GHANA EDUCATION SERVICE

(MINISTRY OF EDUCATION)

REPUBLIC OF GHANA

COMPUTING
CURRICULUM FOR PRIMARY SCHOOLS
(BASIC 4 - 6)

SEPTEMBER 2019

NATIONAL COUNCIL FOR CURRICULUM & ASSESSMENT OF MINISTRY OF EDUCATION

Computing Curriculum for Primary Schools

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FOREWORD

The new curriculum for Ghana's primary schools is standards-based, which demonstrates our determination to place learning at the heart of every classroom and ensuring that every learner receives quality education. Accessibility of quality education for all is non-negotiable if we are to meet the human capital needs required for accelerated sustainable national development. It is for this reason that the new curriculum sets out clearly the learning areas that need to be taught, how they should be taught and how they should be assessed. It provides a set of core competencies and standards that learners are to know, understand and demonstrate as they progress through the curriculum from one content standard to the other and from one phase to the next. The curriculum and its related teachers' manual promote the use of inclusive and gender responsive pedagogy within the context of learning-centred teaching methods so that every learner can participate in every learning process and enjoy learning. The curriculum encourages the use of Information and Communication Technologies (ICTs) for teaching and learning.

The new curriculum has at its heart the acquisition of skills in the 4Rs of Reading, wRiting, aRithmetic and cReativity by all learners. It is expected that at any point of exit from formal education, all learners should be equipped with these foundational skills for life, which are also prerequisites for Ghana becoming a learning nation. The graduates from the school system should not only become functional citizens in the 4Rs but lifelong learners as well. They should be critical thinkers, problem solvers and digitally literate. The education they receive through the curriculum should enable them to collaborate and communicate well with others and be innovative. The graduates from Ghana's schools should be leaders with a high sense of national and global identity. The curriculum therefore provides a good opportunity in its design to develop individuals with the right skills and attitudes to lead the transformation of Ghana into an industrialised nation.

For this reason, the Ministry of Education expects that learners, as a result of the new knowledge, skills and values acquired through the new curriculum, will show a new sense of identity as creative, honest and responsible citizens. These are our core values that underpin the identification and selection of the learning areas of this curriculum. These core values serve as fundamental building blocks for inculcating in our learners the spirit of teamwork, respect, resilience and the commitment to achieving excellence. The Ministry endorses a quality learning experience as an entitlement for each of Ghana's school-going girl and boy; the curriculum has rightly focused on learning and learning progression. The Ministry has also endorsed accountability as a critical domain for effective working of this standards-based curriculum.

More importantly, the role of the teacher is to make this curriculum work for the intended purpose, to inculcate in learners the core competencies and values and to make learning happen, and improve learning outcomes. The support that teachers need is duly recognised and endorsed by my Ministry. The Ministry will support the implementation of the curriculum to include capacity development of all teachers. Teachers matter in the development and delivery of the standards-based curriculum and we will continue to support our teachers on this journey that we have started together, to put learning at the centre of what we do best — teach!

I thank all those who have contributed their time and expertise to the development of this curriculum for primary schools in Ghana.

Dr. Matthew Opoku Prempeh (MP)
The Honourable Minister of Education

TABLE OF CONTENT

RATIONALE FOR PRIMARY COMPUTING

Computing is one of the essential school subjects that permeates and can be applied to all areas of learning. This is because it provides students with access to important computing ideas, knowledge and skills that they can draw on in their personal and work lives, as well as their learning of other school subjects.

Computing learning provides the opportunity for students to develop essential skills and competencies, and motivates learners to become flexible problem solvers and life-long learners. In an increasingly technological age the possession of problem-solving and decision-making skills is an essential pre-requisite and these are acquired in the learning of computing.

PHILOSOPHY

TEACHING PHILOSOPHY

The teaching is focused around a supportive and inclusive learning environment by positively engaging teacher-student relationships. Teachers have the responsibility to create a cooperative learning environment where students feel safe and secure. In addition, appropriate improvisation techniques would be used to represent the actual devices when they are not available.

Relevance, engagement and problem-solving best describe the computing teaching philosophy. In other words, teaching of computing adopts the hands-on approach that is, the tactile/kinaesthetic approach. Students learn computing subject best when they are actively involved in the learning process, and that an engaging classroom best facilitates this. Students should be engaged in computing by using diverse teaching methods, encouraging the use of a variety of their cognitive skills. The more students process data, the more likely they would be able to apply, analyse, synthesise, and evaluate the information.

Teaching of computing should enable learners know how data can be used to understand themselves, explain situations they find themselves in, describe the why and how some things happened or predict what might happen in the future.

LEARNING PHILOSOPHY

Computing education develops a wide range of skills including problem solving, design construction, communication, critical thinking, analysis, synthesis and evaluation. The skills learnt can then be applied to other fields of endeavour. Learners should have freedom of expression and creativity. Learners should be able to experiment and to realize their strengths and weaknesses in the computing subject. Each learner's learning style should be tied into the learning of computing so as to enable learners grow and learn on their own. Learners should be given the chance to pose their own questions and try to answer them independently. Learners should be encouraged to find information in a variety of ways. Learners should also be encouraged to work on projects in groups to foster collaborative learning.

SPECIFIC AIMS

The computing curriculum is designed to help learners to:

1. acquire basic ICT literacy
2. communicate effectively using ICT tools
3. develop interest and acquire skills in the use of the internet
4. develop basic ethics in using ICT tools
5. acquire basic programming and database skills.

INSTRUCTOR'S GUIDELINES

1. Guide and facilitate learning by generating discourse among learners and challenging them to accept and share responsibility for their own learning, based on their unique individual differences.
2. Select computing content, adapt and plan lessons to meet the interests, knowledge, understanding, abilities, and experiences of learners.
3. Work together as colleagues within and across disciplines and grade levels to develop communities of computing learners who exhibit the skills of computing inquiry and the attitudes and social values conducive to computing learning.
4. Use multiple methods and systematically gather data about learner understanding and ability to guide computing teaching and learning, with arrangements to provide feedback to both learners and parents.
5. Design and manage learning environments that provide learners with the time, space, and resources needed for learning computing

CORE COMPETENCIES

The core competencies for computing studies describe a body of skills that teachers in computing at all levels should seek to develop in their learners. They are ways in which teachers and learners in computing engage with the subject matter as they learn the subject. The competencies presented here describe a connected body of core skills that are acquired throughout the processes of teaching and learning. These include:

CRITICAL THINKING AND PROBLEM SOLVING

This skill develops learners' cognitive and reasoning abilities to enable them analyse and solve problems. Critical thinking and problem solving skill enables learners to draw on their own experiences to analyse situations and choose the most appropriate out of a number of possible solutions. It requires that learners embrace the problem at hand, persevere and take responsibility for their own learning.

CREATIVITY AND INNOVATION

Creativity and innovation promotes the development of entrepreneurial skills in learners through their ability to think of new ways of solving problems and developing technologies for addressing the problem at hand. It requires ingenuity of ideas, arts, technology and enterprise. Learners having this skill are also able to think independently and creatively.

COMMUNICATION AND COLLABORATION

This competence promotes in learners the skills to make use of languages, symbols and texts to exchange information about themselves and their life experiences. Learners actively participate in sharing their ideas. They engage in dialogue with others by listening to and learning from them. They also respect and value the views of others.

CULTURAL IDENTITY AND GLOBAL CITIZENSHIP

This competence involves developing learners to put country and service foremost through an understanding of what it means to be active citizens. This is done by inculcating in learners a strong sense of social and economic awareness. Learners make use of the knowledge, skills, competences and attitudes acquired to contribute effectively towards the socioeconomic development of the country and on the global stage. Learners build skills to critically identify and analyse cultural and global trends that enable them to contribute to the global community.

PERSONAL DEVELOPMENT AND LEADERSHIP

This competence involves improving self-awareness and building self-esteem. It also entails identifying and developing talents, fulfilling dreams and aspirations. Learners are able to learn from mistakes and failures of the past. They acquire skills to develop other people to meet their needs. It involves recognising the importance of values such as honesty and empathy and seeking the well-being of others. Personal development and leadership enables learners to distinguish between right and wrong. The skill helps them to foster perseverance, resilience and self-confidence. PL helps them acquire the skill of leadership, self-regulation and responsibility necessary for lifelong learning.

DIGITAL LITERACY

Digital Literacy involves developing learners to discover, acquire, and communicate through ICT to support their learning. It also makes them use digital media responsibly.

LEARNING DOMAINS (EXPECTED LEARNING BEHAVIOURS)

A central aspect of this curriculum is the concept of three integral learning domains that should be the basis for instruction and assessment. These are

- Knowledge, Understanding and Application
- Process Skills
- Attitudes and Values

KNOWLEDGE, UNDERSTANDING AND APPLICATION

Under this domain, learners acquire knowledge through some learning experiences. They may also show understanding of concepts by comparing, summarising, re-writing etc. in their own words and constructing meaning from instruction. The learner may also apply the knowledge acquired in some new contexts. At a higher level of learning behaviour, the learner may be required to analyse an issue or a problem. At higher levels, the learner may be required to synthesize knowledge by integrating a number of ideas to formulate a plan, solve a problem, compose a story, or a piece of music. Further, the learners may be required to evaluate, estimate and interpret a concept. At the last level, which is the highest, learners may be required to create, invent, compose, design and construct. These learning behaviours "knowing", "understanding", "applying", "analysing", "synthesising", "evaluating" and "creating" fall under the domain "Knowledge, Understanding and Application".

In this curriculum, learning indicators are stated with action words to show what the learner should know and be able to do. For example, the learner will be able to describe something. Being able to "describe" something after teaching and learning has been completed means that the learner has acquired "knowledge". Being able to explain, summarise, and give examples etc. means that the learner has understood the concept taught.

