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**TEACHERS' GUIDE FOR TEACHING SYLLABUS DEFINED IN ANNEX No V OF
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THE FIRST CYCLE OF GENERAL SECONDARY EDUCATION OF THE ENGLISH-
SPEAKING AND FRENCH-SPEAKING SUB-SYSTEMS OF EDUCATION**

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LIST OF ABBREVIATIONS

Abbreviations	Meaning
AI	Artificial intelligence
ASCII	American Standard Code for Information Interchange
Bit	Binary Digit
CAL	Computer Aided Learning
CC	Creative Common
CPU	Central Processing Unit
CTC	Context-Task-Criteria
CTC	Context-Task Criteria
CTS	Carpal Tunnel Syndrome
DBMS	Database management system
DE	Distance Education
DRM	Digital rights management
DVD	Digital Versatile Disc
ECU	Environmental Control Units
Email	Electronic Mail
FTP	File Transfer Protocol
GB	Giga Byte
GNU	GNU's Not Unix
GPU	Graphics Processing Unit
GUI	Graphical User Interface
HDD	Hard Disc Drive
HDMI	High-Definition Multimedia Interface
HTML	Hyper Text Markup Language
HTTP	Hyper Text Transfer Protocol
ICT	Information and Communication Technology
IDE	Integrated development
iOS	iPhone Operating System
IoT	Internet of Things
IoT	Internet of Things
IS	Information system
ISP	Internet Service Provider
ISP	Internet Service Provider
KB	Kilo Byte
LAN	Local Area Network
MAC OS	Macintosh Operating System
MAN	Metropolitan Area Network
MB	Mega Byte
MICR	Magnetic Ink Character Recognition
OCR	Optical Character Recognition
OMR	Optical Mark Recognition
OS	Operating System
PAN	Personal Area Network
PC	Personal Computers
PERT	Program Evaluation and Review Technology
PS2	Personal System 2

RAM	Random Access Memory
ROM	Read Only Memory
RSI	Repetitive Stress Injury
SaaS	Software as a service
SDLC	System Development Life Cycle
SERP	Search engine result page
SSD	Solid State Disc
TB	Tera Byte
UPS	Uninterrupted Power Supply
UPS	Uninterruptible Power Supply
URL	Uniform Resource Locator
USB	Universal Serial Bus
VGA	Video Graphics Accelerator
WAN	Wide Area Network

I. INTRODUCTION

Skills in computing are core for every nation that wants to leverage the power of digital technology and integrate digital transformation into their processes and activities. NDS30 (National Development Strategy 2020–2030) considers digital technology as one of the key components for the structural transformation of the Cameroonian economy. Building a syllabus that will prepare learners (future citizens) to leverage the power of digital technology is a means of supporting the Cameroonian government. A good syllabus without a guide on how to effectively implement it may not yield the expected results. Moreover, the changing nature of digital technologies and their plurality make it more necessary to guide teachers on what to teach and how to teach it. The goal of this syllabus guide is to clarify cloudy areas of the syllabus, explain how to make optimum use of the syllabus, and recommend teaching methods, evaluation methods, and best practices when teaching computing.

The guide is structured as follows: Section two (II) will present a summary of the goals and design philosophy of the syllabus; section three (III) will present how the syllabus is organised and provide strategies on how to effectively exploit the syllabus matrix; section four (IV) will focus on the necessity of gender fairness and learning powered by technology, methods for teaching computing, and recommended strategies to adapt to the plurality and changing nature of computer technology; while section five (V) will focus on how to evaluate. The last section will present the syllabus for each class and provide clarifications on ambiguous areas, the extent to which concepts are treated, the recommended context for a competence, specific technologies that can power the learning of a competence, and specific ways of including gender fairness for a particular competence.

II. DESIGN PHILOSOPHY OF THE SYLLABUS

The following five dimensions make up the syllabus's design framework:

- dimension 1: goals of the syllabus;
- dimension 2: pillars used to attain the goals;
- dimension 3: domains in each pillar;
- dimension 4: competency statements in each domain;
- dimension 5: lessons (knowledge, skills, and attitudes) needed to attain the competencies.

The goals of the syllabus are to equip learners with competencies that will enable them to:

- leverage technology to achieve lifelong learning;

- develop social and cross-cultural skills while being rooted in their own culture;
- reason coherently and logically when solving problems;
organise, create, and modify digital content using appropriate tools;
- recommend responsible behaviour and security measures when using ICT (information and communication technology).

To achieve these goals, the inspectorate relied on three pillars: computational thinking and coding, computing environment, and digital citizenship. Each pillar is divided into domains; the competencies to equip learners in each domain are determined, and the lessons (knowledge, skills, and attitudes) needed to achieve the competencies are deduced.

III. ORGANISATION OF THE SYLLABUS

Description of each domain (module)

The syllabus is organised into pillars that have specific domains (modules). The generic goal for each domain is given below.

The computational thinking and coding pillar is made up of two main domains: problem solving and coding.

- **Problem solving:** learners will use computational thinking skills such as abstraction, decomposition, pattern recognition, algorithms, and generalisation to understand, simplify, and solve problems. They will also learn standard methodologies for approaching specific types of problems.
- **Coding:** learners will express solutions to problems in a way that a computing agent can execute. The solutions will be expressed using block programming environments or other types of programming environments.

The computing environment, or computer system pillar, is made up of three main modules: data manipulation, hardware and software systems, and network systems.

- **Data manipulation:** learners will develop competencies in data representation, data organisation, and manipulation of bits.
- **Hardware and software systems:** learners will develop competencies in the use and choice of hardware and software. They will also be able to identify and solve basic hardware and software-related problems.

- **Network systems:** learners will leverage possibilities offered by computer networks; most importantly the internet and its related technologies.

The pillar of digital citizenship is divided into two main domains: computer security and safety, and ethics and responsible use.

- **Computer security and safety:** learners will develop competencies that will enable them to protect their data, devices, digital content, health, and navigate safely in the cyberspace.
- **Ethics and responsible use:** learners will demonstrate appropriate behaviour when using technology and interacting with others, and they will respect cultural and generational diversities.

Prerequisites

Ability to read and write in the English language.

Duration of the syllabus

CLASS	WEEKLY TEACHING LOAD (PERIODS)	ANNUAL TEACHING LOAD (PERIODS)	COEFFICIENTS
FORM 1	02	50	02
FORM 2	02	50	02
FORM 3	03	75	03
FORM 4	03	75	03
FORM 5	03	75	03

The estimated amount of time for a teaching period is 50 minutes.

Description of terms used in the syllabus matrix

The syllabus matrix is made up of three main columns, which are further divided into sub-columns.

The three main columns are: contextualisation, competencies to be attained, and resources.

- **Contextualisation** refers to the context or situations under which the competency to be attained will be developed or tested. This column is further divided into two main columns: families of life situations and examples of life situations.
 - **Families of real-life situations:** it is an umbrella statement that groups related real-life situations.
 - **Examples of real-life situations:** are specific or practical situations that can be used to introduce, develop, or evaluate the competency to be attained.

- **Competency to be attained** refers to the abilities the learners are expected to develop. It is divided into two main columns: competency statement and categories of action.
 - **Competency statement:** it is a generic description of the context in which learners are expected to express their ability, the main task that learners will perform, and the evaluation criteria that will be used to consider whether the learner is competent.
 - **Categories of actions:** represent the main actions learners are expected to carry out to build competency.
- **Resources** refer to the different elements that should be mobilised to attain the defined competency. It is divided into five parts: knowledge, skills, attitudes, didactic materials, and teaching periods.
 - **Knowledge:** It is the body of facts, principles, theories, and practices that are related to a field of work or domain and are necessary for attaining the desired competence.
 - **Skills:** it refers to the ability to apply knowledge and use know-how to complete tasks and solve problems. It can be cognitive (involving the use of logical, intuitive, and creative thinking) or practical (involving manual dexterity and the use of software and hardware tools).
 - **Attitudes:** It refers to the behavioural dispositions, motivations, aspirations, and values the learner needs to ease the attainment of the desired competencies and expected cultural norms and conduct they need to have to integrate seamlessly into society.
 - **Didactic materials:** they are the resources or elements that the teacher can use to facilitate the teaching-learning process (attainment of the desired competence).
 - **Teaching periods:** it is the estimated number of lessons needed for the attainment of the competency.

Exploiting the syllabus matrix

This section explains how a teacher can use the syllabus matrix to cover each competency statement. The teacher is expected to transform the set of knowledge, skills, and attitudes into lessons for each competency and prepare content that meets the knowledge and skills with respect to other constraints provided in the syllabus or guide. The knowledge, skills, and attitudes the teacher is expected to use to attain the competency are defined in the same row as the competency statement. The number of lessons proposed by the teacher should be approximately equal (plus or minus one)

to the prescribed number of teaching periods. Note that among the lessons proposed, there should be an integration activity whose aim is to show how the knowledge, skills, and attitudes divided into each lesson can be mobilised to reach the desired competency. Teachers are advised to use the national progression sheet to guide them on the lessons they are expected to teach for a given competency.

The lessons are supposed to be prepared following a problem-based learning approach. It is advised that every lesson should begin with a real-life situation, problem, or case study. The situation, problem, or case study should be related to the family of life situations, and the teacher can gain inspiration from the examples of life situations or from the recommendations of context provided in the explanatory notes for that competency. The name of the teaching unit (chapter) can be derived from the category of action, and the competency to attain is obtained from the competency statement.

Teachers are expected to intentionally perform activities, use methods, and mention words that promote the development of the attitudes mentioned in the attitude section of the syllabus matrix. Lessons prepared by teachers should clearly show the attitudes they are developing and their strategy to integrate them into the lesson and transmit them to the learners.

Teachers are expected to promote learning that is powered by technology. That is, theoretical lessons and practical lessons are expected to be run using technology, and didactic materials used to simplify lessons are expected to be digital didactic materials such as simulators, games, virtual laboratories, interactive tests, animations, video resources, presentations, images, and more. Recommendations on specific technologies or digital didactic materials to use when working on attaining a specific competence are highlighted in the explanatory notes of the competence.

Among the lessons crafted to meet the teaching periods, one of the lessons must be an integration activity. The aim of this lesson is to show learners how to mobilise the knowledge, skills, and attitudes acquired in the different lessons to solve problems. The problem, case study, or situation used in the integration activity should be an instance of the competency statement in a well-defined context. The recommended contexts for each competency are given at the level of the explanatory notes or can be obtained from the examples of life situations.

Note that every concept provided as core knowledge should be defined or cited, even if there are no skills or objectives explicitly asking the teacher to do so.

IV. METHODOLOGY

The fundamental teaching approach is the competency-based approach (CBA), which helps the teacher adopt diverse teaching and learning methods. The CBA method of teaching and learning favours learner centred teaching and learning, with entry and/or exit through life situations. Also, integration activities should be devised for each competence and for a group of competencies. Such integration activities should be close to the life situations learners can face in their daily activities.

Teachers are expected to be conscious of gender fairness and devise strategies to integrate it into their lessons. For instance, they can involve both male and female students in answering questions and illustrating concepts, or they can make sure group work and the leaders of groups have an even mixture of male and female students. Another way is to ensure that the personas used in problem situations or integration activities are evenly balanced in terms of gender, or to make sure the context used suits the interests of boys and girls. Also, teachers, when teaching a concept, can mention the contributions of women and men, if any. For example, when teaching operating systems, the teacher can mention Anita Borg as someone who helped enhance the UNIX operating system and Linus Torvalds as the creator of the Linux operating system.

Teachers should strive for learning that is powered by technology. They are thus expected to integrate technology as a means of easing the understanding of concepts, either by using premade technology tools or digital didactic materials that facilitate the understanding of a concept, building their own technology tools or digital didactic materials, or modifying existing technology tools or digital didactic materials that ease the understanding of a concept.

PREFERRED METHODS FOR TEACHING COMPUTING

Problem based learning method

This is the most preferred method for teaching the different lessons found in this syllabus. In the problem-based learning approach, the teacher assumes the role of a coach and presents the student or learner with a problem, allowing them to actively solve it. The learners are presented with the problem, study the problem or carry out research on it, organise their ideas, discourse on their relative knowledge concerning the problem, and attempt to define its scope. During their discussions, the learners ask questions concerning aspects of the problem that they don't understand. The learners are continually encouraged to show forth what they know and what they don't know.

