English Dictionary, programming software such as scratch, laptop/computer/tablet.

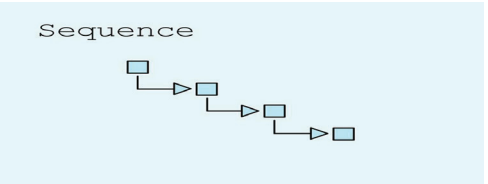
Assessment Task

In groups of five (5), explain the various terminologies under programming. Group members can do this orally.

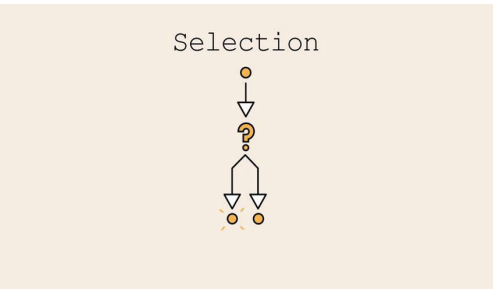
Homework Task

In your various groups, develop a puzzle using the terminologies under programming.

Strand 4	**Computational Thinking**
Sub-strand 2	**Algorithm**
Content standard	**B7.4.2.1** Analyse the correct step-by-step procedure in solving any real-world problem
Indicator	**B7.4.2.1.1** Understand the use of sequence, selection and iteration in writing a program. Explain the meaning of the terms algorithm, decomposition and abstraction
What you should know already	Recall what you learnt from indicator **B7.4.1.1.1** about demonstrating the use of correct terminology to describe programming concepts.
What will you learn? What skills will you develop?	
What will you learn? What skills will you develop?	Learners should be able to build on the knowledge acquired from indicator B7.4.1.1.1 and be able to: 1. Explain sequencing to mean that the computer will run your code in order, one line at a time from the top to the bottom of your program. It starts at line 1, then executes line 2, then line 3 and so on until it reaches the last line of your program. Any sequence that we do every day is a **morning routine**. You might wake up, drink some water, take a shower and eat breakfast before you go to school.



2. Write numbers (e.g. 1-10) in an orderly arrangement to represent a sequence.
3. **Selections** are a bit different. Instead of following a specific order of events, they **ask a question** in order to figure out **which path to take next.** Let's say you go to brush your teeth, and you find out that you have run out of toothpaste. You will then ask, "Do I have any more toothpaste?" If the answer is **no**, you will go and buy some. But if the answer is **yes**, you will just **use the toothpaste**. This is what a selection does: **answering a question based on what it finds.**



Abstraction can be defined as displaying only essential information and hiding the details. Data abstraction refers to providing only essential information about the data to the outside world, hiding the background details or implementation.

NB: These are all suggested definitions. Learners should read wide on their own to broaden their knowledge.

The language and vocabulary you will need to use	Sequence, selection, iteration, algorithm.
Ways to broaden your understanding	1. Do further reading on the terminologies discussed. 2. Read books related to programming. 3. Watch videos on programming.
Things to remember for future lessons	Always relate your learning to real life situations. Read and practise more games with the terminologies discussed.

Activity Instructions

Follow the class session

Teaching Resources

Programming textbooks, English Dictionary, programming software such as scratch, laptop/computer/tablet.

Assessment Task

In groups of five (5), explain the various terminologies under programming. Group members can do this orally.

Homework Task

In your various groups, develop a puzzle using the terminologies under programming.

Strand 4	**Computational Thinking**
Sub-Strand 2	**Algorithm**
Content standard	**B7.4.2.1 Analyse the correct step-by-step procedure in solving any real-world problem.**

Strand 4	Computational Thinking
Indicator	**B7.4.2.1.2** Perform a linear search
What you should know already	Learners should recall knowledge gained from indicator **B7.4.2.1.1**
What will you learn? What skills will you develop?	Learners should be able to build on the knowledge acquired from indicator **B7.4.2.1.1** and be able to: 1. Use Flowchart and Pseudocode to write algorithms. 2. Understand that linear search, also known as sequential search, is a process that checks every element in the list sequentially until the desired element is found.
What will you learn? What skills will you develop?	3. A Linear Search sequentially moves through your collection (or data structure) looking for a matching value. In other words, it looks down a list, one item at a time, without jumping. Think of it as a way of finding your way in a phonebook. A Linear Search is starting at the beginning, reading every name until you find the name you are looking for. ***NB: These are all suggested definitions. Learners should read wide on their own and broaden their knowledge.***

Strand 4	Computational Thinking
The language and vocabulary you will need to use	Sequence, selection, iteration, algorithm
Ways to broaden your understanding	1. Do further reading on linear search and relate it to everyday activities. 2. Read books related to programming. 3. Watch videos on programming.
Things to remember for future lessons	Always relate your learning to real life situations. Read and practise more games with the terminologies discussed.