Similarly, being able to develop, defend, etc. means that the learner can "apply" the knowledge acquired in some new context. You will note that each of the indicators in the curriculum contains an "action word" that describes the behaviour the learner will be able to demonstrate after teaching and learning has taken place. "Knowledge, Understanding and Application" is a domain that should be the prime focus of teaching and learning in schools. Teaching in most cases has tended to stress knowledge acquisition to the detriment of other higher level behaviours such as applying knowledge.

Each action word in any indicator outlines the underlying expected outcome. Each indicator must be read carefully to know the learning domain towards which you have to teach. The focus is to move teaching and learning from the didactic acquisition of "knowledge" where there is fact memorisation, heavy reliance on formulae, remembering facts without critiquing them or relating them to real world – ***surface learning*** – to a new position called – ***deep learning***. Learners are expected to deepen their learning by knowledge application to develop critical thinking skills, explain reasoning, and to generate creative ideas to solve real life problems in their school lives and later in their adult lives. This is the position where learning becomes beneficial to the learner.

The keywords and explanation and the key words involved in the "Knowledge, Understanding and Application" domain are as follows:

Knowing: The ability to remember, recall, identify, define, describe, list, name, match, state principles, facts and concepts. Knowledge is the ability to remember or recall material already learned and this constitutes the lowest level of learning.

Understanding: The ability to explain, summarise, translate, rewrite, paraphrase, give examples, generalise, estimate or predict consequences based upon a trend. Understanding is generally the ability to grasp the meaning of some concepts that may be verbal, pictorial, or symbolic.

Applying: This dimension is also referred to as "Use of Knowledge". Ability to use knowledge or apply knowledge, apply rules, methods, principles, theories, etc. to situations that are new and unfamiliar. It also involves the ability to produce, solve, plan, demonstrate, discover etc.

Analysing: The ability to break down material/information into its component parts; to differentiate, compare, distinguish, outline, separate, identify significant points etc., ability to recognise unstated assumptions and logical fallacies; ability to recognise inferences from facts etc.

Synthesising: The ability to put parts or ideas together to form a new whole. It involves the ability to combine, compile, compose, devise, plan, revise, organise, create, generate new ideas and solutions.

Evaluating: The ability to appraise, compare features of different things and make comments or judgment, criticise, justify, support, discuss, conclude, make recommendations etc. Evaluation refers to the ability to judge the worth or value of some material based on some criteria.

Creating: The ability to use information or materials to plan, compose, produce, manufacture or construct other products.

From the foregoing, creating is the highest form of thinking and learning and is therefore the most important behaviour. This, unfortunately, is the area where most learners perform poorly. In order to get learners to develop critical thinking skills, beginning right from the lower primary level, it is advised that you do your best to help your learners to develop analytical skills and processes as we have said already.

SKILLS AND PROCESSES

Computing is the means by which a learner solves problems or seeks to gain information using technological tools. Learners should be exposed to situations that challenge them to raise questions and attempt to solve problems using technological tools. The more often they are faced with these challenges, the more likely they are to develop a positive attitude toward computing, and the more likely they are to develop relevant computing skills. The skills and processes that learners need to develop in computing are as follows:

Mouse skills
This is the skill of using the mouse to perform various functions.

Keyboarding skills
This is the skill of using the keyboard to perform various functions

Comparing
This is the skill of identifying the similarities and differences between two or more objects, concepts, information or processes.

Communicating/Reporting
This is the skill of transmitting, receiving and presenting information in concise, clear and accurate forms - verbal, written, pictorial, tabular or graphical.

Analysing
This is the skill of identifying the parts of objects, information or processes, and the patterns and relationships between these parts.

Evaluating
This is the skill of assessing the reasonableness, accuracy and quality of information, processes or ideas. This is also the skill of assessing the quality and feasibility of objects or information.

Designing
This is the skill of Visualizing and drawing new objects or gadgets from imagination.

Interpreting
This is the skill of evaluating data in terms of its worth: good, bad, reliable, unreliable; making inferences and predictions from written or graphical data; extrapolating and deriving conclusions. Interpretation is also referred to as "Information Handling".

Learners therefore need to acquire positive attitudes, values and psychosocial skills that will enable them participate actively in lessons and take a stand on issues affecting them and others.

ATTITUDES AND VALUES

To be effective, competent and reflective citizens, who will be willing and capable of solving personal and societal problems, learners should be exposed to situations that challenge them to raise questions and attempt to solve problems. Learners therefore need to acquire positive attitudes, values and psychosocial skills that will enable them participate in debates and take a stand on issues affecting them and others. The computing curriculum thus focuses on the development of attitudes and values.

The computing curriculum aims at helping learners to acquire the following:

1. **Commitment**: determination to contribute to national development.
2. **Tolerance**: willingness to respect the views of others.
3. **Patriotism**: readiness to defend the nation.
4. **Flexibility** in ideas: willingness to change opinion in the face of more plausible evidence.
5. **Respect for evidence**: willingness to collect and use data on one's investigation, and also have respect for data collected by others.
6. **Reflection**: the habit of critically reviewing ways in which an investigation or observation has been carried out to see possible faults and other ways in which the investigation or observation can be improved upon.
7. **Comportment** conforming to acceptable societal norms.
8. **Co-operation** the ability to work effectively with others.
9. **Responsibility**: the ability to act independently and make decisions; morally accountable for one's action; capable of rational conduct.
10. **Environmental Awareness**: being conscious of one's physical and socio-economic surroundings.
11. **Respect** for the Rule of Law: obeying the rules and regulations of the land.

The teacher should ensure that learners cultivate the above attitudes and skills as basis for living in the nation as effective citizens.

VALUES:

At the heart of this curriculum is the belief in nurturing honest, creative and responsible citizens. As such, every part of this curriculum, including the related pedagogy, should be consistent with the following set of values.

Respect: This includes respect for the nation of Ghana, its institutions and laws and the culture and respect among its citizens and friends of Ghana.

Diversity: Ghana is a multicultural society in which every citizen enjoys fundamental rights and responsibilities. Learners must be taught to respect the views of all persons and to see national diversity as a powerful force for nation development. The curriculum promotes social cohesion.

Equity: The socio-economic development across the country is uneven. Consequently, it is necessary to ensure an equitable distribution of resources based on the unique needs of learners and schools. Ghana's learners are from diverse backgrounds which require the provision of equal opportunities to all, and that, all strive to care for each other.

Commitment to achieving excellence: Learners must be taught to appreciate the opportunities provided through the curriculum and persist in doing their best in whatever field of endeavour as global citizens. The curriculum encourages innovativeness through creative and critical thinking and the use of contemporary technology.

Teamwork/Collaboration: Learners are encouraged to be committed to team-oriented working and learning environments. This also means that learners should have an attitude of tolerance to be able to live peacefully with all persons.

Truth and Integrity: The curriculum aims to develop learners into individuals who will consistently tell the truth irrespective of the consequences, be morally upright with the attitude of doing the right thing even when no one is watching. Also, be true to themselves and be willing to live the values of honesty and compassion. Equally important is the practice of positive values as part of the ethos or culture of the work place, which includes integrity and perseverance. These values must underpin the learning processes to allow learners to apply skills and competences in the world of work.

The action words provided in the learning indicators in each content standard, should help you to structure your teaching and learning to achieve the desired learning outcomes. Check the learning indicators to ensure that you have given the required emphasis to each learning domain in your instruction and assessment.

ASSESSMENT

Assessment is a process of collecting and evaluating information about learners and using the information to make decisions to improve their learning.

In this curriculum, it is suggested that assessment is used to promote learning. Its purpose is to identify the strengths and weaknesses of learners to enable teachers ascertain their learner's response to instruction.

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

Assessment ***as*** learning: Assessment as learning relates to engaging learners to reflect on the expectations of their learning. Information that learners provide the teacher forms the basis for refining teaching-learning strategies. Learners are assisted to play their roles and to take responsibility of their own learning to improve performance. Learners are assisted to set their own learning goals and monitor their own progress.

Assessment ***for*** learning: It is an approach used to monitor learner's progress and achievement. This occurs throughout the learning process.
The teacher employs assessment for learning to seek and interpret evidence which serves as timely feedback to refine their teaching strategies and improve learners' performance. Learners become actively involved in the learning process and gain confidence in what they are expected to learn.

Assessment ***of*** learning: This is summative assessment. It describes the level that learners have attained in the learning, what they know and can do over a period of time. The emphasis is to evaluate the learner's cumulative progress and achievement.

It must be emphasised that all forms of assessment should be based on the domains of learning. In developing assessment procedures, try to select indicators in such a way that you will be able to assess a representative sample from a given strand. Each indicator in the curriculum is considered a criterion to be achieved by the learners. When you develop assessment items or questions that are based on a representative sample of the indicators taught, the assessment is referred to as a "Criterion-Referenced Assessment". In many cases, a teacher cannot assess all the indicators taught in a term or year. The assessment procedure you use i.e. class assessments, homework, projects etc. must be developed in such a way that the various procedures complement one another to provide a representative sample of indicators taught over a period.

SUGGESTED TIME ALLOCATION

A total of 4 periods a week, each period consisting of 30 minutes, is allocated to the teaching of computing at the Basic level. It is recommended that the teaching periods be divided as follows: 1(one) period per day (30-minutes per period)

PEDAGOGICAL APPROACHES

These are the approaches, methods, strategies, appropriate relevant teaching and learning resources for ensuring that every learner benefits from teaching and learning process. The curriculum emphasises the:

1. creation of learning-centred classrooms through the use of creative approaches to ensure learner empowerment and independent learning;
2. positioning of inclusion and equity at the centre of quality teaching and learning;
3. use of differentiation and scaffolding as teaching and learning strategies for ensuring that no learner is left behind;
4. use of Information Communications Technology (ICT) as a pedagogical tool;
5. identification of subject specific instructional expectations needed for making learning in the subject relevant to learners;
6. integration of assessment as learning, for learning and of learning into the teaching and learning processes and as an accountability strategy; and
7. questioning techniques that promote deep learning.
8.