Learners in a group identify and classify which of the questions asked are to be solved by the group and which are to be answered by individuals. They discourse with their teacher about what resources would be needed to solve the problems and where exactly to obtain such resources. After some time of research, the learners come back together in the group to integrate their new knowledge obtained from research into the context of the problem. Learners could continue to ask questions during discussions to resolve the problem. This continues until a satisfactory final solution is obtained. Learning is a continuous process, and there will always be new questions to ask during the learning process. The teacher must guide, encourage, and support the learners' initiative.

In summary, this method has three main activities:

1. learners are assigned a problem;
2. learners identify what they need to know to solve the problem and engage in learning it;
3. learners apply what they have learnt to solve the problem.

Project method (Project-based learning)

The project approach, which is constructivist pedagogy, involves the presentation of a life situation in the form of a mini-project, thereby provoking inquiry-based learning and computational thinking. In this method, learners are presented with a project, and they are expected to plan, execute, evaluate, and report on the project. The teacher here acts as a guide during the process of planning, executing, evaluating, and reporting.

This project (which should not be artificial but one that has value in real life) is often assigned to a group of learners. Group projects are often encouraged as they are an ideal booster for the development of several attitudes and competencies. The project (especially in a group) method helps the learner to:

- learn by using a project as a vehicle for achieving new competencies;
- work effectively in a group while gaining experience from others in the group;
- analyse his or her work in a reflexive manner;
- research and use information from different experts and appropriate sources (e.g., CD, Web, multimedia);
- synthesise and communicate the results of the work done with others;
- Incorporate life-long learning attitudes.

Expository method

The expository method is one in which the teacher masters the contents of a structured lesson and then presents it to the learners in the form of an exposé. In the context of the CBA, this method is only recommended when the teacher is to present the external resources necessary for the acquisition of competence.

Demonstrative method

The demonstrative method is one in which the teacher teaches how to do something by doing it and then guides the learner to do the same while evaluating the degree of learner understanding. This method has the following elements:

- show (demonstrate);
- make do (experimentation);
- Make say (formulation).

Interrogatory method

In this method, the learner is considered to have some knowledge of what is to be acquired or an idea of its contents. Through an appropriate question given by the teacher, the learner constructs his own knowledge based on his own understanding or tries to link and give some sense to the disjointed ideas he possesses. This method is often used when the teacher is set out to diagnose the level of knowledge in learners.

Discovery method

With the discovery method, the teacher creates a pedagogic scenario where he uses appropriate materials to allow the learners to use the trial-and-error method for learning. The teacher exploits his personal experience or those of the learners in a group to solve a given problem, using the means available to them. Intra-cognitive and collaborative work here is highly utilized. This method has the following elements:

- make the learner do;
- make the learner say;
- the teacher corrects.

This method must be used with care, as it is expensive and time-consuming.

DIDACTICS OF COMPUTER SCIENCE

The didactics of computer science refers to the way computer science should be taught. The variety of technologies for a given purpose and the speed at which these technologies change demand some attention on how computing should be taught to make sure learners can easily adapt to these changes and stay relevant.

One of the key principles in the didactics of computer science is based on the generic engineering principle that goes thus: separate what changes from what does not change. This means teachers are expected to identify what does not change, teach it as an independent concept, link it to what changes, and give strategies to cope with what changes.

For instance, if there is a lesson where learners are expected to produce content using a word processor, teachers are expected to present generic features of a word processor in such a way that they are independent of a particular word processor, illustrate the use of these features in a specific word processor, and give strategies that will permit learners to adapt and use any word processor.

Another example of such separation can be seen in the concept of displaying the context menu. Popular thinking sees right-clicking as displaying the context menu. Looking at it like that is good, but it is not enough to integrate adaptability. Right-clicking is just a method of displaying the context menu when you are using the mouse. If you are using a touch screen or another form of input, the way the context menu is displayed will be different. Thus, teachers should separate the concept of displaying the context menu from how it is done. Teachers are thus expected to identify misnomers or misconceptions due to their popularity and explain the unchanging ideas to the learners.

Also, we recommend teachers identify knowledge or technology that is obsolete and mention it without focusing on it. The focus should be on the currently used technologies and methods, while future trends can also be mentioned.

Moreover, teachers should keep in mind that tablets and smartphones are also considered to be computers and should discuss features that are specific to these devices when necessary. There are thus instances where the word computer will include all these devices.

Furthermore, computational thinking and digital citizenship skills should be seen as attitudes that are to be integrated in every lesson or competence. This means that, teachers are expected to apply computational thinking and other problem solving methods, and mention and demonstrate digital citizenship skills as they teach other competencies that are not related to computational thinking or

digital citizenship. That is, for each competency, teachers are expected to intentionally mention and apply computational thinking and problem solving methods when solving the different case studies or life situations, and intentionally outline and demonstrate elements of ethics, responsible use and security when solving case studies or life situations.

V. EVALUATION

Evaluation should always include a section where the competency is evaluated based on the competency statement written in the syllabus for the teaching unit to be evaluated.

Evaluation should focus on learners' ability to apply, integrate, and transfer the knowledge, skills and attitudes received during learning.

VI. EXPLANATORY NOTES

This section attempts to define the extent to which concepts will be covered, clarifies areas that seem ambiguous, recommends possible context for crafting real-life situations, case studies, or problem situations, proposes specific technologies or digital didactic materials that can ease the understanding of a concept, and highlights situations teachers can emphasise on gender fairness.

Note that recommended contexts are school, home, business, agriculture, and any other field of life that is close to the learners. Also, every competency must end with a lesson called integration activity, which aims at showing how the KSA (knowledge, skills, and attitudes) can be combined to solve a problem. Do not forget that problem-solving techniques such as computational thinking are both a skill and an attitude and should be clearly demonstrated when running an integration activity. Also, elements of digital citizenship (responsible use and security) that are linked to a particular competence, knowledge, or skill should be mentioned when covering that competency.

Explanatory notes Form 1

COMPUTING ENVIRONMENT 1

FORM 1, MODULE 1: COMPUTING ENVIRONMENT 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
COMPUTING ENVIRONMENT	- Working in a computing environment - Classifying computer components	HS 1.1 Discovering the computing environment	Presented with a computing environment, learners identify and state the roles of the main components of the environment.	- Computing environment - Hardware - Software - Computer users - Computer - Data - Information - Processing	- Identify the components of a computing environment; - Give the role of the main components in a computing environment; - Discover the relationship between components of a computing environment - List the different types of users (end user; secretary, programmers, computer repairer, ...) - Differentiate between data and information. - List the different forms of data (numbers, characters, images, video, sound)	- The components of a computing environment to focus on are hardware, software, user (peopleware), and data. Hardware, software, and user are the main components. - The relationship between components of the computing environment should focus on the fact that one cannot work without the other. - Recommended contexts to consider during evaluation, case studies, or problem situations are: computer laboratory, home computing environment, office computing environment, cybercafé, secretariat, ...
	- Buying a computer - Using a computer	HS 1.2 Exploring the computer	Presented with a variety of computers and their components, learners correctly identify the types of computers involved and their respective components, and effectively use the main input devices.	- Types of computers (Laptop, Desktop, tablets & smartphones) - Computer - Keyboard - Mouse - Monitor - System unit - Touch screen - Touch screen gestures (swipe,	- State the characteristics of computers. - List the main components of a computer. - State the different types of computers - List the advantages and disadvantages of each type of computer. - Outline the different types of each computer component.	- The main components to consider here are the ones presented in the core knowledge (keyboard, monitor, mouse, system unit). - The teacher is expected to briefly discuss types of mice (mechanical and optical), keyboards (QWERTY, AZERTY), monitors (CRT, LCD), and system units (tower, desktop). - In the skill expressing the ability to use main components, learners are expected to match a mouse action to a

FORM 1, MODULE 1: COMPUTING ENVIRONMENT 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
				tap, double tap, press and hold, pinch, ...)	• State the roles of the main components • Manipulate the main components (keyboard, mouse, touch screen)	particular purpose, a touch screen action to a particular purpose, and how to access the symbols on a keyboard. • Recommended contexts to consider during evaluation, case studies, or real-life situations are: computer laboratory, computer shop, computer repair shop, office or home computing environment, cybercafé, etc.
	• Proposing equipment for a computer laboratory • Choosing a computer laboratory layout • Proposing rules for using a computer laboratory	HS 1.3 Describing the computer laboratory.	Provided with a situation with factors related to setting up a computer laboratory, learners identify and enumerate the needs and rules of a school computer laboratory.	• Seating layouts • Computers • Projectors • Air conditioner • Printers • UPS	• Identify the elements of the computer laboratory. • State the main role of each element of the computer laboratory • Identify the steps for the laboratory build up. • Identify the different layouts of a computer laboratory • State advantages and disadvantages of these different layouts • Identify good behaviours to adopt when working in the computer laboratory. • State precautions to take when using the computer laboratory. • State the importance of rules in a computer laboratory.	• In the third skill, the word “build up” means set up. • Recommended contexts to consider during evaluation or real-life situations are: primary school, secondary school, public university, professional university, training centre of a company, etc.

FORM 1, MODULE 1: COMPUTING ENVIRONMENT 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	- Choosing a computer for a specific task. - Classifying computers	HS 1.4 Understanding computer evolution	Given a situation with factors related to the evolution of computers, learners explain computer evolution and classify computers based on technology used. The explanation should bring out the inventor, date, and name of device.	- Computer Timeline - Analog, digital and hybrid computers - Supercomputers, Mainframes, Minicomputers, Microcomputers - Computer generations	- Trace the history of computers by identifying the main computing device, the date, and the inventor - Classify computers based on application, and size. - Describe the different computer generations and for each, identify the main technology used.	- Highlight women and men in computer evolution, for instance: Ada Lovelace promoted the Babbage Analytical Engine, and Charles Babbage created the analytical engine. - Recommended contexts to consider during evaluation or real-life situations are: training, a school assignment, research, applications of computing technology, etc.
	- Using computers at home - Using computers in education - Using computers in the society	HS 2.1 Exploring areas of computer application	Presented with domains of life and specific computing technologies, learners describe the use of computers in these domains. The description should include an example of technologies used in the domain.	- Documentation - Leisure - School management information system - Embedded systems and IoT - Robots - Research - Learning (CAL) - Distance learning	- Describe some general applications of computers in homes and school e.g., create documents, leisure, research, etc. - Outline uses of robots at home and school. - List tools for searching information. - List embedded systems and IoT that can be used at home and in school. - Explain general computer applications in school, e.g., documentation, teach/study, production of report cards, etc. - Discuss the use of	- Documentation here refers to a business site where basic computing services such as typing, editing, and printing of documents are offered. - Recommended domains are: home, school, documentation, and agriculture, while recommended technologies are: embedded systems and IoT, robots, and computer-assisted learning (CAL).

FORM 1, MODULE 1: COMPUTING ENVIRONMENT 1

FORM 1, MODULE 1: COMPUTING ENVIRONMENT 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
					computers in documentation.	
	- Connecting peripheral components to the computer - Choosing appropriate devices for different activities.	HS 3.1 Describing the hardware	Given peripheral devices and system units, learners set up correctly and power on a computer.	- Peripheral devices - Ports - System Unit - Booting	- Identify common peripheral devices such as USB stick, external hard drive, memory card, monitor, mouse, keyboard, printer, charger, earphones, ... - Identify computer ports (USB port, PS2, Power port, VGA port, HDMI port, audio port, memory card port, ...) - Connect devices to their appropriate ports. - Identify the power button. - Explain the boot process.	- Teachers are not expected to describe devices found inside the system unit. They can mention that some devices are found inside the system unit. - Recommended contexts to consider during evaluation or real-life situations are: computer laboratory, home computer, school assignment, computer repair shop, documentation business, cybercafé, etc.
	- Choosing software to install in a computer - Buying a software	HS 3.2 Describing software	Given a set of tasks, learners identify appropriate application software needed to carry out each task.	- Software - System software - Application software - Word processor - Spreadsheets - Graphics software - Desktop publishing - Presentation - Video editor - Audio editor	- State and give examples of system software. - State and give examples of application software. - State examples of task that can be carried out by a given application software. - Distinguish between system software and application software.	- The application software to consider are the ones presented in the core knowledge. - Recommended contexts to consider during evaluation or real-life situations are: computer laboratory, cybercafé, home computer, secretariat, photo studio, newspaper company, TV or radio company, etc.
	- Using an operating system - Storing information	HS 3.3 Working with a GUI operating system	Provided with a situation where files are being created or transferred into a computer, learners	- Windows - Menus - Icons - Taskbar - Desktop	- Identify features of a GUI operating system. - Access the start menu. - Arrange items on the desktop with respect to a	- Note that the word computer can refer to tablets, laptops, phones, and desktop computers. Thus, mobile operating systems should be considered. - The features here refer to icons,