Activity Instructions

Follow the class session.

Teaching Resources: Programming textbooks, English Dictionary, programming software such as scratch, laptop/computer/tablet.

Assessment Task

In groups of five (5), explain the various terminologies under programming. Group members can do this orally.

Homework Task

In your various groups, develop a puzzle using the terminologies under programming.

Strand 4	COMPUTATIONAL THINKING
Sub-strand 3	**Robotics**
Content standard	**B7.4.3.1** Discuss Robot intelligence concepts
Indicator	**B7.4.3.1.1** Review the various applications of robotic machines in society

What you should know already	Learners should have basic knowledge from indicator **B6.1.4.1.4**. (Basic 6), identifying three importance of technology in communication.
What will you learn? What skills will you develop?	1. Define a robot as a machine designed to execute one or more tasks automatically with speed and precision. 2. State the application and uses of robots in society. Relate the uses to real life examples. For example, drones for taking pictures and recording videos. Another example could be drones being used by the Ghana Health Service to transport medical supplies.
	Learners should be able to build on the knowledge acquired from indicator **B6.1.4.1.4** and be able to:   ***NB: These are all suggested definitions. Learners should read wide on their own to broaden their knowledge.***
The language and vocabulary you will need to use	Robotics, drones

Ways to broaden your understanding	• Do further reading on robotics. • Join a Robotic club and learn more. • Read books related to robots. • Watch videos on robots.
Things to remember for future lessons	Remember to always relate robotics to the real world. For example, the use drones by the Ghana Health Service to deliver medical supplies to designated areas across Ghana.

Activity Instructions

Follow the class session.

Teaching Resources: Robotic textbooks, English Dictionary, programming software such as scratch, laptop/computer/tablet.

Assessment Task

In groups of five (5), explain the importance of robots in our society.

Homework Task

In your various groups, develop a puzzle using the terminologies under programming.

Strand 4	**Computational Thinking**
Sub-Strand 3	**Robotics**
Content standard	**B7.4.3.1** Artificial Intelligence
Indicator	**B7.4.4.1.1** Discuss the application of various areas of artificial intelligence (Machine learning, Artificial Neural Networks, Virtual Reality, Augmented Reality, Gamification)
What you should know already	Learners should have basic knowledge from indicator **B5.1.4.1.4** and **B6.6.8.1.2**

What will you learn? What skills will you develop?	Learners should be able to build on the knowledge acquired from indicator **B5.1.4.1.4** and **B6.6.8.1.2**, and be able to explain the following: **Artificial Intelligence** (**AI**) is the branch of computer science that emphasises the development of intelligent machines thinking and working like humans. For example, speech recognition, problem-solving, learning and planning, etc. A real-world example is **Fraud detection** where banks use artificial intelligence to determine if there is strange activity on your account.
What will you learn? What skills will you develop?	Machine learning is a sub-area of artificial intelligence. It refers to the ability of IT systems to independently find solutions to problems by recognising patterns in databases. Machine learning undoubtedly helps people to work more creatively and efficiently. Learners will, therefore, develop creativity and innovative skills. ***NB: These are all suggested definitions. Learners should read wide on their own to broaden their knowledge.***
The language and vocabulary you will need to use	Artificial Intelligence, Machine learning, Neural networks, Virtual Reality, Augmented Reality, Gamification.
Ways to broaden your understanding	1. Do further reading on Artificial Intelligence, Machine learning, Neural networks, Virtual reality, Augmented reality, Gamification. 2. Ask further questions and seek additional explanations from your facilitator/teacher.
Things to remember for future lessons	Relating robotics to real life situations. Watch videos (if available) on how AI works.

Activity Instructions

Follow the class session

Teaching Resources

AI textbooks and resources, English Dictionary

Assessment Task

In groups of five (5), explain AI and its importance.

Homework Task

In your various groups, write down real life situations within your environment that show Artificial Intelligence at work.