LEARNING-CENTRED PEDAGOGY

The learner is at the centre of learning. At the heart of the national curriculum for change and sustainable development is the learning progression and improvement of learning outcomes for Ghana's young people with a focus on the 4Rs – Reading, wRiting, aRithmetic and cReativity. It is expected that at each curriculum phase, learners would be offered the essential learning experiences to progress seamlessly to the next phase. Where there are indications that a learner is not sufficiently ready for the next phase a compensatory provision through differentiation should be provided to ensure that such a learner is ready to progress with their cohort. At the primary school, the progression phases are KG1 to KG2 and B1 to B6.

The Curriculum encourages the creation of a learning-centred classroom with the opportunity for learners to engage in meaningful "hands-on" activities that bring home to the learner what they are learning in school and what they know from outside of school. The learning-centred classroom is a place for the learners to discuss ideas through the inspiration of the teacher. The learners then become actively engaged in looking for answers, working in groups to solve problems. They also research for information, analyse and evaluate information. The aim of the learning-centred classroom is to enable learners take ownership of their learning. It provides the opportunity for deep and profound learning to take place.

The teacher as a facilitator needs to create a learning environment that:

1. makes learners feel safe and accepted,
2. helps learners to interact with varied sources of information in a variety of ways,
3. helps learners to identify a problem suitable for investigation through project work,
4. connects the problem with the context of the learners' world so that it presents realistic opportunities for learning,

5. organises the subject matter around the problem, not the subject,
6. gives learners responsibility for defining their learning experience and planning to solve the problem,
7. encourages learners to collaborate in learning and
8. expects all learners to demonstrate the results of their learning through a product or performance.

It is more productive for learners to find answers to their own questions rather than teachers providing the answers and their opinions in a learning-centred classroom.

INCLUSION

Inclusion is ensuring access and learning for all learners, especially, those disadvantaged. All learners are entitled to a broad and balanced curriculum in every school in Ghana. The daily learning activities to which learners are exposed should ensure that the learners' right to equal access and accessibility to quality education is met. The Curriculum suggests a variety of approaches that addresses learners' diversity and their special needs in the learning process. When these approaches are effectively used in lessons, they will contribute to the full development of the learning potential of every learner. Learners have individual needs and learning experiences and different levels of motivation for learning. Planning, delivery and reflection on daily learning experiences should take these differences into consideration. The curriculum therefore promotes:

1. learning that is linked to the learner's background and to their prior experiences, interests, potential and capacities.
2. learning that is meaningful because it aligns with learners' ability (e.g. learning that is oriented towards developing general capabilities and solving the practical problems of everyday life); and
3. the active involvement of the learners in the selection and organisation of learning experiences, making them aware of their importance and also enabling them to assess their own learning outcomes.

DIFFERENTIATION AND SCAFFOLDING

Differentiation is a process by which differences (learning styles, interest and readiness to learn) between learners are accommodated so that all learners in a group have best chance of learning. Differentiation could be by content, tasks, questions, outcome, groupings and support. Differentiation as a way of ensuring each learner benefits adequately from the delivery of the curriculum can be achieved in the classroom through (i) Task (ii) Support from the Guidance and Counselling Unit and (iii) Learning outcomes.

Differentiation by task involves teachers setting different tasks for learners of different abilities. E.g. in sketching the plan and shape of their classroom some learners could be made to sketch with free hand while others would be made to trace the outline of the plan.

Differentiation by support involves the teacher giving needed support and referring weak learners to the Guidance and Counselling Unit for academic support.

Differentiation by outcome involves the teacher allowing learners to respond at different levels. Weaker learners are allowed more time for complicated tasks.

Scaffolding in education refers to the use of variety of instructional techniques aimed at moving learners progressively towards stronger understanding and ultimately greater independence in the learning process.

It involves breaking up the learning task, experience or concepts into smaller parts and then providing learners with the support they need to learn each part. The process may require a teacher assigning an excerpt of a longer text to learners to read and engaging them to discuss the excerpt to improve comprehension. The teacher goes ahead to guide them through the key words/vocabulary to ensure learners have developed a thorough understanding of the text before engaging them to read the full text. Common scaffolding strategies available to the teacher are:

1. give learners a simplified version of a lesson, assignment, or reading, and then gradually increases the complexity, difficulty, or sophistication over time.
2. describe or illustrate a concept, problem, or process in multiple ways to ensure understanding;
3. give learners an exemplar or model of an assignment they will be asked to complete;
4. give learners a vocabulary lesson before they read a difficult text;
5. describe the purpose of a learning activity clearly and the learning goals they are expected to achieve; and
6. describe explicitly how the new lesson builds on the knowledge and skills learners were taught in a previous lesson.

INFORMATION COMMUNICATIONS TECHNOLOGY

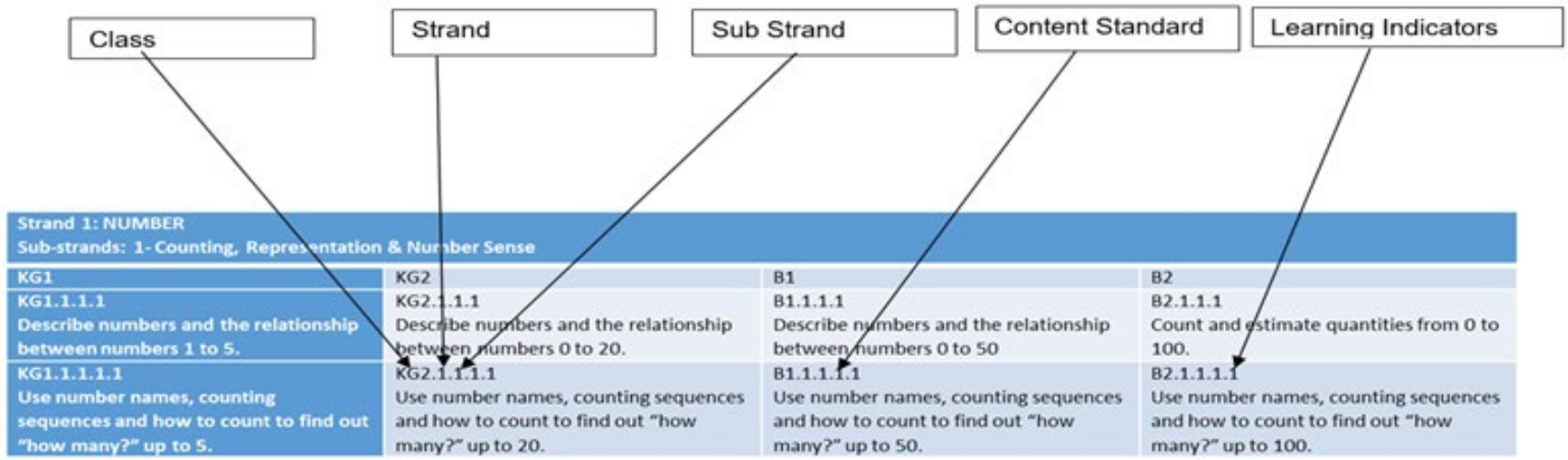
Information Communications Technology (ICT) has been integrated into the computing curriculum as part of the core of education, alongside reading, writing and numeracy. Thus, the curriculum is designed to use ICT as a teaching and learning tool to enhance deep and independent learning. For instance, the teacher in certain instances is directed to use multimedia to support the teaching and learning process.

ICT has the potential to innovate, accelerate, enrich, and deepen skills. It also motivates and engages learners to relate school experiences to work practices. It provides opportunities for learners to fit into the world of work. Some of the expected outcomes that this curriculum aims to achieve are:

1. improved teaching and learning processes;
2. improved consistency and quality of teaching and learning;
3. increased opportunities for more learner-centered pedagogical approaches;
4. improved inclusive education practices.;
5. improved collaboration, creativity, higher order thinking skills; and
6. enhanced flexibility and differentiated approach of delivery.

The use of ICT as a teaching and learning tool is to provide learners access to large quantities of information online and offline. It also provides the framework for analysing data to investigate patterns and relationships in the computing context. Once learners have made their findings, ICT can help them organize, edit and print the information in many different ways.

Learners need to be exposed to various ICT tools around them including calculators, radios, cameras, phones, television sets and computers and related software like Microsoft Office packages - Word, PowerPoint and Excel as teaching and learning tools. The exposure that learners are given at the primary school level to use ICT in exploiting learning will build their confidence and will increase their level of motivation to apply ICT use in later years, both within and outside of education. ICT use for teaching and learning is expected to enhance the quality and competence level of learners.



Strand 1: NUMBER Sub-strands: 1- Counting, Representation & Number Sense			
KG1	KG2	B1	B2
KG1.1.1.1 Describe numbers and the relationship between numbers 1 to 5.	KG2.1.1.1 Describe numbers and the relationship between numbers 0 to 20.	B1.1.1.1 Describe numbers and the relationship between numbers 0 to 50	B2.1.1.1 Count and estimate quantities from 0 to 100.
KG1.1.1.1.1 Use number names, counting sequences and how to count to find out "how many?" up to 5.	KG2.1.1.1.1 Use number names, counting sequences and how to count to find out "how many?" up to 20.	B1.1.1.1.1 Use number names, counting sequences and how to count to find out "how many?" up to 50.	B2.1.1.1.1 Use number names, counting sequences and how to count to find out "how many?" up to 100.