FORM 1, MODULE 1: COMPUTING ENVIRONMENT 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	in the computer • Organising files.		use basic features of an operating system to organise files logically.	• Files • Folders • Dialog box	specific criterion. • Manipulate files and folders in a GUI OS.	desktop, start button, taskbar, system tray, dialogue box, windows, etc. • The teacher should note that these elements need to be presented in a generic way before applying it to a specific operating system. • Manipulation of files and folders refers to the use of operations like create, rename, move, copy, paste, archive, etc. • Recommended contexts to consider during evaluation or real-life situations are: party (organising digital content taken in a party according to types of content, people, location, etc.); searching information (grouping downloaded material or transferring it); copying files into a computer, organising files on a choked desktop; work (organising files produced at work); etc.
	• Writing a report • Editing images	HS 3.4 Using application software	Given a situation that requires the use of a software to perform a task, learners create expected content using appropriate software.	• Word processor • Editing text • Formatting text • Spreadsheet • Workbooks • sheet • Cell • Cell address • Formula • Graphic software • Resizing • Eraser	• Describe features of word processors, spreadsheets, and graphics software. • Use word processors, spreadsheets, and graphics to carry out simple task.	• The use of word processors should be limited to launching the software, typing, and performing basic formatting such as bolding, changing font size, font face, underlining, and changing the colour of text. • The use of spreadsheets should be limited to identifying cells, and addresses, entering data, and performing simple calculations without the use of functions. • The use of graphic software should be limited to cropping, erasing, resizing,

FORM 1, MODULE 1: COMPUTING ENVIRONMENT 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
				• Crop • Colouring		colouring, and other additional basic features of an image editor. • Recommended contexts to consider during evaluation or real-life situations are: writing a work report, typing an assignment, typing a market list, preparing a home budget, calculating profit, producing a marksheet, creating a logo, producing a barbing saloon poster, drawing a cartoon, etc.
	• Searching for information • Using the internet	NS 1.1 Discovering the Internet	Given a situation with issues related to searching information from the internet, learners use a web browser and hyperlinks to navigate between web pages and find information.	• Browser • Web page • Search engine • URL	• Start a web browser • Start and access a search engine • Enter a website address to view a specific website and navigate between pages and sites using the hyperlinks. • Find information on the web	• Recommended contexts to consider during evaluation or real-life situations are: searching for information for studies; searching for information on restaurants, government offices, hotels, businesses, and schools in a town; searching for a tool or software; etc.

DIGITAL CITIZENSHIP 1

FORM 1, MODULE 2: DIGITAL CITIZENSHIP 1

FORM 1, MODULE 2: DIGITAL CITIZENSHIP 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
DIGITAL CITIZENSHIP	- Setting rules for computer users - Respecting the rights of others	ED 1.1 Introducing ethics in computing	Given a computing environment, learners adopt responsible behaviours in such an environment.	- Ethics - Principles of ethics - Computer Ethics - Ten commandments of computer ethics	- State the importance of computer ethics. - List the three major issues of concern in the study of computer ethics. - Give examples of scenarios highlighting ethical issues - Discuss ethical ways of using technology - Make mentions of types of crime.	- The three major issues to consider, as mentioned in the second skill, are: privacy and security; intellectual property and copyright; and social impact and inequality. - Mention is made of different types of crimes. - Recommended contexts to consider during evaluation or real-life situations are: home, computer laboratory, work, communicating, etc.
	- Setting up a secretariat - Setting up a computer laboratory - Setting up a home computer workplace	ED 2.1 Computers and the workplace	Given a computing environment, learners adopt appropriate safety measures in the environment.	- Electricity shock - Fire outbreak - Flood attack. - Repetitive strain injury - Carpal tunnel syndrome - Computer ergonomics.	- Explain the risk of electricity shock and measures of prevention. - Explain measures to avoid and how to contain a fire or flood incidence. - Explain repetitive strain injury (RSI) and causes. - State methods of preventing RSI.	- The word flood here means water entering a computing environment. - Recommended contexts to consider during evaluation or real-life situations are: home, computer laboratory, work environment, communicating on the internet, etc.

PROBLEM SOLVING AND CODING 1

FORM 1, MODULE 3: PROBLEM SOLVING AND CODING 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
PROBLEM SOLVING AND CODING	- Choosing a strategy in solving a problem - Expressing a solution as a series of steps	PS 1.1 Introducing analytical and logical thinking	Given a problem, learners develop strategies to solve problems logically and adapt common solutions to similar problems.	- Sub problem - Resources - Pattern recognition - Abstraction - Decomposition - Algorithm - Instruction - Sequence	- State the expected outcome of a problem. - List resources that are needed to solve a problem. E.g., computer, hardware and software, thermometer, ruler, etc. - Break a problem into smaller simple sub-problems e.g., area of a diagram with combined rectangles and triangles, area of a trapezium, etc. - Counting number of steps in a strategy to solve a problem and decide on the best strategy. - Combine solutions of sub problems to solve the bigger problem. - Write simple algorithms. - use an algorithm to solve similar problems - Describe sequence structure - Evaluate other solutions - Make sense of the situation	- The first lesson should focus on showing learners that the same idea can be seen from different angles by different people. The problem to solve should come from there, and they should see problem solving as a day-to-day way of tackling their issues in every domain, not just as something they have to apply when asked to. - This section is expected to be taught by providing problems that will permit learners to think analytically and logically and apply the pillars of computational thinking to solve the problem. - A simple algorithm here can be a procedure to cook food, to go somewhere, etc. - Recommended problems are: cleaning a room; producing a recipe; analysing a shape; calculating the area of a complex figure; using a given geometric figure to construct an image; choosing the shortest path; sorting and classifying items; tangrams; etc.
	- Developing software - Maintaining	CO 1.1 Introducing Programming	Given a situation that requires writing a program, learners create	- Programming Concepts - instructions - Control	- Write pseudo codes. - Outline features of block programming environments. - Work in block programming	Proposed work or tasks learners can do using a block programming environment are: creation of a program; study of the interface of a specific block

FORM 1, MODULE 3: PROBLEM SOLVING AND CODING 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	software		scenarios or programs using a block programming tool.	structures	environments. • Create scenarios (Scratch, mBlock).	programming environment; and creation of simple scenarios or programs. • Recommended contexts to consider during evaluation or real-life situations are: home automation, cartoon entertainment, games, etc.

Explanatory notes Form 2

COMPUTING ENVIRONMENT 2

FORM 2, MODULE 1: COMPUTING ENVIRONMENT 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
COMPUTING ENVIRONMENT 2	- Choosing hardware - Categorising devices	HS 3.1 Classifying hardware components	Given a set of hardware, learners classify devices into appropriate categories clearly justifying their answers.	- Input devices - Output devices - Printers - Storage devices - Primary storage (RAM, ROM) - Secondary storage (Hard disk, USB disk, DVD) - Processing device	- State the main role of input, output, processing, and storage devices. - Identify input, output, processing, and storage devices. - State the function of a given input device. - State the function of a given output device. - Outline examples of primary and secondary storage respectively. - Outline differences between impact and non-impact printers. - Outline differences between primary and secondary storage. - State the main components of the CPU.	- Mouse types, keyboard types, and monitor types were covered in Form 1; they can be recalled based on the situation on the field. - The components of the CPU can be limited to the arithmetic and logic unit, and the control unit. - Recommended contexts to consider during evaluation or real-life situations are: computer laboratory, computer shop, computer repair shop, office or home computing environment, cybercafé, etc.
	- Preventing faults - Correcting faults - Detecting faults	HS 3.2 Applying basic preventive and corrective maintenance	Given a situation presenting computer faults, learners propose basic corrective and preventive maintenance actions to solve or stop such	- Maintenance - Hardware maintenance - Software maintenance - Preventive maintenance - Corrective	- Classify computer faults into hardware and software issues. - Differentiate between corrective and preventive maintenance. - Match basic computer faults to an action that can prevent	- The common faults to discuss are found in the core knowledge. The instructor may include other faults if necessary. - Recommended contexts to consider during evaluation or real-life situations are: computer laboratory, computer shop, computer repair shop, office or home computing environment,

FORM 2, MODULE 1: COMPUTING ENVIRONMENT 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
			issues. The action proposed should be logical and pertinent.	maintenance • Computer faults (overheating, can't power on, freezing, hardware having dust or debris, virus, hard drive or memory card full, slow performance, smartphone screen breaking, ...)	it. • Identify the symptoms of a given computer fault. • State a possible solution to correct a given computer fault.	cybercafé, etc.
	• Smart houses • Identifying IoT in the society	HS 4.1 Understanding embedded systems, IoT and cloud computing	Given a situation with factors related to IoT and embedded systems, learners identify the correct type of sensors used in the situation and their role.	• Cloud computing • Embedded systems • Internet of Things • Wearable computers • Sensors • Types of sensors (temperature, proximity, humidity, pressure, gas) • Actuators	• Differentiate between IoT, embedded systems and cloud computing. • Outline the 3 main types of cloud computing services. • Outline examples of cloud services. • Explain the concept of sensors. • State the different types of sensors. • State the function of a given type of sensor. • Describe scenarios where IoT and embedded systems are used.	• Teachers are expected to mention areas where artificial intelligence is used. • Sensors to consider are: temperature, proximity, humidity, pressure, gas, and accelerometers. Other sensors can be discussed based on the environment and other constraints faced by the teacher. • Recommended contexts to consider during evaluation or real-life situations are: home automation, bank automation, school, agriculture, gym, etc.
	• Proposing technology	HS 4.2 Examining	Provided with a situation with factors	• Disabilities • Assistive	• Explain the concept of assistive technology.	Recommended contexts to consider during evaluation or real-life situations are:

FORM 2, MODULE 1: COMPUTING ENVIRONMENT 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	for social inclusion • Choosing appropriate tools	technologies for the disabled	related to users with disabilities, learners identify appropriate technologies for a given disability within a context.	technologies • Hands-free devices • Braille devices • Track ball • Hearing-aids • Environmental control units (ECU) • Speech to text	• Outline examples of assistive technologies. • State the role of a given assistive technology. • Match a given technology to an appropriate disability.	school, home (with the elderly), NGOs for the disabled, etc.
	• Choosing software • Training on types of system software	HS 5.1 Choosing appropriate system software	Given a situation, learners select system software that are in line with the situation.	• System software • Operating system ○ Mobile operating systems (IOS, android, ...) ○ Personal computer operating system (MAC OS, Linux, Windows, ...) • Utility software ○ Antivirus ○ Disk clean-up tool ○ Compression • Device drivers	• Explain the concept of operating systems. • Outline types of operating system. • Outline the functions of an operating system. • Give examples of each type of operating system. • Explain the concept of utility software. • State the function of a given type of utility software. • State the purpose of device drivers.	• Types of operating systems should be limited to mobile OS and classical PC OS. • The main utility software to consider are those found at the level of core knowledge, but the teacher may decide to mention other utility software. Also, examples of these software should be given for smart devices and classical PCs. • Recommended contexts to consider during evaluation or real-life situations are: computer laboratory, home, repair shop, etc.
	• Calculating marks	HS 6.1 Using presentation,	Given a task that requires a desktop publishing,	• Desktop publishing	• Identify when to use a presentation, spreadsheet,	• It is advisable to always give examples that range in three categories: open,

FORM 2, MODULE 1: COMPUTING ENVIRONMENT 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	• Calculating total cost of a market list • Producing a birthday card • Designing a newspaper	desktop publishing and spreadsheet software	spreadsheet software or presentation software, learners choose adapted software and produce an output that corresponds to the task given.	• Spreadsheet • Presentation	and desktop publishing software. • State examples of desktop publishing, presentation, and spreadsheet software. • Outline core features of a presentation, spreadsheet, and desktop publishing software • Carry out simple formatting using desktop publishing, spreadsheet and presentation software. • Produce simple posters, birthday cards, newspapers, using a desktop publishing software. • Perform basic calculations with formulas using a spreadsheet. • Produce slides with different layouts.	closed, and cloud. • Core features of desktop publishing apps can be a variety of templates, text tools, layout tools, and graphic tools. • Core features of spreadsheet software can include addresses, formulas and functions, charts, data filtering, and sorting. • Core features of presentation software are: variety of templates, animations, and slides. • Recommended contexts to consider during evaluation or real-life situations are: presenting an assignment in school, presenting a lesson, work presentations, preparing a home budget, calculating profit, producing a marksheet, creating a logo, producing a barbing saloon poster, , etc.
	• Connecting to the internet • Managing bookmarks • Seminar on using rh	NS 2.1 Exploring the internet and browsers	Provided with a situation related to the access and use of the internet, learners assemble the necessary and adapted tools needed to access the internet, and use basic features of a browser correctly.	• History and growth of the internet • Internet Service Provider (ISP) • Browser • Tabs • Bookmark	• Outline major landmarks in the history of the internet. • Outline elements influencing the growth of the internet. • State elements needed to access the internet. • Choose appropriate ISP in a given context. • Use a browser to access a webpage.	• The landmarks can be presented using three main criteria: period, achievement, and major actor. • Criteria to consider when choosing an ISP are cost, coverage, and reliability. • Organising bookmarks means creating folders in the browser and keeping bookmarks based on their purpose. • Recommended contexts to consider during evaluation or real-life situations are: computer laboratory, cybercafé,

FORM 2, MODULE 1: COMPUTING ENVIRONMENT 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
					• Identify the menu button of a browser. • Create a tab and switch between tabs. • Use a browser to bookmark a page. • Organise bookmarks. • View browsing history.	home, office, etc.
	• Working together • Discussing with others	NS 2.2 Using communication and collaborative tools	Provided with a situation with factors related to communication and collaboration, learners select and use the most appropriate tool for the situation.	• Communication tools • Collaboration tools • Email • Chat • Videoconferencing • Word processors in the cloud.	• Differentiate between communication and collaboration. • Outline basic features of a videoconferencing, chat, and email tool. • Create an email account. • Use an email to send, read and attach a file. • Use a chat tool to send and receive text messages. • Use a chat tool to send non-text messages. • Respond to a specific message in a conversation. • Create a videoconference using appropriate tool. • Use basic features of a conferencing tool. • Use a word processor in the cloud to collaborate.	• Some basic features of videoconferencing tools are: screen sharing, recording, group and private chats, active talk indicator, video and audio options. • Some features of chat tools are: emojis, file transfer, and video and audio chat capabilities. • Some features of email tools to consider are: composing, receiving messages, organising messages, file transfer, filtering. • Note that when using a particular tool in class, teachers should give strategies that can help learners adapt and use any software with the same purpose. • Recommended contexts to consider during evaluation or real-life situations are: group school assignments, work meetings, family meetings, etc.

FORM 2, MODULE 1: COMPUTING ENVIRONMENT 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	• Encoding information • Converting from one base to another	DM 2.1 Representing numbers and characters	Given a situation in relation to encoding data, learners apply the right encoding technique to represent numbers and characters correctly.	• Encoding • Number system • Characters • Encoding numbers • Encoding characters	• Explain the concept of encoding. • State the main number system used in computing. • Explain how to count in base 2, 8 and 16. • Convert from base 10 to base 2 and vice versa. • State character encoding schemes. • Use the ASCII character encoding scheme.	• Character encoding schemes to consider are ASCII, EBCDIC, and UNICODE. • Use 3 bits maximum to represent objects, for example, 00 for cat, 01 for dog, etc. • Recommended contexts to consider during evaluation or real-life situations are: school assignments, research, etc.
	• Measuring time	DM 2.2 Converting between units of time	Given time units, learners compare and convert from one unit to another.	• Picoseconds, • Nanoseconds • microseconds • milliseconds • and seconds	• Arrange units of time in a particular order. • Identify units of time • Convert from one seconds to milliseconds and vice versa.	Recommended contexts to consider during evaluation or real-life situations are: school assignments, home, etc.
	• Measuring storage capacity	DM 2.3 Converting between units of storage	Given storage units, learners compare and convert from one unit to another.	• Bytes • KB • MB • GB • TB	• Arrange units of storage in a particular order. • Identify units of storage • Convert from one unit of storage to another	Recommended contexts to consider during evaluation or real-life situations are: school assignments, home, business, etc.

DIGITAL CITIZENSHIP 2

FORM 2, MODULE 2: DIGITAL CITIZENSHIP 2

FORM 2, MODULE 2: DIGITAL CITIZENSHIP 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Digital Citizenship 2	• Securing a system • Preventing data loss	SS 1.1 Protecting against data loss and unauthorised access	Presented with a situation with factors related to protecting data, learners propose appropriate protection mechanisms to fight against loss and unauthorised access.	• Unauthorised access • Data loss • Password • Authentication • Biometric • Backup • Cloud backup • Firewall	• Explain the concept of unauthorised access. • Outline techniques used to protect data from unauthorised access. • Explain the concept of backup. • Compare and contrast online backup from local backup. • Describe types of backup (online backup and local backup) • State advantages and disadvantages of online backup over local backup..	• Techniques that protect data from unauthorised access are given at the level of core knowledge. The teacher may add other techniques if need be. • Recommended contexts to consider during evaluation or real-life situations are: computer laboratory, computer shop, office, cybercafé, communicating online, etc.
	• Protecting reputation online • Preventing account mix up	SS 1.2 Managing digital identities and footprints	Provided with a situation with issues related to digital identities, digital footprints, and reputation, learners recommend best practices to deal with or prevent such a situation. The practices should be pertinent and coherent to the situation.	• Digital identity • Username • Password • Footprints • Identity theft • Privacy • Cookies • Passive and active digital footprints	• Explain the concept of digital identity and footprint. • Outline best practices to manage multiple digital identities. • State ways users create digital footprints. • Differentiate passive from active digital footprints. • Outline ways of minimising digital footprints. • State positive and negative effects of digital footprints. • Discuss ways of protecting online reputation.	• Recommended contexts to consider during evaluation or real-life situations are: school, cybercafé, working online, etc.

FORM 2, MODULE 2: DIGITAL CITIZENSHIP 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	• Spreading fake news • Judging the credibility of information	ED 3.1 Evaluating the credibility and reliability of sources of information	Given a problem with factors related to the credibility of information, learners detect the credibility and reliability of common sources of information and digital content and recommend trustworthy sources to access information and digital content.	• Digital distribution platforms (Google store, apple store) • Secured websites • Primary sources • Secondary sources • Authority • Digital signature • Digital certificates • Clickbait • Domain name	• Identify the source of a given information. • Identify sponsored content on the internet. • Explain ways of verifying the credibility of a source. • State trustworthy sources of information and digital content. • Explain why secured websites and digital distribution platforms can be reliable sources of information.	• Recommended contexts to consider during evaluation or real-life situations are: getting information or digital content from the internet, sharing information online, risky websites, etc.

PROBLEM SOLVING AND CODING 2

FORM 2, MODULE 3: PROBLEM SOLVING AND CODING 2

FORM 2, MODULE 3: PROBLEM SOLVING AND CODING 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
PROBLEM SOLVING AND CODING	Choosing a strategy in solving a problem	PS 2.1 Problem solving strategies.	Learners develop strategies to solve problems in a logical way.	- Subproblem - Resources - Pattern recognition - Abstraction - Decomposition (top down, divide and conquer) - Bottom up, - Algorithm - Instruction - Sequence	- State the expected output for a given problem. - List resources that are needed to solve a problem. E.g., computer, hardware and software, thermometer, ruler, etc. - Break a problem into smaller simple sub-problems e.g., area of a diagram with combined rectangles and triangles, area of a trapezium, etc. - Counting number of steps in a strategy to solve a problem and decide on the best strategy. - Combine solutions of sub problems to solve the bigger problem. - Write simple algorithms. - Use an algorithm to solve similar problems - Describe control structures - Evaluate other solutions	- This section is expected to be taught by providing problems that will permit learners to think analytically and logically and apply the pillars of computational thinking to solve the problem. - The strategies for solving problems should be ongoing in all problems learners face and in mini-projects. - Recommended problems are: puzzles, producing a recipe, analysing a shape, calculating the area of a complex figure with variant geometric figures, using a given geometric figure to construct an image, choosing the shortest path, sorting and classifying items, tangrams, etc.
	- Developing software - Maintaining software	CO 2.1 Notions of Programming	Given a project or problem related to coding, learners with the guidance of the teachers use features of	- Programming Concepts - instructions - Control structures	- Work in block programming environments (Scratch, Blockly, mBlock) - Write programs using a block programming tool.	Proposed work or tasks learners can do using a block programming environment are: create a program, create simple scenarios that make use of control structures, create animations, create

FORM 2, MODULE 3: PROBLEM SOLVING AND CODING 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
			a block programming tool to produce code that responds to the project or situation.			simple games and illustrations. • Recommended contexts to consider during evaluation or real-life situations are: home automation, cartoon entertainment, games, etc.

Explanatory notes Form 3

HARDWARE AND SOFTWARE SYSTEMS 1

FORM 3; MODULE 1: HARDWARE AND SOFTWARE SYSTEMS 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Hardware and software systems	- Choosing hardware - Categorising devices - Training on internal components	HS 1.1 Describing internal components of the computer	Provided with a situation with factors related to devices that are not peripherals, learners select devices or features of these devices that are coherent to the situation and justify their choice.	- Processor - Processor cycle - Cache - RAM - Hard disk drives - Solid state drives - Non-volatile and volatile memory - Secondary and primary storage. - GPU - Motherboard - Bus - Power supply - Power bank - Battery - Fans	- Describe the components of the CPU. - Identify units for measuring the speed of the processor and storage. - Describe the CPU cycle (machine instruction cycle). - State the function of the GPU. - Explain the concept of volatile and non-volatile memory. - Describe primary storage and secondary storage. - State the function of the registers, cache, RAM, and internal secondary storage (HDD, SSD). - Compare HDDs and SSDs. - State the function of the motherboard. - Describe main ports on the motherboard. - Describe the different types of bus.	- The machine instruction cycle presented here can focus on the three main stages: fetch, decode, and execute. - The description of a port should include its function, the main device where it is found, and a visual image of the port. The ports to focus on should concern classic computers and mobile devices. Some ports to consider are: PCIe slots, CPU socket, ATX power connector, SATA ports, HDMI port, VGA port, audio ports, DVI ports (classic, mini, and micro DVI), display port, mini display port, S-video ports, RJ-45 ports, RJ-11 ports, USB type A ports (classic, mini, and micro), USB type B ports (classic, mini, and micro), USB type C ports, thunderbolt 3, microSD slot, etc. - Deprecated ports such as PS2, serial, and parallel ports should be mentioned. - Recommended contexts to consider during evaluation or problem situations are computer laboratories, home computing devices, office computing devices, cybercafés, choosing hardware, categorising hardware, etc.

FORM 3; MODULE 1: HARDWARE AND SOFTWARE SYSTEMS 1

FORM 3; MODULE 1: HARDWARE AND SOFTWARE SYSTEMS 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
					State the function of power supply, battery, and fans in a computer.	
	Operating a point of sale	HS 1.2 Describing data capture technologies	Given a situation with issues related to data capture, learners choose the most appropriate data capture technology clearly justifying their choice.	- Data capture - Biometric reader - RFID - Scanners - Barcode reader - QR code reader - Optical readers (OCR, OMR) - Magnetic stripe reader - MICR - Webcam or Camera - Contactless card reader - Chip and Pin reader	- Explain the concept of data capture. - Outline advantages of using data capture technologies. - Describe a given data capture technology. - Compare and contrast data capture technologies.	- Data capture technologies to consider are presented at the level of core knowledge. - Recommended contexts to consider during evaluation or problem situations are supermarkets, schools, libraries, examinations, banks, businesses, etc.
	- Proposing technology for social inclusion - Choosing appropriate tools	HS 2.1 Choosing application software	Provided with tasks to produce or edit digital content, learners choose the most appropriate software for each task clearly justifying their choice.	- Software - Application software - Note taking - Text editor - Calendar software - Word processor - Spreadsheet - Presentation software - Desktop publishing software - DBMS (Database	- Explain the concept of application software. - Differentiate between application and system software. - Explain the purpose of a given application software. - Outline key features of a given application software. - State examples of a given application software.	- Application software to consider are presented at the level of core knowledge. - Examples of application software should be provided for mobile operating systems and classic operating systems. - Recommended contexts to consider during evaluation or problem situations are school, business, home, communication, marriage ceremony, etc.