ANNOTATION

A unique annotation is used to label the class, strands, sub-strands, content standards and learning indicators in the curriculum for the purpose of easy referencing. The annotation is defined in figure 1:

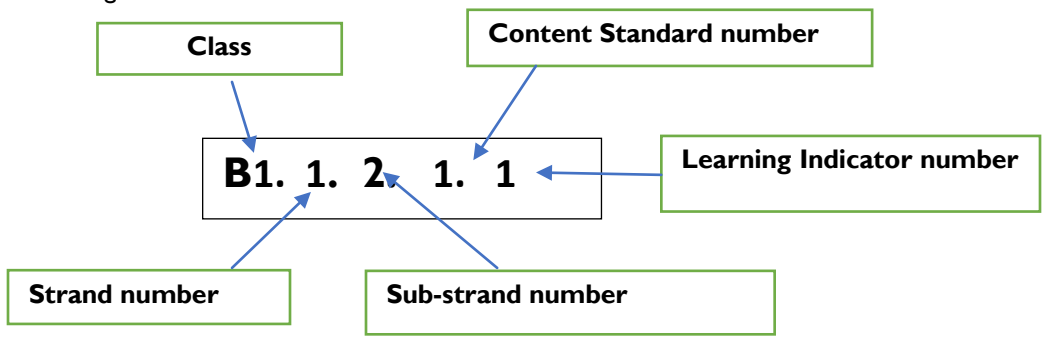


Figure 1: Curriculum Reference Numbers

ORGANIZATION OF THE STANDARDS (Basic 4 – 6)

The content standards in this document are organized by grade level. Within each grade level, the contents are grouped first by strands. Each strand is further subdivided into sub-strands of related indicators.

- **Indicators** are learning outcomes that define what learners should know and be able to do.
- **Content Standards** are groups of related indicators. Note that indicators from different standards may sometimes be closely related, because computing is a connected subject.
- **Sub-strands** are larger groups of related indicators (or computing topics to be studied). Indicators from different sub-strands may sometimes be closely related.
- **Strands** are the main branches of the computing content to be studied.

The Standards are organized at the KG1 – B6 phase under seven strands:

1. Introduction to computing
2. Presentation
3. Word processing
4. Desktop Publishing
5. Programming and databases
6. Internet and social media
7. Health and safety in using ICT tools

The table below shows the scope and sequence of the strands addressed at the KG1 – B6 phase. The remaining part of the document presents the details of the standards and indicators for each grade level,

Strand	Sub-strands	B1	B2	B3	B4	B5	B6
Introduction to computing	Generation of computers and parts of a computer and other gadgets	✓	✓	✓	✓	✓	✓
	Introduction to MS-Windows Interface (Desktop Background and locations of the computer.)			✓	✓	✓	✓
	Data, sources and usage	✓	✓	✓	✓	✓	✓
	Technology in the community (communication)	✓	✓	✓	✓	✓	✓
Presentation	Introduction to MS-PowerPoint (Tabs and ribbons of MS-PowerPoint)			✓	✓	✓	✓
Word processing	Introduction to Word Processing (Tabs and ribbons of word processing)			✓	✓	✓	✓
Desktop Publishing	Introduction to MS-Publisher						
Programming and databases	Introduction to databases, algorithm and programming.					✓	✓
	Introduction to programming languages (e.g.MS- Excel, Scratch, VB dot Net etc.)					✓	✓
	Introduction to Electronic Spreadsheet					✓	✓
	Tabs and ribbons manipulation					✓	✓

Strand	Sub-strands	B1	B2	B3	B4	B5	B6
Internet and social media	Network Overview					✓	✓
	Web browsers and Web Pages					✓	✓
	Surfing the world wide web					✓	✓
	Favourite places and Search engine					✓	✓
	Using Online Forms					✓	✓
	Customising your browser					✓	✓
	Electronic Email					✓	✓
	Internet of things (IoT)					✓	✓
	Digital Literacy					✓	✓
	Network Etiquette					✓	✓
Health and safety in using ICT tools	Health and safety in using ICT tools					✓	✓

BASIC 4

B4

STRAND 1: WORD PROCESSING

SUB-STRAND 1: GENERATION OF COMPUTERS AND PARTS OF A COMPUTER AND OTHER GADGETS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.1.1.1: Identify parts of a computer and technology tools	**B4.1.1.1.1. Identify parts of a computer and technology tools (the mouse, keyboard, monitor, system unit and its components (memory, hard disk drive, CD-ROM etc.), speakers, and peripherals.** Bring items such as memory(i.e. memory cards, memory sticks),hard disk drive, CD-ROM etc. or pictures of these items to class and ask the learners to label selected items or computer parts in their note books. **B4.1.1.1.2. Describe the types of input devices of a computer and their uses. E.g. joystick, light pen, mouse, pointing stick etc. Bring input devices to class.** Guide learners to explore the types of input devices and their uses. **B4.1.1.1.3. Differentiate between RAM and ROM.** Bring a RAM or ROM to class or a picture of RAM and ROM to class. Guide learners to differentiate between ROM and RAM. **B4.1.1.1.4. Type short phrases.** Guide learners to type different phrases using any Word Processing Application. **B4.1.1.1.5. Summarise the first generation of computers which used vacuum tubes as a major piece of technology**. Guide learners to discuss the first generation of computers. e.g. ENIAC, EDVAC, UNIVAC, IBM-701 etc.	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Hardware Manipulation Skill

SUB-STRAND 2: INTRODUCTION TO MS-WINDOWS INTERFACE
(DESKTOP BACKGROUND AND LOCATIONS OF THE COMPUTER.)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.1.2.1: Demonstrate the use of the Desktop Background as well as working with folders.	**B4.1.2.1.1. Describe the desktop background and explain its features (e.g. image, icons and Taskbar of the background).** **NB: This is to help the learner with software knowledge such as in office applications.** Guide learners to explore the desktop background and explain its features (i.e. wallpaper, icons of files and folders you have or may have saved to the desktop, taskbar etc.). Show different desktop background images to learners. Assist them to explain its features. **B4.1.2.1.2. Demonstrate how to Personalise the Desktop Background using required tools and settings;** Show projected examples of personalised Desktop Background to learners with the aid of a projector or pictures. Guide learners to personalise the Desktop Background using the required tools and settings. **B4.1.2.1.3. Demonstrate the use of the Sections of the Taskbar; Start Menu (Location and Launching only), Pinned Applications (Launched / Minimised programmes) and Notification Area or system tray (Date & Time, and Volume).** Guide learners to explore the use of the Taskbar, Start Menu, and Pinned Applications and Notification Area. **B4.1.2.1.4. Adding and removing icons from the desktop.** Guide learners to add and remove icons from the desktop. **B4.1.2.1.5. Moving, selecting and hiding multiple icons on the desktop.** Guide learners to move, select and hide icons on the desktop.	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skill 1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** Hardware Manipulation Skill

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.1.2.1: Demonstrate the use of the Desktop Background as well as working with folders. CONTI'D	**B4.1.2.1.6. Creating, naming and renaming a folder.** Guide learners to create, name and rename a folder. **NB:** **1. Learners can practise with the keyboard only in the absence of the applications.** **2. Learners should be guided to play computer games to reinforce keyboard and mouse skills.**	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Hardware Manipulation Skill

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.1.3.1. Identify Data and collect data from different sources.	**B4.1.3.1.1. Use strategies for identifying data in conversation and newspapers.** Guide learners to discuss strategies, which can be used to identify data and information. Use different approaches to aid identify data in conversation and newspaper e.g. grouping students, role play etc. **B4.1.3.1.2. Use strategies for classifying data into information (i.e. sorting and classifying)** Guide learners to identify and record data in the different forms (e.g. age, shoe size, etc.) Assist learners to extract and classify the relevant data into information. **B4.1.3.1.3. Identify primary sources of information (photographs, audio recordings, video recordings, film, letters and diaries, speeches, published books, newspapers and magazines, government publications, oral histories, etc.)** Guide learners in groups to discuss where one can get data and information and make a presentation on it to the class. **B4.1.3.1.4. Demonstrate Sending and sharing information to and from other gadgets. e.g., radio, fax, telephones calls, SMS etc.** Guide learners to mention or talk about where one can receive or share information in the community and the world as a whole. NB: recall content in B3 and add to this activity. **B4.1.3.1.5. Demonstrate basic calculations on sample data e.g. sum, percentage, average etc.** Guide learners to perform basic calculations on sample data they have been made to collect using sum, average, percentages etc. **NB: This is to help the learner with fundamental principles of problem-solving in computing and Computer science**.	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Communication 2. Arithmetic

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.1.3.2. Demonstrate data collection using Data collection tools. **CONTI'D**	**B4.1.3.2.1. Identify the steps and issues involved in data collection.** Guide learners to explore: I. the steps and issues involved in collection of data, a) identify the reason(s) for collecting data, b) select from the list of reasons for collecting the data and set goals, c) plan an approach and methods to collecting data and d. collect the data and interpret the data. II. the issues involved in collection of data: a) Unavailability of data b) Intentional manipulation of data c) Random errors etc. **B4.1.3.2.2. Describe various tools or techniques of data collection e.g. interview, observation, checklist etc.** Guide learners to explore the tools for collecting data and aid them to make practical examples of the various tools. **B4.1.3.2.3. Draw or sketch maps of the area to be surveyed.** Bring diagrams or pictures of area(s) surveyed. Guide learners to sketch maps of an area to be surveyed by them.	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Data Collection Skill

SUB-STRAND 4: TECHNOLOGY IN THE COMMUNITY (COMMUNICATION)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.1.4.1. Demonstrate the use of technology in the community	**B4.1.4.1.1. Describe how digital systems are used and could be used at home, in school and the local community.** Guide learners to mention and describe how digital systems (computers, mobile phones, megaphones etc.) are used and could be used at home, in school and the local community. **B4.1.4.1.2. Identify and list common examples of energy-efficient gadgets and techniques used in homes, in schools and in the local communities e.g. using the appropriate energy-efficient gadgets - energy saving bulbs …, choosing the right appliances, cleaning your stove often (soot removal), reducing overall cooking time etc.** Bring pictures of energy-efficient gadgets or devices to class e.g. energy saving light bulbs, energy-efficient cooking stoves, toilet water saver, solar chargers, energy-saving shower heads etc. to class. Guide learners to discuss in groups of five or less and present to the whole class examples of energy-efficient devices and techniques. **B4.1.4.1.3. Describe how a range of digital systems (hardware and software) and their peripheral devices can be used for different purposes in the community.** Guide learners to discuss in groups of three to five, the range of digital systems and their peripheral devices. How they can be used for different purposes in the community. Let learners present their findings to the class. **NB: technological tools stated here should be different from those stated in B3**.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Phonics 2.Skill development

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.2.1.1. Demonstrate the use of MS- PowerPoint	**B4.1.4.1.4. Identify technological changes in the community (e.g. Using automated irrigation for farming, eco-friendly pesticides and manure, etc.)** Guide learners to explore technological changes in the community or in the world. Let learners find examples of technological changes in the community or world around them. They should be encouraged to present their findings to the class.	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills

STRAND 2: PRESENTATION

SUB-STRAND 1: INTRODUCTION TO MS-POWERPOINT (TABS AND RIBBONS OF MS-POWERPOINT)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.2.1.1. Demonstrate the use of MS- PowerPoint	**B4.2.1.1.1. Demonstrate the use of clipboard, slides, fonts, paragraph and editing in the ribbons under the home ribbons section.** Guide learners to explore the use of the clipboard, slides, fonts, paragraph, and editing features in MS- PowerPoint under the Home tab. **B4.2.1.1.2. Show a 3-slide presentation using clipboard, slides, fonts, paragraph and editing of the ribbons studied.** Guide learners to prepare and present a prepared project or exercise using clipboard, slides, fonts, paragraph and editing of the ribbons studied their work in MS-PowerPoint to the class. **NB: This is to help the learners with software knowledge in Ms PowerPoint, office applications to grasp the concept well**	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills

STRAND3: WORD PROCESSING

SUB-STRAND 1: INTRODUCTION TO WORD PROCESSING (TABS AND RIBBONS OF WORD PROCESSING)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B4.3.1.1. Demonstrate understanding of the use of word processing application	**B4.3.1.1.1. Demonstrate how to use the clipboard, styles, fonts, paragraph and editing.** Guide learners to use clipboard, styles, fonts, paragraph and editing in the Home Tab of MS –Word. **B4.3.1.1.2. Illustrate the use of the clip board, styles, fonts, paragraph and editing.** Guide learners to use the clipboard, styles, fonts, paragraph and editing feature under the Home tab and let learners explore on a simple word document. NB. This is to help the learners with software knowledge in office applications (word processing) to grasp the concept better.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1 Software Manipulation Skills

BASIC 5

Basic 5

STRAND1: INTRODUCTION TO COMPUTING
SUB-STRAND 1: GENERATION OF COMPUTERS AND PARTS OF A COMPUTER AND OTHER GADGETS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.1.1.1: Identify parts of a computer and technology tools	**B5.1.1.1.1. Recognise and use output devices.** Guide learners to recall what they learnt in the previous classes and ask them to mention computer devices that produce output. Softcopy- computer monitor/projector, audio electrical signals etc. Hardcopy- printed images, pictures documents, **NB: This is to help the learner with hardware knowledge.** **B5.1.1.1.2. Describe the types of output device and identify their uses.** Guide learners to identify types of output devices and their uses. Assist them to list them on the board as well as their uses. **B5.1.1.1.3. Distinguish the difference and similarities between analogue and digital devices e.g. telephone, mobile phone, radio, tablets, satellite etc.** Guide the learners to identify the similarities and differences between analogue and digital devices. Present examples of analogue and digital devices to learners. Aid them to mention other examples of analogue devices and digital devices as well as noticing the differences. **B5.1.1.1.4. Identify the left, right mouse button, holding of mouse, performing single, double and triple clicking and dragging object**. Guide learners to use the mouse to perform single, double and triple clicking and dragging object into a folder or bring picture(s) describing the processes; single, double and triple clicking and dragging objects into a folder and ask leaners to point out a mentioned process.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** **1** Software Manipulation Skills

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.1.1.1: Identify parts of a computer and technology tools **CONT'D**	**B5.1.1.1.5. Identify home row keys, top row, bottom row keys, numerical pad and type (short sentences).** Guide learners to type using top row keys (Q, W, E, R, and T keys for the left-hand and Y, U, I, O, and P keys for the right-hand), bottom row keys (Z, X, C, V, and B keys for the left-hand and N, M, comma, period, and forward slash keys for the right-hand), numerical pad (1, 2, 3, …9. etc.) and type an essay (50 words) using Word Processor or typing tutorial **B5.1.1.1.6. Summarise the generation of computers.** Guide learners to recall what has been learnt in previous classes and ask leading questions, use scenarios to help learners identify the difference between the types of computers, their advantages and disadvantages. **NB: Learners can practise with the keyboard only in the absence of the applications.** **Learners should be guided to play computer games to reinforce keyboard and mouse skills.**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills

SUB-STRAND 2:

INTRODUCTION TO MS-WINDOWS INTERFACE (DESKTOP BACKGROUND AND LOCATIONS OF THE COMPUTER)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.1.2.1. Demonstrate the use of the Desktop Background as well as working with folders.	**B5.1.1.1.1. Introduction to Windows Interface.** Guide learners to list the features (i.e. Start Menu Returns, Cortana on Desktop, Xbox App, Project Spartan Browser, etc.) and compatibility issues of Windows 10. Do this by using leading questions, or any other method. **B5.1.2.1.2. Personalise the Desktop Background and edit its images (e.g. image, icons and Taskbar of the background).** Guide learners to create their own background picture using any application (e.g. paints). Guide them to use it as background picture. **B5.1.2.1.3. Recognise how to customise the Desktop Background using Change Background, Start menu and Pin to taskbar or start menu**. Guide learners to identify and use task bar, start menu, etc. **B5.1.2.1.4. Describe how to Personalise the Desktop Background using advance tools and settings.** Guide learners to customize the Start Menu and the Notification Area. **B5.1.2.1.5. Creating a short cut, adding or removing common icons on the desktop.** Guide learners to create shortcuts of icons on the computers' desktop.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.1.2.1. Demonstrate the use of the Desktop Background as well as working with folders. **CONT'D**	**B5.1.2.1.6. Moving, copying and pasting a file or icon into and from a folder on the desktop** Guide learners to copy and paste a file or icon into and from a folder on the desktop. **B5.1.2.1.7. Demonstrate understanding of the File Explorer window and locations of the computer through the file explorer.** Guide learners to use the file explorer to locate files. **NB: This is to help the learner with the fundamental skills of creativity in computing and Computer Science.**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** Software Manipulation Skills

SUB-STRAND 3: DATA, SOURCES AND USAGE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.1.3.1. Illustrate the use of Data and identify their sources.	**B5.1.3.1.1. Use Strategies for identifying data from results of an experiment.** Guide learners to identify the types of data (qualitative and quantitative) by asking leading questions. Task them to convert data from one format to another without losing its value. **B5.1.3.1.2. Identify primary sources of information e.g. photographs, audio, video recordings, letters etc.** Guide learners to mention or talk about primary sources of information. Task learners to record data from the primary source and bring them to class for discussion. List items recorded and ask learners to group according to their similarities. **B5.1.3.1.3. Identify secondary sources of information e.g. radio, fax, telephones calls, SMS etc.** Guide learners to mention or talk about where one can receive or send information by asking leading questions. Task learners to record data from the news on the radio and bring to class for discussion. List items recorded and ask learners to group according to their similarities. **B5.1.3.1.4. Demonstrate sending and sharing information e.g. arranging data, sorting and calculations etc.** Task learners to sort data in alphabetical order (increasing and decreasing order) and perform basic calculations such as multiplying, dividing and adding vales of sample data. Learners can also be guided to generate age data from their dates of birth. **NB: recall content in B4 and add to it.** **B5.1.3.1.5. Demonstrate basic calculations on sample data e.g. arranging and summing and averaging data.** Guide learners to add and find the average data collected and present their findings to the class.	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills 2. Communication

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.1.3.1. Illustrate the use of Data and identify their sources. **CONT'D**	**B5.1.3.1.6. Recognise data types (integer, double, float).** Divide learners into two groups and ask one group to mention a number and the other group to identify the type of data mentioned **B5.1.3.1.7. Demonstrate sending and sharing information.** Guide learners to send messages to each other via SMS, email. etc. **NB: This is to help the learner with fundamental principle of problem solving skills and creativity in computing and computer science.** **B5.1.3.1.8 Select the samples and collect data (e.g. listening to radio, newspaper, talking to people etc.)** Put learners into groups, task them to interview teachers using simple questionnaire, and record the data in books. **B5. 1.3.1.9 Make simple tables and diagrams from the collected data.** Bring tools or pictures of the tools in a box or container and ask learners to select tools for collecting data out of the box or container. Alternatively, ask learners to bring tools for collecting data for a class discussion. **B5. 1.3.1.10 Analyse tables, maps, diagrams, photographs and charts, and generalize the results and make suggestions (e.g. Finding sum or grand total).** Task learners to calculate the average, mean, sum and difference between data collected in an earlier class. NB: This is to help the learner with fundamental principle of problem-solving skills and creativity in computing and computer science.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Arithmetic 2. Data Manipulation Skill 3. Communication 4. Critical Thinking