FORM 3; MODULE 1: HARDWARE AND SOFTWARE SYSTEMS 1

FORM 3; MODULE 1: HARDWARE AND SOFTWARE SYSTEMS 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
				management system) o Image editor o Audio editor o Video editor o Communication software o Collaboration software o Search engines		
	• Choosing software • Acquiring software • installing software	HS2.2 Describe ways of acquiring or distributing software	Given a situation with issues involving the acquisition or distribution of software, learners recommend pertinent acquisition or distribution means while justifying their proposals clearly.	• Generic, specific, and tailor-made software. • Open software • Closed software • Freeware • Shareware • Public domain software • SaaS (Software as a service) • Installation • Updating	• Describe generic, special purpose and tailor-made software. • Give examples of generic, specific, and tailor-made software. • Differentiate between open and closed software. • Outline examples of open and closed software. • Describe the concepts of shareware, freeware, and software as a service. • Differentiate between updating and installing a software. • Perform software update and installation.	• Recommended contexts to consider during evaluation or problem situations are school, business, home, etc.
	• Producing digital content	HS 2.3 Creating digital	Given tasks to accomplish, learners use appropriate	• Word processors - o Formatting - o Text boxes	• Perform document editing and formatting using a word processor.	• Some basic spreadsheet functions to use are SUM, AVERAGE, PRODUCT, COUNT, MIN, and MAX.

FORM 3; MODULE 1: HARDWARE AND SOFTWARE SYSTEMS 1

FORM 3; MODULE 1: HARDWARE AND SOFTWARE SYSTEMS 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	Using a software	content using a software	features of a software to correctly accomplish the task.	- Spreadsheets - Cells, address, formula - Functions - Sorting and filtering - Presentation - Slides - Animations - Desktop publishing software - Layout tools - Templates - Text boxes	- Outline situations where a text box can be used. - Create and manipulate a text box. - Explain the concepts of cell, address, and formula. - Identify the address of a cell. - Perform calculations using basic spreadsheet functions. - Perform data filtering and sorting using a spreadsheet. - Represent cross sections of data as a chart using a spreadsheet. - Add slides to a presentation. - Create animations using a presentation software. - Produce a given publication from a template. - Use layout features of a desktop publisher.	Recommended contexts to consider during evaluation or problem situations are school, business, home, etc.
	- identifying technologies used in a given sector - training on applications of AI	HS 3.1 Describing how computing technology is used in different areas of life	Given sectors of life or a situation related to application areas of computing technology, learners describe how computing technology is used in different sectors of life. The description	- Automated systems - Artificial intelligence (AI) - Robots - Virtual reality and augmented reality - Monitoring and control systems.	- Describe how sensors, microprocessors and actuators can be used in collaboration to create automated systems - Describe the advantages and disadvantages of an automated system used for a given scenario. - Explain what is meant by	- Sectors of life to consider are: business, education, agriculture, health, military, manufacturing, home, Government, transport, ... - Recommended context to consider during evaluation or problem situations are education, home, business, health, agriculture, military, manufacturing, government, transport, etc.

FORM 3; MODULE 1: HARDWARE AND SOFTWARE SYSTEMS 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	and robots		should be coherent with the situation and sector of life and should entail the technology used, how it is used, and the advantages of using such technology.		artificial intelligence (AI) • Describe the main characteristics of AI • Explain the basic operation and components of AI systems to simulate intelligent behaviour. • Explain what is meant by robotics • Describe the characteristics of a robot • Describe the roles that robots can perform • Explain the advantages and disadvantages of using robots. • Explain how robots, artificial intelligence, virtual reality, augmented reality and control systems are used in different sectors of life.	

NETWORK SYSTEMS 1

FORM 3; MODULE 2: NETWORK SYSTEMS 1

FORM 3; MODULE 2: NETWORK SYSTEMS 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESEOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
Network systems	- Choosing data transmission methods - Identifying communication systems	NS 1.1 Describing data communication systems and their various mechanisms	Given a situation with factors related to data communication systems, learners explain correctly, concisely, and precisely the mechanisms used in the situation.	- Communication systems - Components of a communication system - Types of signals - Duplex, simplex, half-duplex - Synchronous and asynchronous transmission - Transmission mediums (wired and wireless) - Serial and parallel transmission - Bandwidth - Throughput	- State the main components of a communication system. - Differentiate analogue signals from digital signals. - Describe duplex, half-duplex and simplex communication systems. - Describe serial and parallel transmission. - Describe asynchronous and synchronous communication. - Describe the different types of wired and wireless transmission mediums. - Explain the concepts of data throughput and bandwidth.	Recommended contexts to consider during evaluation or problem situations are school, home, business, government, etc.
	- Setting up a network - Assembling tools for a network - Choosing network devices	NS 2.1 Setting up simple LANs	Given a situation that requires setting up a simple network, learners prescribe the appropriate tools and configuration to meet the needs of the situation.	- Computer network - Classifying based on coverage (LAN, MAN, WAN, ...) - Network topology (Star, Bus, Ring) - Network architecture (client-server, peer-to-peer) - Network devices - Ad hoc network	- State advantages and disadvantages of a computer network. - Describe types of networks based on coverage. - Describe bus, ring, and star network topologies. - Differentiate between client-server architecture and peer-to-peer architecture. - Explain the function of a given networking device.	- Networking devices to consider are: NIC (network interface card), repeater, switch, hub, router, gateway, access point, modem, etc. - Recommended contexts to consider during evaluation or problem situations are school, home, business, government, etc.

FORM 3; MODULE 2: NETWORK SYSTEMS 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESEOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
					•Set up a simple Ad hoc network.	
	•Finding information •using the internet formulate a search query	NS 3.1 Searching information	Given a problem that demands the use of a search engine to find information, learners produce a logical search query and use advance features of a given search engine to ameliorate the results of a search.	• Internet services ◦ Search engine ◦ Social media ◦ Email ◦ File transfer (upload, download) ◦ Instant messaging ◦ E-learning ◦ E-commerce ◦ E-banking • Search query • Search engine result page (SERP)	• Describe major internet services. • State examples of a search engine. • Outline the main factors that influence the results of a search. • Identify the parts of a search engine result page. • Determine search terms for a given topic. • Formulate spoken queries in a way that is unambiguous. • Perform search using a search engine. • Use advanced features of a given search engine.	• The internet services to focus on are presented in the core knowledge column. • Factors that influence search results to consider are: device used, geographical area, search terms, trending topics, regulations, etc. • Note that generic concepts on how to use a search engine should be presented before applying them to a specific search engine. Applications can be done on the most-used search engines. • Recommended contexts to consider during evaluation or problem situations are education, home, business, travelling, entertainment, shopping, etc.

ETHICS, SOCIETY AND LEGAL ISSUES 1

FORM 3; MODULE 3: ETHICS, SOCIETY AND LEGAL ISSUES 1

FORM 3; MODULE 3: ETHICS, SOCIETY AND LEGAL ISSUES 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
Ethics, society and legal issues.	• Protecting own creation • Training on copyright and licenses • Using digital resource legally	ED 1.1 Examining licenses and copyright practices	Placed in a situation with issues related to copyright and intellectual property, learners identify and describe rules of copyright and licenses that apply to information or digital content.	• Copyright • Intellectual property • Licenses • Creative Common (CC) • Fair use • DRM (Digital rights management) • Unauthorised use	• Explain the concepts of fair use, intellectual property, and copyright. • Identify situations of fair use. • Identify situations involving copyright infringement. • Outline possibilities provided by DRM. • Describe the different types of creative common licenses.	• Recommended contexts to consider during evaluation or problem situations are education, business, government, home, financial institutions, etc.
	• Identifying computer crimes • Preventing computer crimes	ED1.2 Describing computer crimes and measures to combat them	Given a situation involving an unethical or illegal action with computers, learners identify crimes and propose appropriate measures to combat each crime.	• Computer crimes ◦ Hacking ◦ Identity theft ◦ Scamming ◦ Piracy ◦ Phishing ◦ Doxing ◦ Denial of service • Authentication • Access control • Encryption • Digital forensics	• Explain the concept of computer crime. • Identify unethical actions that are computer crimes. • Describe a given computer crime. • Describe authentication methods (biometric, password, multifactor, possessed objects, pin, and lock pattern) • Explain ways of fighting a given computer crime.	• Recommended contexts to consider during evaluation or problem situations are business, government, education, home, financial institutions, etc.
	• Recycling computing equipment	ED 4.1 Explaining the impact of digital technology to	Given a situation with issues related to reducing the effects of computing technology on the environment, learners	• Green computing • Energy star products	• Explain the concept of green computing. • State devices or technologies that promote or encourage green computing.	• Some ways of reducing the environmental impact of computing are: the use of energy-efficient hardware (Energy Star), cloud computing, e-waste recycling, renewable power sources,

FORM 3; MODULE 3: ETHICS, SOCIETY AND LEGAL ISSUES 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
	Promoting green computing	the environment	explain standard ways of reducing its effects that are coherent with the situation.		- State measures used by manufacturers to encourage green computing. - Explain ways of reducing the environmental impact of computing.	etc. Recommended contexts to consider during evaluation or problem situations are home, computer manufacturers, government, organisations, etc.

PROBLEM SOLVING AND CODING 1

FORM 3; MODULE 4: PROBLEM SOLVING AND CODING 1

FORM 3; MODULE 4: PROBLEM SOLVING AND CODING 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
PROBLEM SOLVING AND CODING	Writing algorithms	PS 1.1 Exploring basic algorithmic instructions for computers	Given an algorithmic problem, learners construct a model that solves the problem and determine simple algorithmic instructions needed to solve the problem.	- Structure diagrams - Flowcharts - Pseudocode - Flowchart symbols - Algorithms - Instructions - Declaration - Input - Output - Assignment - Arithmetic and logic	- Demonstrate an understanding of the program development life cycle, limited to: analysis, design, coding and testing. - Understand that every computer system is made up of sub-systems, which are made up of further sub-systems. - Decompose problems into its component parts. - Design and construct solutions to problems using different methods (structured diagrams, flowcharts, pseudocode). - Explain the concept of algorithms. - Explain characteristics of a good algorithm. - Describe simple algorithmic instructions. - Explain the purpose of a given algorithm.	- Detailed knowledge of the program development life cycle is not required. Teachers can focus on the purpose of each stage in the program development life cycle and situate the place of algorithms in the program development life cycle. - Mention Margaret Hamilton as the first person to use the words software engineering. - Simple algorithmic instructions here mean control structures are not considered. - Recommended contexts to consider during evaluation or problem situations are school, software company, home, business, arithmetic, data validation and verification, etc.
	Choosing a programming language	CO 2.1 Exploring programming languages and tools	Given a situation with factors related to programming languages, learners choose the most appropriate type of	- Program - Programming - Programming languages - Types of	- Differentiate between algorithm and program. - Describe the different types of programming languages. - Compare high-level language	- Highlight women and men who worked in programming languages and compilers: For example: Grace Hopper, etc. - Recommended contexts to consider

FORM 3; MODULE 4: PROBLEM SOLVING AND CODING 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
	Using an IDE		language clearly justifying their choice. Learners also demonstrate use of the main features of an IDE.	programming language (high level and low level) - Language translators (compiler, interpreter, assembler) - IDE (Integrated development environments)	and low-level language. - Outline examples of high-level languages. - Explain the concept of language translators. - Differentiate between compiler and interpreter. - Explain the advantages and disadvantages of a compiler and an interpreter - Explain the role of an IDE in writing program code and the common functions IDEs provide. - Use an IDE to create, edit, translate, and run a program.	during evaluation or problem situations are school, software company, home, etc.
	- Studying a programming language - Writing program	CO 2.2 Implementing algorithms using a programming language	Given an algorithm and appropriate guidance on a programming language, learners transform the algorithm into a program that is syntactically correct.	- Structure of a program - Keywords - Syntax - Bug	- Identify the structure of a program in a programming language. - Declare and use variables and constants. - Use the basic data types - Write simple instructions in a given programming language. - Manipulate operators in a given programming language. - Write simple programs	- Note that a generic strategy on how to move from an algorithm to a program should be presented before applying it to a specific programming language. - Programming languages to consider in order of preference are: Pascal, C, Python, and JavaScript. - Mention women and men in programming, for example, Grace Hopper as one of the actors for popularising the term computer bug, etc. - The programming to do here should also include web programming (HTML and CSS). - Recommended contexts to consider

FORM 3; MODULE 4: PROBLEM SOLVING AND CODING 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
						during evaluation or problem situations are school, software company, home, etc.

Explanatory notes Form 4

PROBLEM SOLVING AND CODING 2

FORM 4; MODULE 1: PROBLEM SOLVING AND CODING 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
PROBLEM SOLVING AND CODING	• Writing algorithms • Training on control structures	CO 1,1 Using control structures	When given an algorithmic problem that requires the use of control structures, learners produce an algorithm that uses the appropriate control structure to solve the problem.	• Control structures (sequence, decision, loops)	• Explain how each control structure works. • Draw flowcharts to illustrate working of control structures. • Choose most appropriate control structure in a context. • Write simple algorithms that make use of control structures.	• Highlight women and men that pioneered programming: for instance, Ada Lovelace is the pioneer of loops, ... • Algorithms written should have a maximum of 12 lines. • When presenting the key concepts, it is advisable to use technological tools like simulators to show how control structures work or videos, animations, or other types of technological illustration. • Evaluation on control structures should ignore nested if statements and nested loops. • Recommended contexts to consider during evaluation or problem situations are school, software company, home, business, arithmetic, data validation and verification, transport, ... For instance, a context in transport can be on traffic lights, that on verification can be on

FORM 4; MODULE 1: PROBLEM SOLVING AND CODING 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
						double entry, that on home can be the functioning of a smart lighting system, that on business can be on computing the difference after a customer has bought some items and given a certain amount of money, ...
	- Ensuring the correctness of an algorithm - Fixing errors in an algorithm	CO 1.2 Testing and debugging	Learners when given an algorithm, evaluate its semantic correctness using the dry running technique and propose a way of fixing the errors if any. The solution proposed should be logical and coherent with the problem identified.	- Testing - Bug - Debugging - Dry running - Trace tables	- Explain the role of testing. - Differentiate between testing and debugging. - Perform a dry run.	- Highlight women and men and their contributions to software development and testing for example Margaret Hamilton, ... - Algorithms used should contain basic control structures and should solve similar problems like those seen during the lessons on using control structures.
	Acquiring tools for programming	CO 1.3 Setting up a programming environment	Given a problem, learners select the appropriate tools for programming and install them.	- Compilers - Interpreters - Text editors - IDE	- Identify the appropriate software tools for programming. - Differentiate between compiler and interpreter. - Install the tools for programming - Test the functionalities of a tool.	- IDEs to consider should be related to the programming language to be used during programming. - Recommended contexts to consider during evaluation or problem situations are school, software company, home, ...
	Learning a programming language	CO 2.1 Writing of source code	Given an algorithm, learners transform it into a program. The program should be syntactically and semantically correct.	- Arithmetic operators - Relational operators - Logic operators - Assignment	- Manipulate operators in a given programming language. - Implement programming constructs in a given language	- Highlight women and men and their contributions in programming. For instance, Margaret Hamilton source code contribution to the Apollo's 11 navigation system, ... - Specify syntax for declarative

FORM 4; MODULE 1: PROBLEM SOLVING AND CODING 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
				• Selective statements (IF) • Iterative statements • Nested statements		statements, assignment, input, output, selection, iteration. • Recommended contexts to consider during evaluation or problem situations are school, software company, home, ...

DATA MANIPULATION 1

FORM 4; MODULE 2: DATA MANIPULATION 1						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Data Manipulation	• Getting the hexadecimal value of a colour and vice versa • Encoding numbers	DM 2.1 Operations on number systems	Presented with a situation that involves number systems, learners apply appropriate operations on number systems (conversion, addition, subtraction) to solve the problem. The method used should be logical, concise, and clearly express all the steps.	• Symbols of base 2, 8, and 16 • Principles of conversion • Principle of addition • Principle of subtraction	• Identify the symbols in a given base. • Explain the principles for converting from a given number system to another. • Apply principles of converting from one number system to another. • Explain the principles of addition and subtraction. • Apply principles of addition and subtraction in any base.	• When teaching conversion from base 2 to 8 and 16 and vice versa it's advisable to focus on methods that do not go through base 10. • Recommended contexts to consider during evaluation or problem situations are school, business, home, ...
	• Building a logic circuit	DM 2.2 Analysing simple logic	Learners analyse a situation concerning logic circuits and determine the	• Logic gates (NOT, AND, OR, NOR, NAND, XOR)	• Identify a given logic gate • Describe the different types of logic gate.	• Recommended contexts to consider during evaluation or problem situations are school, home, industry, ...

FORM 4; MODULE 2: DATA MANIPULATION 1

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
		circuits	correct outputs and truth tables of the different elements used in the circuit.	• Logic circuits • Truth tables	• Draw the truth table of a logic gate or circuit. • Combine gates to obtain a circuit.	

HARDWARE AND SOFTWARE SYSTEMS 2

FORM 4; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 2

FORM 4; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Hardware and software systems	• Slow computer • Freezing PCs • Training on optimising the computer	HS 1.1 Optimising computer performance	Provided with a situation with issues related to optimising the computer, learners propose methods of optimising the performance of the computer that are coherent with the situation.	• Utility software (defragmenter, antivirus, disk cleaner, file compression, ...) • Upgrading the hardware • Defragmentation • SSD vs HDD	• Outline tools for optimising the performance of the computer. • Explain how malware can slow down a computer. • Explain the concepts of fragmentation and defragmentation. • Explain how the size of the RAM and disk can influence the performance of a computer. • Explain configurations that can be done at the level of the operating system to improve the performance of the computer. • Explain how emptying the cache of a browser or apps running on a computer can help improve performance.	• Recommended contexts to consider during evaluation or real-life situations are computer laboratory, computer repair shop, office, home, cybercafe, ...
	• Proposing a device • Training on peripheral devices	HS 1.2 Choosing appropriate peripheral devices	Given a situation with issues related to hardware, learners select appropriate peripheral devices based on a situation or context. Clear justification of the choice should be made.	• Printer • Projector • Scanner • Keyboard • Mouse • Webcam • External storage • Interactive	• State the purpose of a given peripheral devices. • Describe characteristics of a given peripheral device. • Compare and contrast peripheral devices with the same purpose.	• The main peripheral devices to consider are given at the core knowledge column. • Recommended contexts to consider during evaluation or real-life situations are computer laboratory, travelling, computer repair shop, office, home, cybercafe, business, computer shop, entertainment, ...

FORM 4; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 2

FORM 4; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
				whiteboard • Graphics tablet • Joystick • Sensor • Touch screen • Microphone • Actuators		
	• Problem of insufficient space • Identifying units of storage	HS 1.3 Calculating storage space	Given a problem with factors related to storage space and units, learners determine the cause and solution to the problem showing clearly how they achieved the proposed conclusions.	• Storage • Storage units	• Outline units of storage. • State the relationship between units of storage. • Convert from one unit of storage to another.	• Recommended contexts to consider during evaluation or real-life situations are home, school, office, entertainment, ...
	• Repairing a computer • Identifying faults in a computer	HS 1.5 Carrying out basic computer maintenance	When presented with a situation involving issues with a computer, learners propose possible causes and possible methods to fix such issues. The proposals made should be logical and pertinent.	• Maintenance • Hardware maintenance • Software maintenance • Preventive maintenance • Corrective maintenance • Beeps	• Classify computer related issues into hardware and software maintenance. • Differentiate between preventive and corrective maintenance. • Match symptoms to a given fault. • Explain common preventive computer maintenance tips. • Determine appropriate and logical means of solving a given maintenance issue.	• Recommended contexts to consider during evaluation or real-life situations are computer laboratory, computer repair shop, office, home, cybercafe, ...
	• Writing a letter • Carrying	HS 2.1 Creating digital	Faced with a situation related to the creation and editing of digital	• Types of digital content (text, images, audio,	• Outline methods of creating digital content. • Identify appropriate tools	• Recommended contexts to consider during evaluation or real-life situations are school, travelling, computer repair

FORM 4; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 2

FORM 4; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	out a Powerpoint presentation	content	content, learners propose a variety of tools that can be used to solve the problem and produce digital content using an appropriate tool.	video, hypermedia) • Multimedia vs hypermedia • Methods of creating digital content • File formats	for producing digital content for a given type of digital content. • State AI tools for producing digital content. • Use appropriate tools to produce digital content of different formats. • Combine various types of digital content to better express facts or opinions for personal or professional use.	shop, office, home, cybercafe, business, computer shop, entertainment, advertisement, ...
	• Producing a report Editing a document	HS 2.2 Producing a word-processed document	Given a task that is related to using a word processor to produce or reproduce content, learners use appropriate features of a word processor to achieve the task.	• Word processor • Formatting • Tables Page layout	• Choose appropriate word processor feature for a given task. • Perform basic formatting. • Perform basic operations on a page. • Create a table with a specific number of columns and rows. • Perform basic operations on tables.	• Recommended contexts to consider during evaluation or real-life situations are: school, home, office, organisation, secretariat, cybercafe, ...
	• Calculating profit Producing statistics	HS 2.3 Manipulating spreadsheets	Given tasks that is related to spreadsheets and with appropriate guidance, learners choose functions or spreadsheet features that are coherent with the tasks and apply them correctly on spreadsheet	• Spreadsheet software • Functions • Charts • Referencing types (relative, absolute, mixed)	• Choose appropriate cell referencing in a context. • Perform operations using simple functions. • Perform operations that necessitate the use of conditional functions. • Represent data as a chart	• Recommended contexts to consider during evaluation or real-life situations are school, home, office, organisation, secretariat, cybercafe, ...

FORM 4; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 2

FORM 4; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
			software.		with the aid of spreadsheet software.	
	• Smart houses • Identifying IoT in the society	HS 3.1 Understanding embedded systems, IoT and cloud computing	Given a situation with factors related to IoT and embedded systems, learners identify the correct type of sensors used in the situation and their role.	• Cloud computing • Embedded systems • Internet of Things • Wearable computers • Sensors • Types of sensors (temperature, proximity, humidity, pressure, gas) • Actuators	• Differentiate between IoT, embedded systems and cloud computing. • Outline the 3 main types of cloud computing services. • Outline examples of cloud services. • Explain the concept of sensors. • State the different types of sensors. • State the function of a given type of sensor. • Describe scenarios where IoT and embedded systems are used.	• Recommended contexts to consider during evaluation or real-life situations are home automation, bank automation, school, agriculture, gym, transport, ...

ETHICS, SOCIETY AND LEGAL ISSUES 2

FORM 4; MODULE 4: ETHICS, SOCIETY AND LEGAL ISSUES 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Ethics, society and legal issues.	- Communicating with others - Respecting others point of view - Sharing and posting content	ED 1.1 Practicing netiquette rules	Placed in a context that requires communicating with others, learners determine and apply appropriate behavioural norms that respect others and their cultural and generational diversities.	- Emojis - Smiley faces - Netiquette - Empathy	- State codes of conduct for posting and sharing content. - Identify hostile/derogatory messages or activities online that attack an individual or groups of individuals. - Explain why it is important to know the meaning of an emoji before using it. - Propose behavioural rules when using digital technologies in a context. - Choose communication modes and strategies adapted to an audience.	Recommended contexts to consider during evaluation or real-life situations are communicating with family, communicating at work, communicating with friends, communicating with people in other countries, ...
	- Train on laws governing ICT in Cameroon - Fighting cybercrime	ED 1.2 Appraising national and international laws on cybersecurity	Learners state national and international laws or acts that are related to protecting and regulating activities in the cyberspace.	- Law no 2010-12 of 21st December - Data protection act 1998 - Computer misuse act of 1990 - Copyrights, Design and Patents act 1988 - Freedom of information act 2000	- State a goal of law no 2010-12 of 21st December. - State bodies that regulate and are responsible for electronic security in Cameroon (NAICT) - Discuss elements of law no 2010-12 of 21st December. - State the penalties to a given information and communication malpractice in Cameroon.	Recommended contexts to consider during evaluation or real-life situations are home, school, office, business, ...
	Spreading fake news	ED 3.1 Evaluating the credibility and	Given a problem with factors related to the reliability and credibility of	- Disinformation - Misinformation - Primary sources	- Identify the source of a given information. - State factors of information	Recommended contexts to consider during evaluation or real-life situations are: getting information or digital

FORM 4; MODULE 4: ETHICS, SOCIETY AND LEGAL ISSUES 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	Judging the credibility of information	reliability of information	information, learners propose strategies of verifying the information. The strategies proposed should be pertinent, coherent, and logical.	- Secondary sources - Clickbait - Deep-fake - infodemic	- biases. - Identify sponsored content on the internet. - Explain strategies for verifying the credibility and reliability of information. - Explain the concept of deep-fake. - Analyse information in order to detect its purpose or interest (economic, political or religious)	content from the internet, sharing information online, risky websites, school journal, television, social media, ...
	- Identifying causes of computer related health issues - Preventing computer related health issues	ED 4.1 Avoiding computer related health issues	Given a problem or a situation related avoiding computer related issues, learners evaluate the workplace, practices and habits of users based on standards and report on elements to reinforce and elements to adjust. The recommendations should express appropriate practices and health issues that can arise for not respecting these practices.	- Computer ergonomics - Musculoskeletal disorder - Tendinitis - Neck pain - Back pain - Computer vision syndrome	- Identify wrong user posture in the workplace, - Identify wrong equipment placement in the workplace. - Identify health hazards related to wrong posture and wrong equipment placement. - Outline the main causes of computer injuries (repetitive actions, awkward positions). - Explain how the design of items, work habits, design of the workplace and exercises can help prevent computer related injuries.	Recommended contexts to consider during evaluation or real-life situations are: home, computer laboratory, work environment, ...