SUB-STRAND 4: TECHNOLOGY IN THE COMMUNITY (COMMUNICATION)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.1.4.1. Demonstrate the use of Technology in the community	**B5.1.4.1.1. List the effects of technology on the community.** Guide learners to investigate the types and importance of compression of document Positive effects – health care, education, manufacturing, agriculture etc. Negative effects – resource depletion ,pollution, privacy and security etc., **B5.1.4.1.2. Explain the fundamentals of digital system components (hardware, software and networks).** Guide learners to brainstorm the basics of digital system components such as hardware, software and networks). **B5.1.4.1.3. Discuss how technology is used to save lives in community and how they are used** Guide learners to explore how technology is used to save lives in communities. Group them into groups of a maximum of five and let them present their findings to the class. **B5.1.4.1.4. Discuss the effects of technology on the community.** Guide learners to brainstorm the effects of technology on the community. Show learners videos or pictures of effects of technology on the community. Let them discuss in groups, the effects of technology on their own community. Positive effects – health care, education, manufacturing, agriculture etc. Negative effects – resource depletion, pollution, privacy and security etc. **NB: This is to help the learners to have fundamental knowledge of hardware such as robots and sensors).**	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills 2. Communication

STRAND 2: PRESENTATION

SUB-STRAND 1: INTRODUCTION TO MS-POWERPOINT (TABS AND RIBBONS OF MS-POWERPOINT)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.2.1.1. Demonstrate how to use Microsoft PowerPoint	**B5.2.1.1.1. Show the use of Insert, design, animation and transition in the ribbons section. (New, Open, Save, Save As, Print and Close) and the Insert and design ribbon.** Ask learners to use "File menu", "Insert" and "Design Ribbons" to create a new MS-PowerPoint slide and use shapes in the "Insert ribbon" to draw the Ghana flag". **B5.2.1.1.2. Show a 5-slide presentation using Insert, design, animation and transition of the ribbons studied.** Ask learners to use "File menu", "Insert" and "Design Ribbons" to design a colourful 5-paged MS-PowerPoint on the topic "Myself". NB. This is to help learners with software knowledge to understand well, the concept in office applications (Microsoft PowerPoint).	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills 2. Communication

STRAND 3: WORD PROCESSING

SUB-STRAND 1: INTRODUCTION TO WORD PROCESSING (TABS AND RIBBONS OF WORD PROCESSING)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.3.1.1. Illustrate the use of word processing	**B5.3.1.1.1. Demonstrate the use of Insert, Design, and Layout (New, Open, Save, Save As, Print and Close) and Insert, Design, and Layout ribbons. (i.e. clipboard, slides, fonts and paragraph).** Guide learners to use File menu, Insert, Design and Layout Ribbon. **B5.3.1.1.2. Illustrate the use of Insert, Design and Layout.** Guide the learners to create and format a document. **NB. This is to help learners with software knowledge such as office applications (word processing).**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills

STRAND 5: PROGRAMMING AND DATABASES

SUB-STRAND 1: INTRODUCTION TO DATABASES, ALGORITHM AND PROGRAMMING.

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.5.1.3. Demonstrate how to use Databases	**B5.5.1.3.1. Describe databases.** Guide learners to identify the features of a database and the types of databases that exist. Ask learners to select the databases from a list of items written on the board. **B5.5.1.3.2. Discuss the importance and uses of database.** Play a video of the importance and uses of databases and ask learners to mention other uses of database and their importance. Assist learners to realise that Database designers typically organise the data to model aspects of reality in a way that supports processes requiring information. **B5.5.1.3.3. Describe the types of database**. Guide learners to describe the types of database. **B5.5.1.3.4. Identify types of databases and data.** Guide learners to investigate on the types of databases and data. Let learners present their findings to the class. **B5.5.1.3.5. Explain fundamental database concepts.** Guide learners to explore the fundamental database concepts e.g. tables and data types, data selection and manipulation, security, and backup and restore. **B5.5.1.3.6 Discuss programming languages and their use (e.g. scratch, vb.net etc.)** Guide learners to investigate in groups on the programming languages and their use (e.g. scratch, vb.net etc.) NB: This is to give a foundation to the learner in computing and Computer Science which is more concerned with uses of and development of programming together with fundamental principles of problem-solving and creativity.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Data Manipulation Skills

SUB-STRAND 2: INTRODUCTION TO ELECTRONIC SPREADSHEET(TABS AND RIBBONS MANIPULATION)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.5.1.2. Demonstrate how to use Electronic Spreadsheet.	**B5.5.1.2.1. Identify Electronic Spreadsheets and their uses.** Play video on Electronic Spreadsheets and their uses in society. Assist learners to list examples of Electronic Spreadsheets (MS Excel, Numbers, Google sheets, Lotus 1-2-3 etc.). Guide learners to explore the uses of electronic spreadsheets. **B5.5.1.2.2. Learners discuss the importance of Electronic Spreadsheets.** Guide learners to discuss the importance of Electronic Spreadsheets and what they are used for. **B5.5.1.2.3. Learners get familiar with the interface of MS-Excel** Guide Learners to demonstrate how to access MS-Excel on any computer or gadget and display text in MS-Excel. **NB. This is to help the learner with an understanding of application softwares (Electronic Spreadsheet application).**	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Software Manipulation Skills 2. Communication skills

STRAND 6: INTERNET AND SOCIAL MEDIA SUB-STRAND 1: NETWORK OVERVIEW

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.1.1. Demonstrate how to Network computers.	**B5.6.1.1.1. Explain what a network is.** Guide the learners to discuss how devices communicate. Demonstrate simple connectivity between nodes. **B5.6.1.1.2. Describe how the internet works.** Guide learners to distinguish between PAN, LAN, MAN, WAN and Internet. **B5.6.1.1.3. Explain what the Internet is.** Guide learners to discuss the inter-connection of the internet computers (learners should be made to realise that the internet is a network of networks). Also, guide learners to come out with examples of Internet Communication.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Communication skills

SUB-STRAND 2: WEB BROWSERS AND WEB PAGES

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.2.1. Demonstrate how to use Web Pages.	**B5.6.2.1.1. Explain what a web browser is and its use.** Guide learners to understand the concept and use of browsers through practical lessons. Show interfaces or images of browsers to learners. **B5.6.2.1.2. Identify web browsers.** Guide learners to list the various types of browsers e.g. Firefox, Internet Explorer, Chrome etc. through practical lessons or the use of pictures. **B5.6.2.1.3. Demonstrate the use of MS-Internet Explorer.** Guide learners to launch MS-Internet Explorer and use the components (navigation, browse, etc.) **B5.6.2.1.4. Show how to create and remove a favourites link.** Guide learners to practice how to create or remove favourite links in practical session(s). **B5.6.2.1.5. Create favourites folder.** Guide learners to practice how to create a favourites folder through practical session(s). **B5.6.2.1.6. Use the links toolbar.** Guide learners to practise the use of link toolbar through practical session(s). NB: This is to help the learner with the fundamental skills of creativity in computing and Computer Science.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Communication skills 2. Internet skills

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.2.1. Demonstrate how to use Web Pages CONT'D	**B5.6.2.1.7. Explain what a Web Page is.** Guide learners to explore features of a Web Page (text, graphics, audio, video, animation etc. through practical lessons) **B5.6.2.1.8. Explain what a home page is.** Guide learners to identify a home page from other web pages, through practical lessons. **B5.6.2.1.9. Movement within and between web pages using hyperlinks.** Guide learners to practise clicking hyperlinks, through practical lessons. NB: This is to help the learner with the fundamental skills of creativity in computing and Computer Science.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Internet Skills 2. Communication

SUB-STRAND 3: SURFING THE WORLD WIDE WEB

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.3.1. Demonstrate how to use Favourite places	**B5.6.3.1.1. Show how to create a favourite link.** Guide learners to create a favourite link. . **B5.6.3.1.2. Demonstrate deleting favourite links.** Guide learners to delete favourite links they have created in the previous lesson. **B5.6.3.1.3. Create favourite folder.** Guide learners to create a favourite folder. **B5.6.3.1.4. Use the links toolbar.** Guide learners to use the links toolbar. **NB: This is to help the learner with the fundamental skills of surfing and navigating the internet.**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Communication

SUB-STRAND 4: FAVOURITE PLACES AND SEARCH ENGINE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.4.1. Demonstrate how to use Search Engines.	**B5.6.4.1.1. Identify common search engines.** Guide learners to discuss search engines and the different types of search engines (Google, DuckDuckGo, Yahoo etc.) **B5.6.4.1.2 Explore how smart search engines work**. Guide learners to appreciate how smart search engines work (i.e. how professionals or people seek information for their work or interests and what information they draw from it). **B5.6.4.1.3. Demonstrate how to handle search results.** Guide learners to explore the way to handle search results from a search engine. **NB: This is to help the learner with the fundamental skills of surfing and navigating the internet.**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Communication Skills 2. Research Skills

SUB-STRAND 5: USING ONLINE FORMS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.5.1. Demonstrate the Usage of Forms	**B5.6.5.1.1. Identify and describe forms in a web page.** Guide learners to fill out dropdown boxes, combo box, Text fields etc. **B5.6.5.1.2. Demonstrate working on or offline.** Guide learners to register or fill out online forms as well as offline through practical sessions. Learners can be guided to create PDF or Word forms to practise filling out forms offline. **B5.6.5.1.3. Demonstrate downloading of files (e.g. pictures, audio, pdf etc.).** Guide learners to download a file through practical session(s).	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Communication 2. Software Manipulation Skill development

SUB-STRAND 6: CUSTOMIZING YOUR BROWSER

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.6.1. **Show how to Customize a Browser**	**B5.6.6.1.1. Demonstrate how to set default search engines.** Guide learners to set default search engines. **B5.6.6.1.2. Show how to set homepages.** Guide learners to set homepages. **B5.6.6.1.3. Show how to make Browser apps, add-ons, plug-ins, and extensions.** Guide learners to make Browser apps, add-ons, plug-ins, and extensions. **B5.6.6.1.4. Illustrate how to customise the browser toolbar**. Facilitate learners to customise the browser toolbar. **B5.6.6.1.5. Identify cookies in web browsers.** Aid learners to recognize cookies in web browsers. **B5.6.6.1.6. Illustrate how to set disk space or cache usage**. Guide learners to set disk space or cache usage.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Internet Skill Development 2. Communication

SUB-STRAND 7: ELECTRONIC EMAIL

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.7.1. **Demonstrate the use of Electronic Mail**	**B5.6.7.1.1. Identify the various e-mail service providers.** Guide learners to explore on the various email service providers (email, outlook.com, icloud mail). **B5.6.7.1.2. Demonstrate the use of internet e-mail addresses.** Guide learners to start an email address. Assist learners to use email address. **B5.6.7.1.3. Creating an email account e.g. Yahoo mail or Gmail account. (Yahoo Mail or Gmail account.).** Guide learners to create email account (i.e. the possible steps). **B5.6.7.1.4. Illustrate viewing received messages and Create or Compose messages.** Guide learners to write messages, format text, etc.	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Communication 2. Software Manipulation Skill development

SUB-STRAND 8: INTERNET OF THINGS (IOT)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.8.1. **Demonstrate the use of Internet of Things (IoT)**	**B5.6.8.1.1 Describe the purpose of Internet of Things.** Guide learners to discuss the purpose IoT in groups. **B5.6.8.1.2. Give examples of Internet of Things with a consumer part and an industrial/business segment.** Guide learners to give, explore and present in class examples of Internet of Things with a consumer part and an industrial/business segment. **B5.6.8.1.3. Identify components of Internet of Things.** Guide learners to explore the components of the Internet of Things. e.g. Hardware, Data, Software and Connectivity.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy.

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.8.1. **Demonstrate the use of Internet of Things (IoT)** **CONT'D**	**B5.6.8.1.4. Identify the role of smart sensors in the Internet of Things.** Guide learners to explore the role of smart sensors in the Internet of Things e.g. Sensing and data collection capability such as climatic change (e.g. Electronic Doors, RFID, CCTV camera, etc.), define at least five terms and acronyms of IoT. NB: This is to help the learner grasp the fundamental knowledge of hardware such as robots and sensors.	**Subject Specific Practices** 1. Communication 2. Software Manipulation Skill development

SUB-STRAND 9: DIGITAL LITERACY

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.4.9.1. Demonstrate proficiency in Digital Literacy.	**B5.6.4.9.1.1. Describe private and personal information.** Encourage learners to tell you what they know about private and personal information online. Ask leading questions to help them bring out points they could not make out. **B5.6.4.9.1.2. Discuss various techniques on online protection from online identity theft.** Guide learners to discuss security measures online such as logging out after browsing, etc.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Communication 2. Phonics 3. Skill development

SUB-STRAND 10: DIGITAL LITERACY

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.6.10.1. Demonstrate the application of Network Etiquette (Netiquette).	**B5.6.10.1.1. Define digital footprint.** Guide learners to explain digital footprint. **B5.6.10.1.2. Illustrate how to keep some information from public when using the internet.** Guide learner to avoid posting personal information.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Communication 2. Phonics 3. Skill development

STRAND 7: HEALTH AND SAFETY IN USING ICT TOOLS
SUB-STRAND 1: HEALTH AND SAFETY IN USING ICT TOOLS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B5.7.1.1. Demonstrate the application of Health and safety measures, in using ICT tools.	**B5.7.1.1.1. Identify some major health hazards associated with the use of ICT tools.** Guide the learners to discuss wrist pain and sitting posture (neck, back and waist pain). **B5.7.1.1.2. Describe proper sitting posture.** Guide learners in groups to discuss, identify and practise the proper sitting posture (i.e. siting at 90 degrees, wrist should be supported with a wrist pad, take short breaks etc.) when using the computer.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** **1.** Communication

BASIC 6

Basic 6

STRAND 1: INTRODUCTION TO COMPUTING

SUB-STRAND 1: GENERATION OF COMPUTERS AND PARTS OF A COMPUTER AND OTHER GADGETS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.1.1.1: Identify parts of a computer, technology tools and history of computers	**B6.1.1.1.1. Learn about the Generation of Computers** Guide learners to discuss the Generation of Computers. Microprocessors - Super Computers, Mainframe, Minicomputers and Microcomputers, Mobile Phones, etc **B6.1.1.1.2. Identify components of a Computer System: Hardware, Software and Liveware.** Guide learners to identify Hardware (input, output, storage and communication), Software, Liveware and discuss the components and how they are used NB: the discussion should be limited to definition level. **B6.1.1.1.3. Identify the left, right mouse button, holding of mouse, performing single, double and triple clicking, dragging object and using the scroll wheel** Guide learners to master the use of mouse through practical sessions and games. **B6.1.1.1.4 Demonstrate proper use of keyboarding technique.** Guide learners to type stories using Word Processor or typing tutorial (e.g. Mavis Beacon) to improve typing speed **B6.1.1.1.5. Summarise the generation of computers (second generation of computers.)** Group learners into groups. Guide them to summarise the generation of computers. Thereafter, let them present their findings in groups to the class. eg. First generation, Second generation, Third generation etc.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Communication 2. Phonics 3. Skill development

SUB-STRAND 2: INTRODUCTION TO MS-WINDOWS INTERFACE (DESKTOP BACKGROUND AND LOCATIONS OF THE COMPUTER)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.1.2.1. Demonstrate the use of the Desktop Background as well as working with folders.	**B6.1.2.1.1. Explore the use of the desktop Background, changing the themes, colours and User account. (e.g. classic, icons and Taskbar of the background)** Guide learners to use the desktop Background, change the themes, colours and the User account. **B6.1.2.1.2. Demonstrate the use of the Recycle Bin or Trash Can.** Guide learners to use the recycle bin by deleting and viewing deleted files. **B6.1.1.1.3 Perform permanent delete or Empty Trash can and restoring files or icons in the recycle bin.** Support learners to liken the Recycle bin and its use to the real-world office trash can. **B6.1.2.1.4. Explore the use of Copy, Paste, Delete tools, the moving of folders by using the Desktop Pop-Up menu.** Guide learners to use the Copy, Paste, Delete tools, the moving of folders by using the Desktop Pop-Up menu. **B6.1.2.1.5. Illustrate the use of File Explorer window and locations of the computer through the file explorer.** Guide learners to use File Explorer window and locations of the computer through the file explorer. **B6.1.2.1.6. Locate the hard drives, and other removable storage icons in the File explorer.** Guide learners to locate the hard drives and other removable storage icons in the File explorer.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development 2. Communication

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.1.2.1. Demonstrate the use of the Desktop Background as well as working with folders. **CONT'D**	**B6.1.2.1.7. Use the File Explorer Ribbon (Home Ribbon only), that is, the use of the Clipboard and Organise tools of the Home Ribbon of the File Explorer, as well as the Open New Window and Close tools of the File Menu of the File Explorer.** Guide learners to use the File Explorer Ribbon (Home Ribbon only); the use of the Clipboard and Organise tools of the Home Ribbon of the File Explorer, and Open New Window and Close tools of the File Menu of the File Explorer. **B6.1.2.1.8. Demonstrate the use of the navigation Pane of the File Explorer to access different locations of the computer from the navigation pane.** Guide learners to use the navigation Pane of the File Explorer to access different locations of the computer from the navigation pane. **B6.1.2.1.9. Demonstrate the use of Frequent Folders Section of the File Explorer to access frequently used locations of the computer.** Guide learners to explore the use of Frequent Folders Section of the File Explorer to access frequently used locations of the computer. **B6.1.2.1.10. Demonstrate the use of Recent Files Section of the File Explorer to access frequently used files of the computer.** Guide learners to explore the use of Recent Files Section of the File Explorer to access frequently used files of the computer.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development 2. Communication 3. Phonics

SUB-STRAND 3: DATA, SOURCES AND USAGE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.1.3.1. Demonstrate the use of Data and identify sources of data	**B6.1.3.1.1. Identify types of data. (Integers, double, characters, float etc.)** Guide learners to identify and record data in the different forms. **B6.1.3.1.2. Identify more sources of data and information e.g. internet (emailing, Skype, SMS etc.)** Guide learners to discuss where one can get data and information. **B6.1.3.1.3. Demonstrate sending and receiving information from other gadgets e.g. Bluetooth, Infrared, Radio, Fax, Telephones calls, SMS etc.** Guide learners to mention or talk about where one can receive or send information **B6.1.3.1.4. Demonstrate basic manipulations on sample data e.g. arranging data in a matrix table, sorting and calculations etc.** Guide learners to sort data in alphabetical order (increasing and decreasing order) and perform basic calculations such as multiplying, dividing and adding values of sample data. Learners can also be guided to generate age data from dates of birth. **B6.1.3.1.5. Demonstrate how to manage users of the Desktop** Guide learners to brainstorm managing users of the Desktop. Use videos or pictures that show how to manage users of the Desktop. Facilitate learners to do same. **NB:** This is to help the learner with fundamental principle of problem-solving skills and creativity in computing and computer science.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development 2. Communication 3. Phonics 4. Arithmetic