Explanatory notes form five

Problem solving and coding 3

FORM 5; MODULE 1: PROBLEM SOLVING AND CODING 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Problem solving and coding	Choosing algorithm design and presentation	CO 1,1 Writing algorithms	Presented with a problem, learners express the solution by writing down instructions that will lead to solving the problem efficiently.	- Totalling - Counting - Maximum, minimum and average values - Swap - Linear search - Bubble sort - Subroutines - Actual parameters - Formal parameters - Global variables - Dry run testing - Trace table - Pseudocode - Flow chart - Counting number of steps - Memory demands	- Write pseudocode for algorithm with sequence, decision, and loop structures - Write simple procedures and functions - Establish the correctness of algorithm developed. - Discuss aspects used in comparing algorithms.	- Highlight the work of women and men in programming: For instance, Ada Lovelace the pioneer of loops, ... - Recommended contexts to consider during evaluation or problem situations are school, software company, home, business, arithmetic, data validation and verification, transport, ...
	- Describing a programming style - Identifying the style used in a	CO 2,1 Describing programming paradigms	Given the solution or method used to solve a problem, learners identify the paradigm	- Imperative paradigm - Declarative paradigm - OOP paradigm	- Describe types of programming paradigm. - State examples of languages that make use of a given	- The programming paradigms to focus on are listed at the level of the core knowledge. - Recommended contexts to consider during evaluation or problem situations are school, software

FORM 5; MODULE 1: PROBLEM SOLVING AND CODING 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Problem solving and coding	programming language		used clearly justifying their choice.		programming paradigm.	company, home, writing programs, ...
	- Selecting data structures - Declaring variables in a program	CO 2,2 Describing data structure	After analysing a problem such that the variables in a problem are known, learners choose the appropriate data type for each variable and also determine the best data structure to use in order to guarantee efficient processing.	- Simple data type (Integer, Real/float, Character, pointer, Boolean) - Structured data type (Array, Record) - Abstract data type (Stacks, Queues)	- Outline examples of data structures used in programming. - Select appropriate data types and data structure for a given problem. - Describe the characteristics of a given data structure.	- The data structures to focus on are listed at the level of the core knowledge. - Implementation of pointers is not required. - Recommended contexts to consider during evaluation or problem situations are school, software company, home, business, arithmetic, data validation and verification, transport, paying bills, buying from a shop, ...
	- Choosing programming language - Choosing programming tools - Choosing programming paradigm	CO 2,3 Converting an algorithm into a program	In a situation where the algorithm for a problem is available, learners develop corresponding instructions in a programming language; using the appropriate IDE.	- Totalling - Counting - Maximum, minimum and average values - Swap - Linear search - Bubble sort - Procedures and functions with and with no	- Implement standard methods of solutions - Implement procedures and functions - Use library routines	- Highlight women and men and their contributions in programming. For instance, Margaret Hamilton's source code contribution to the Apollo's 11 navigation system, ... - Recommended contexts to consider during evaluation or problem situations are school, software company, home, ...

FORM 5; MODULE 1: PROBLEM SOLVING AND CODING 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
				parameters • length, substring, upper, lower for string manipulation		
Problem solving and	- Analysing a system - Designing a system - Designing implementation strategies	PS 2.1 Developing a system	In a situation of developing a system for a school, business, party management, etc., learners select and design appropriate ways of organising data, describe the processing of data, and select appropriate hardware and software for the given task.	- Investigation - Analysis - Design - Construction - Implementation - Direct changeover - Parallel implementation - Piecemeal implementation - Pilot implementation - Support	- Outline the functions of a system to be developed. - Define the relationship between components of a system. - Outline the stages of the SDLC and the activities of each stage in the SDLC. - Describe the need for appropriate choice of software and hardware for a system. - Describe different implementation strategies. - Explain the need for documentation in system development. - Explain the concept of prototyping.	- Highlight the contribution of men and women in SDLC for instance Margaret Hamilton as the first person to use the words software engineering, Winston W. Boyce, ... - Note that we are looking at the content at the level of system development and not software. In this case, system implementation will be the same as deployment when talking about software development life cycle. - At the design stage of the SDLC, teacher can mention strategies of solving problems such as top down, bottom up and divide and conquer. - Recommended contexts to consider during evaluation or problem situations are school, company, party, library, shop, ...
	- Handling data in a system - Selecting data	PS 2.2 Describing data capture	To describe the functioning of a system, learners	- Data integrity - Data validation - Data verification	Describe appropriate data collection and capture method for a	Recommended contexts to consider during evaluation or problem situations are school, software

FORM 5; MODULE 1: PROBLEM SOLVING AND CODING 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
coding	capture method for a system	methods	describe the method used to capture the data, the measures used to ensure the integrity of the data as well as the processes that take place in the system.	• Batch processing • Real time processing	given system • Describe data validation and verification methods used for a system. • Describe the processes that take place in a system	company, home, ...
	• Monitoring a project. • Managing resources for a project.	PS 4.1 Managing projects	In a situation where a number of activities (tasks) are given for a project, learners relate the activities in a coherent manner and use project management tools to assemble the tasks in order to finish the project in the shortest time possible.	• Project • Project life cycle • Task • Gantt chart • PERT chart • Slack time • Critical path	• Explain the need for project management. • Describe the phases of a project life cycle. • Describe the elements used for monitoring, planning and control in project management. • Describe tools used in project management. • Produce the Gantt chart for a project. • Determine the critical path critical path, earliest finish time, slack time, etc. with the help of a Gantt chart.	• Recommended contexts to consider during evaluation or problem situations are school, software company, home, building, transport, ...
Problem solving	• Storing large data	PS 4.2 Designing and	Provided with a problem in an	• Flat-file • Attribute	• Outline limitation and advantages of file-file	• Simple database here means that we should have a maximum of 4 tables

FORM 5; MODULE 1: PROBLEM SOLVING AND CODING 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
and coding	• Creating a database • Identifying attributes • Mining data	implementing simple databases	organisation related to databases, learners build simple database systems for the organisations. The implementation should meet the needs of the organisation.	• Record • Primary key • Foreign key • Relationship • Relational database	system over database systems • Describe the features of a relational database. • State the features of DBMS • Describe relational database and its elements. • Explain the purpose of the normalisation process. • List the properties of a database in 1NF 2NF and 3NF • Create database with up to 3 tables using a DBMS software. • Create queries from a table in a database.	in the relational or logical model. • Recommended contexts to consider during evaluation or problem situations are school, home, party, library, cybercafé, transport company, small business, ...
	• Identifying information systems • Evaluating an information system	PS 4.3 Evaluating an information system	Given the description of an information system learners evaluate its effectiveness, efficiency, security, ease of use and reliability justifying their answer in each	• Information • Characteristics of good information • Organisation and its main subsystems • Information system (IS) • Elements of an IS	• Describe an organisation and its functional units. • Explain the characteristics of good information. • Explain the flow of information within an organisation. • Describe the	• Types of information systems to consider are: MIS, TPS, DSS, GIS, HIS, LIS, and expert system) • Teachers can access tools or software that implement or illustrate a given type of information system. • Recommended contexts to consider during evaluation or problem situations are school, home, party, library, cybercafé, transport

FORM 5; MODULE 1: PROBLEM SOLVING AND CODING 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
			case.	• Manual IS and automated IS • Types of IS • Data capture	elements of an IS • Explain ways of ensuring data integrity in an IS. • Describe types of IS.	company, small business, bank, ...

Data manipulation 2

FORM 5; MODULE 2: DATA MANIPULATION 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Data Manipulation	• Encoding • Storing data	DM 1.1 Representing data in the computer	In a situation where data is stored in the computer, learners identify and use coding schemes to represent data	• Numbers (BCD) • Characters (ASCII, EBCDIC, UNICODE) • Images (pixel, shapes) • Sound	• Explain how data is represented in the computer. • Distinguish between the concepts of numbers, characters, and instructions. • Describe machine representation of characters using the ASCII, UNICODE, and EBCDIC codes. • Choose the appropriate coding scheme for a given data.	• Teachers are expected to focus on integration activities since these concepts were done in previous classes. • The description of character representations should focus on number of bits and maximum number representable characters. • Recommended contexts to consider during evaluation or real-life situations are: school assignment, research, ...
	• Performing arithmetic on numbers • Getting the hexadecimal value of a colour and vice versa • Encoding numbers	DM 2.1 Operations on number systems	Presented with a situation that involves numbers, learners recognise the possible system and correctly apply a number of operations on the number (conversion, addition, subtraction) The	• Bits • States • Symbols of base 2, 8, and 16 • Place value	• State the importance of binary data representation in the computer • Identify the symbols of binary, octal and hexadecimal systems. • Convert from a given number system to another. • Carry out addition and subtraction of binary numbers.	• Teachers are expected to focus on integration activities since these concepts were done in previous classes. • Recommended contexts to consider during evaluation or problem situations are school, business, home, ...

FORM 5; MODULE 2: DATA MANIPULATION 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
			method used should be logical, concise, and clearly given in steps.			
	• Creating a control system • Creating circuits	DM 2.2 Analysing simple logic circuits and logic expressions	Presented with a logic circuit or expression, learners isolate the different components and correctly express the possible output.	• Logic gates (NOT, AND, OR, NOR, NAND, XOR) • Logic circuits • Truth tables • De Morgan's laws	• Identify various logic gates • Describe the different types of logic gate. • Identify components of a logic circuit. • Draw the truth table of a logic gate or circuit with at most 2 inputs. • Combine gates to obtain a circuit. • Simplify boolean expressions.	• Logic expressions should have a maximum of 2 inputs and logic circuits should have a maximum of 5 gates. • Simplification of Boolean expressions should make use of only De Morgan's laws. • Recommended contexts to consider during evaluation or problem situations are school, home, manufacturing computers, ...

Hardware and software systems 3

FORM 5; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 3

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	• Using the computer • Choosing I/O device • Adding and removing hardware	HS 1.1 Describing peripheral devices	In a situation where a computer is to be equipped for various purposes, learners identify appropriate input and output peripheral devices for high productivity.	• Keyboards • Microphone • Cameras • Scanners • Pointing devices • Printers • Monitors • Speakers	• Identify, and describe the functioning of input and output devices • Differentiate between different types of each type of component and state their relative advantages. • Discuss relative advantages of components of similar purpose.	• Teachers are expected to recall concepts and focus on integration activities. • Recommended contexts to consider during evaluation or real-life situations are computer laboratory, travelling, computer repair shop, office, home, cybercafé, business, computer shop, entertainment, ...
Hardware and software systems	• Choosing hardware • Categorising devices • Training on internal components	HS 1.2 Describing internal components of the computer	Provided with a situation with factors related to devices that are not peripherals, learners select devices or features of these devices that are coherent to the situation and justify their choice.	• Processor • Processor cycle • Cache • RAM • Registers • Hard disk drives • Solid state drives • Non-volatile and volatile memory • Secondary and primary storage. • GPU • Motherboard • Bus • CMOS • Battery • Sound card	• Identify the components of processing in the computer. • Describe the components of the CPU. • State the units for measuring the speed of the processor and storage. • Describe the CPU cycle (machine instruction cycle). • State the function of the GPU. • Explain the concept of volatile and non-volatile memory. • Describe primary storage and secondary storage. • State the function of the registers, cache, RAM, and	• Teachers are expected to recall concepts and focus on integration activities. • Recommended contexts to consider during evaluation or problem situations are computer laboratory, home computing devices, office computing devices, cybercafé, choosing hardware, categorising hardware, ...

FORM 5; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 3

FORM 5; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
				• Graphic card • Video card	internal secondary storage. • State the function of the motherboard. • State the main ports on the motherboard. • Describe the different types of bus. • State the role of CMOS and the battery. • State the functions of interface devices.	
	• Proposing technology for social inclusion • Choosing appropriate tools	HS 2.1 Getting application software	Provided with tasks to produce or edit digital content, learners choose the most appropriate software for each task clearly justifying their choice.	• Software • Application software ◦ Text editor ◦ Word processor ◦ Spreadsheet ◦ Presentation software ◦ Desktop publishing software ◦ DBMS (Database management system) ◦ Communication software ◦ Collaboration software ◦ Search engines	• Explain the concept of application software. • Differentiate between application and system software. • Explain the purpose of a given application software. • Outline key features of a given application software. • State examples of a given application software.	• Teachers are expected to recall concepts and focus on integration activities. • Recommended contexts to consider during evaluation or problem situations are school, business, home, marriage, research, banking, library, meetings, ...
	• Choosing software	HS2.2 Describe ways	Given a situation with issues involving	• Generic, specific, and tailor-made	• Describe generic, special purpose and tailor-made	• Teachers are expected to recall concepts and focus on integration

FORM 5; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 3

FORM 5; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	• Acquiring software • installing software	of acquiring or distributing software	the acquisition or distribution of software, learners recommend pertinent acquisition or distribution means while justifying their proposals clearly.	software. • Open software • Closed software • Freeware • Shareware • Public domain software • SaaS (Software as a service) • Installation • Updating	software. • Give examples of generic, specific, and tailor-made software. • Differentiate between open and closed software. • Outline examples of open and closed software. • Describe the concepts of shareware, freeware, and software as a service.	activities. • Recommended contexts to consider during evaluation or problem situations are school, business, home, ...
	• Creating personal documents • Keeping business records • Using a software	HS 2.3 Creating digital content using a software	Given tasks to accomplish, learners use appropriate features of a software to correctly accomplish the task.	• Word processors ◦ Formatting ◦ Text boxes • Spreadsheets ◦ Cells, address, formula ◦ Functions ◦ Sorting and filtering • Presentation ◦ Slides ◦ Animations • Desktop publishing software ◦ Layout tools ◦ Templates ◦ Text boxes	• Perform document editing and formatting using a word processor. • Create and manipulate a text box. • Explain the concepts of cell, address, and formula. • Identify the address of a cell. • Perform calculations using basic spreadsheet functions. • Perform data filtering and sorting using a spreadsheet. • Represent cross sections of data as a chart using a spreadsheet. • Add slides to a presentation. • Create animations using a presentation software. • Produce a given publication from a template.	• Recommended context to consider during evaluation or problem situations are school, business, home, library, transport, photography, marriage, ...

FORM 5; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 3

FORM 5; MODULE 3: HARDWARE AND SOFTWARE SYSTEMS 3						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
					• Use layout features of a desktop publisher.	
	• Identifying technologies used in a given sector • Training on applications of AI and robots	HS 3.1 Proposing assistive technology for social inclusion	Given a situation with factors related to the aging and users with disabilities, learners select appropriate technologies for a given disability while clearly justifying their choices.	• Disabilities (Blindness and low vision, Deafness and hard of hearing, mobility impairment) • Assistive technologies • Social inclusion • Hands-free devices • Braille devices • Track ball • Hearing-aids • Environmental control units (ECU) • Speech to text • Screen reader • Magnifier • Special keyboards	• Explain the concept of assistive technology. • State common disabilities. • Outline features common to operating systems aimed at helping the disabled. • Describe a given assistive technology. • Match a given technology to an appropriate disability.	• Social inclusion should focus on the old and disabled. • Recommended contexts to consider during evaluation or problem situations are school, business, home, travelling, ...

Network systems 2

FORM 5; MODULE 4: NETWORK SYSTEMS 2

FORM 5; MODULE 4: NETWORK SYSTEMS 2						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESEOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
Network systems	- Choosing data transmission methods - identifying communication systems	NS 1.1 Exploring the concepts related to data communication	Given a situation with factors related to data communication systems, learners explain correctly, concisely, and precisely the mechanisms used in the situation.	- packet header - payload - trailer - packet switching - parity check - checksum and echo check - symmetric and asymmetric encryption	- Explain how data is prepared before transmission. - Describe the structure of a packet - Describe the process of packet switching - Explain the suitability of each method of data transmission, for a given scenario - Describe the universal serial bus (USB) interface and explain how it is used to transmit data - Explain the need to check for errors after data transmission and how these errors can occur - Describe some error detection methods - Explain the need for and purpose of encryption when transmitting data - Explain how data is encrypted.	Recommended context to consider during evaluation or problem situations are school, home, business, Government, ...
	- Choosing hardware for a network - Connecting devices of a network	NS 2.1 Classifying hardware for networks	Situated in a school or organisation LAN, learners correctly identify hardware and state their roles.	- Network cards - Modems - Multiplexers - Bridges, - Repeaters, - Routers,	- Identify hardware needed for internet connectivity in a house, school, etc. - State the role of common data communication hardware - State the hardware needed in a school LAN.	Recommended contexts to consider during evaluation or problem situations are cybercafé, computer laboratory, home, library, company, ...

FORM 5; MODULE 4: NETWORK SYSTEMS 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESEOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
	• setting up a network • assembling tools for a network • choosing network devices	NS 2.2 Setting up LANs	Given a situation that requires setting up a simple network, learners prescribe the appropriate tools and configuration to meet the needs of the situation.	• Computer network • classifying based on coverage (LAN, MAN, WAN, ...) • Network topology (Star, Bus, Ring) • Network architecture (client-server, peer-to-peer) • Network devices • Ad hoc network • Bandwidth	• State advantages and disadvantages of a computer network. • Describe types of networks based on coverage. • Describe and sketch bus, ring, and star network topologies. • Differentiate between client-server architecture and peer-to-peer architecture. • Explain the function of a given networking device. • Explain the determinant of speed of communication. • Set up a simple Ad hoc network.	• Recommended contexts to consider during evaluation or problem situations are school, home, business, Government, ...
	• Exploring the Internet	NS 3.1 Working on the Internet	Given a situation related to the use of the internet and its services, learners select appropriate service clearly justifying their choice	• Internet • Extranet • Intranet • URL • ISP • Emails • Voice over the Internet. • HTML • Protocols • HTTP • FTP • telnet • browsers • Google • Yahoo • Digital currencies	• Identify the components of the Internet. • Describe internetworks for communication. • Outline the benefits of Internet. • State the roles of protocols in internetworks. • Explain services provided by the Internet. • State the role of HTML • Describe the importance of URL and its nomenclature. • state the role of ISP and identify some examples. • Identify the popular browsers. • State the use and give examples of search engines.	• Recommended contexts to consider during evaluation or problem situations are school, home, business, meetings, research, work, ...

FORM 5; MODULE 4: NETWORK SYSTEMS 2

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESEOURCES		
Family of life situations	Examples of life situations	Categories of actions	Competency statement	Basic (core) knowledge	Skills (examples of actions)	Explanatory notes
					• Explain the concept of a digital currency and how digital currencies are used • Explain the process of blockchain and how it is used to track digital currency transactions.	
	• Sharing information • Working in a team	NS 3.2 Social networks	Given the need to share experiences and knowledge, learners communicate using platforms that permit interaction in real-time.	• Sharing • Social networks • Forum • Chatting • Facebook • WhatsApp • Instagram • Twitter	• State the reasons for social network. • State the characteristics of social media. • Explain the impact of social media. • Distinguish between different social media networks. • Sharing information in forums and other platforms. • State the advantages and disadvantages of social networks.	• Recommended contexts to consider during evaluation or problem situations are school, education, home, business, ...

System security

FORM 5; MODULE 5: SYSTEM SECURITY

FORM 5; MODULE 5: SYSTEM SECURITY						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
System security	• Securing a computer • Recovering lost data.	SS 1.1 Securing computer and data.	Given the need to protect a school computer laboratory, workplace computers, learners identify threats to system and data and prescribe security measures to be taken.	• Unauthorised access • Intentional and unintentional deletion of data • Virus attack • Power failure • Breakdown of system • Non availability of network • Access control • Procedures • Antivirus software • Firewall • UPS • Physical protection • Backup • Recovery facilities	• Differentiate between computer security and data security. • Describe the different types of malware. • Describe threats to data. • Describe threats to a system. • Explain measures to ensure system security. • Explain measures to secure data. • Explain data recovery strategies.	• Recommended contexts to consider during evaluation or problem situations are school, home, business, bank, health, ...
	• Securing a school network • Securing school computers • Securing a home network	SS 2.1 Securing networks	Given a situation where a computer is connected to a network, more than many users have access to a common computer, computers are in a network, users share resources, etc., learners propose	• Access control, • Authentication, • Confidentiality • Non repudiation, • Hackers • Integrity • Social engineering, • Phishing, • Denial of service attacks	• Identify the 3 security objectives • Explain the various threats to a network or computer. • Identify some vulnerabilities in networks • Describe some attacks to a network. • Explain network security mechanisms against	• Recommended contexts to consider during evaluation or problem situations are school, home, business, bank, health, ...

FORM 5; MODULE 5: SYSTEM SECURITY

FORM 5; MODULE 5: SYSTEM SECURITY						
CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
	• Securing home computers • Securing an organisational network		appropriate protection against the various threats on computers or computer networks clearly justifying the choice of protection chosen.	• Data interception and theft • Firewalls, • Software security • Physical Security policy • Backup • Digital signature • Digital certificates	- vulnerabilities • Describe security mechanisms for keeping a computer system safe.	
	• Protecting reputation online • Preventing account mix up	SS3.1 Evaluating the impacts of digital identities and digital footprints	Given a situation outlining the online practices of a user, learners evaluate their management of digital footprints, expose the risk they are facing and recommend tips for managing footprints and reputation.	• Digital identity • Username • Password • Footprints • Privacy • Cookies • Identity theft • Passive and active digital footprints.	• Explain the concept of digital identity and footprint. • Outline best practices to manage multiple digital identities. • Explain characteristics of a good password. • Explain ways that a user creates active and passive digital footprints. • Differentiate passive from active digital footprints. • Explain ways of protecting digital footprints. • State positive and negative effects of digital footprints. • Explain how inadequate management of digital footprints can destroy online reputation.	• Recommended contexts to consider during evaluation or real-life situations are: school, cybercafé, working online, ...

Ethics, society and legal issues 3

FORM 5; MODULE 6: ETHICS, SOCIETY AND LEGAL ISSUES 3

CONTEXTUALISATION		COMPETENCIES TO BE ATTAINED		RESOURCES		
Family of life situations	Examples of life situations	Categories of Actions	Competency statement	Basic (core) knowledge	Skills (examples of action)	Explanatory notes
Ethics, society and legal issues.	• Securing a system • Preventing data loss	ED 1.1 Examine licenses and copyright practices	Placed in a situation with issues related to intellectual property, learners propose ways of identifying free and copyrighted data or digital content, ways of protecting digital content and ways of using content protected by a given license. Proposals should be coherent with the situation and clearly justified.	• Intellectual property • Copyright • Patent • Trademark • Licenses • Creative Common (CC) • DRM (Digital rights management) • Unauthorised use • Copyleft • GNU License • Creative Commons Search • Public domain	• Explain ways of identifying free and copyrighted material. • State platforms where free content can be found. • State ways of sharing and using digital content legally. • Explain mechanisms or methods to block or limit access to digital content. • Match each type of creative common license to a given permission. • State the freedoms provided by copyleft licenses. • Identify legal limitations of using and sharing copyrighted content • State possible international and national consequences of non-respect of intellectual property. Recommend strategies for protecting and sharing digital creations and inventions in a given context.	• Recommended contexts to consider during evaluation or problem situations are education, business, government, home, financial institution, ...
	• Staying healthy while using computer	ED 2.1 Avoiding computer related health issues	Studying the activities of computer users who stay on the computer for longer hours and carrying out repeated activity for	• Eye strain • RSI • CTS • Tendinitis • Back pain • Neck pain	• Identify wrong user posture in the workplace, • Identify wrong equipment placement in the workplace. • Identify health hazards related to wrong posture	• Recommended contexts to consider during evaluation or real-life situations are: home, computer laboratory, work environment, ...

	• Acquiring good computer accessories • Designing good computer environment		long period, learners evaluate the workplace, the practices and the habits of users; and explain their impact on the health of users. They also prescribe measures that will guarantee good health and provide safe environment for computer users.	• Computer vision syndrome • Computer ergonomics • Green computing	and wrong equipment placement. • Outline the main causes of computer injuries (repetitive actions, awkward positions). • Explain how the design of items, work habits, design of the workplace and exercises can help prevent computer related injuries. • List safe disposal measures of computer equipment.	
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