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.1.3.1. Demonstrate the use of Data and identify sources of data **CONT'D**	**B6.1.3.1.6. Demonstrate how to collect data (e.g. listening to radio, reading newspapers, interviews, use of questionnaires etc.)** Lead learners to collect data from the community using simple questionnaires, surveys, documents, observations, and record their findings data. **B6.1.3.1.7. Demonstrate the use of the tools for collecting data.** Bring tools or pictures of the tools for collecting data e.g. case studies, interviews, checklists, etc. **B6.1.3.1.8. Demonstrate data interpretation by computing data to gain required information (e.g. Finding sum or grand total using Electronic Spreadsheet).** Guide learners to make meanings out of data collected using tables, charts or Spreadsheets. **B6.1.3.1.9. Demonstrate data presentation in different forms.** Guide learners to write data in tables, pictures, charts, maps, words etc. as well as type them in a Spreadsheet. **B6.1.3.1.10. Demonstrate how to store data.** Guide learners to use the tools stated above to store data in different formats. eg. handwriting, phone recording, magnetic tapes, optical disc etc.	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1.Skill development 2.Communication 3.Phonics 4. Arithmetic

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.1.3.1. Demonstrate the use of Data and identify sources of data **CONT'D**	**B6.1.3.1.11. Manipulate data to gain required output (e.g. Finding sum, mean, grand totals, maximum, minimum, mode, division, multiplication etc.)** Guide learners to find the mode, product, minimum value, maximum value etc. **NB: This is to help the learner with fundamental principle of problem solving-skills and creativity in computing and Computer Science.**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Arithmetic 2. Skill development 3. Communication

SUB-STRAND 4: TECHNOLOGY IN THE COMMUNITY

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.1.4.1. Demonstrate the use of Technology in the community.	**B6.1.4.1.1. Define communication.** Put learners into groups to discuss communication and present findings to the class. **B6.1.4.1.2. Identify three more technological tools for communication in the community.** Guide learners to mention and describe the importance of technology in communication. **B6.1.4.1.3. Demonstrate communication with others.** Guide learners to demonstrate communication (explain how communication is done via TV, radio, phone call, satellite etc.). **B6.1.4.1.4. Identify three more importance of technology in communication.** Guide learners to mention the importance of technology in communication. **NB: Technological tools stated here should be different from those stated in B5.This is to help the learner have a fundamental knowledge of hardware such as robots and sensors).**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Communication 2. Phonics 3. Skill development

STRAND 2: PRESENTATION
SUB-STRAND 1: INTRODUCTION TO MS-POWERPOINT

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.2.1.1 Demonstrate how to use Microsoft PowerPoint	**B6.2.1.1.1. Demonstrate how to use the File menu, the Insert and Design Ribbon from B5.** Guide learners to use File menu, Insert and Design Ribbons. **B6.2.1.1.2. Demonstrate how to use icons in the Text group in the Insert Ribbon.** Guide learners to properly use the icons in the Insert Ribbon. **B6.2.1.1.3. Be able to give a 5-side presentation in MS-PowerPoint using the tools of the ribbons studied.** Guide learners to present their work to the class. **NB. This is to help the learner with software knowledge such as in-office applications (Presentation software).**	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development 2. Communication 3. Phonics

STRAND 3: WORD PROCESSING
SUB-STRAND 1: INTRODUCTION TO MS-POWERPOINT

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.3.1.1. Illustrate the use of word processing application	**B6.3.1.1.1. Demonstrate how to use the File menu and Insert, Design, and Layout Ribbons from B5.** Guide learners to use File menu, Insert, Design and Layout Ribbon. **B6.3.1.1.2 Demonstrate how to use icons in the Text group in the Insert Ribbon.** Guide learners to properly use the icons in the Insert Ribbon. B**6.3.1.1.3 Be able to use the attributes of the ribbons studied in a paragraph.** Guide the learners to create and format text in a document **NB. This is to help the learner with software knowledge such as in-office applications (word processing).**	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1.Skill development 2.Communication 3. Phonics

STRAND 5: PROGRAMMING AND DATABASES
SUB-STRAND 1: INTRODUCTION TO DATABASES, ALGORITHM AND PROGRAMMING. LANGUAGES (e.g. MS- EXCEL, SCRATCH, VB DOT NET ETC.)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.5.1.1. Demonstrate how to manipulate data in Databases	**B6.5.1.1.1 Describe Databases.** Guide learners through discussion in groups, to list and describe databases. **B6.5.1.1.2 Identify databases and data structures.** Guide learners to identify databases structures. ie. database structure is the collection of record type and field type definitions that comprises the database. **B6.5.1.1.3. Explain Fundamental Database concepts.** Guide learners to apply the fundamental database concepts to a sample database in a class discussion **B6.5.1.1.5. Describe the basics of Relational Data model.** Lead learners to describe the basics of Relational Data model. ie. rows and columns. **B6.5.1.1.6. Identify the basics of logical Database Design.** Guide learners to list the basics of logical database design and develop sample database design. **B6.5.1.1.7. Illustrate basics of relational algebra.** Guide learners to apply the basics of relational algebra in a sample database.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development 2. Communication

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.5.1.1. Demonstrate how to manipulate data in Databases **CONT'D**	**B6.5.1.1.8. Operate basics SQL: querying and manipulating data.** Guide learners to write simple queries to retrieve specific names of students from a database of the names of all students in class database design. eg. CREATE DATABASE , SELECT and UPDATE **B6.5.1.1.9. Operate basics SQL: querying and manipulating data.** Guide learners to write simple queries to retrieve specific names of students from a database of the names of all students in class. e.g CREATE TABLE, DELETE and INSERT INTO, **NB: This is to give a foundation to the learner in computing and Computer Science which is more concerned with uses of and development of programming together with fundamental principles of problem-solving and creativity.**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development 2. Arithmetic 3.Communication

SUB-STRAND 2: INTRODUCTION TO ELECTRONIC SPREADSHEET (TABS AND RIBBONS MANIPULATION)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.5.3.1. Demonstrate how to use Spreadsheet.	**B6.5.3.1.1 Demonstrate how to use the ribbons under the home ribbons. (i.e. clip board, styles, fonts, paragraph and editing)** Guide learners to do a presentation on the use of the ribbons under the home button. **B6.5.3.1.2. Learners to create basic worksheets using Microsoft Excel 2016.** Guide learners to develop worksheet consisting of list of names ie. teachers, students, friends, families, etc. **B6.5.3.1.3. Perform calculations in an MS-Excel worksheet.** Guide learners to develop worksheet that will help in calculating multiplication, addition and subtraction. **B6.5.3.1.4. Modify an MS-Excel worksheet.** Guide learners to modify worksheet by adding the age of learners in the class to the list of learners created in an earlier class. **B6.5.3.1.5 Modify the appearance of data within a worksheet.** Show examples of modified data in (a) worksheet(s), either on projected screens or pictures. Guide learners to modify the appearance of data within a worksheet.	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1. Skill development 2. Arithmetic

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.5.3.1. Demonstrate how to use Microsoft Excel **CONT'D**	**B6.5.3.1.6. Manage Excel workbooks.** Guide learners to properly name MS-Excel workbooks and store them in folders for retrieval later. **B6.5.3.1.7. Print the content of an MS-Excel worksheet.** Guide learners to adjust margins to suit the A4 paper size for printing in landscape and portrait. **NB. This is to help the learner with software knowledge such as in-office applications (Electronic spreadsheet application).**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy.

STRAND 6: INTERNET AND SOCIAL MEDIA
SUB-STRAND 1: NETWORK OVERVIEW

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.1.1. Demonstrate how to Network computers.	**B6.6.1.1.1. Give examples of facilities the internet offers.** Guide learners to give examples of internet facilities ie. e-mail, FTP's, www, etc. for presentation. **B6.6.1.1.2. Describe the types of information available on the Internet.** Guide learners to identify and describe the types of information available on the Internet. eg. Educational, Financial, Entertainment, etc. Select learners into groups to do this task. **B6.6.1.1.3. Identify data duplication.** Display list of names of learners on the board and ask them to identify the duplicated data. **B6.6.1.1.4. Outline what one needs to connect to the Internet.** Encourage learners to bring any device or pictures of devices that are needed. eg. desktop computers, Laptop computers, Mobile phones, etc. **NB: This is to help the learner with fundamental principle of problem-solving skills and creativity in computing and computer science.**	1. Creativity and innovation. 2. Communication and collaboration. 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy.

SUB-STRAND 2: WEB BROWSERS AND WEB PAGES

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.2.1. Demonstrate the use of a Web Browser	**B6.6.2.1.1 Identify the address or links window.** Guide learners to identify the address or links window on phones and other electronic gadgets with browsers, **B6.6.2.1.2. Recognise the status bar and list its use.** Bring a picture of a window that has the status bar and ask the learners to point out the status and mention its functions **B6.6.2.1.3. Illustrate using help button.** Guide learners to do an activity you have not tackled in class and ask them to use the Help button to navigate and find the steps involved. Guide learners to carry out the stated steps. **B6.6.2.1.4. Recognise internet explorer speed keys.** Ask learners to use the speed keys to open a new browser, make font size bigger in a browser, etc. **NB: This is to help the learner with fundamental principle of problem-solving skills and creativity in computing and computer science.**	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy.

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.2.1. Demonstrate the use of a Web Browser **CONT'D**	**B6.6.2.1.5. Recognise Uniform Resource Locators (URLs).** Guide learners to discuss the properties of URLs, their uses and where they are located. Learners can practise how to enter URLs in a browser. **B6.6.2.1.6. Demonstrate how to return to a URL.** Guide the learners to navigate using the back button to go to a previous page. **B6.6.2.1.7. Show how to find items on a page.** Guide learners to search for items using the search textbox. **NB: This is to help the learner with fundamental principle of problem-solving skills and creativity in computing and Computer Science.**	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development

SUB-STRAND 3: SURFING THE WORLD WIDE WEB

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.3.1. Demonstrate Surfing The World Wide Web	**B6.6.3.1.1. Recognize Resource Locators (URLs).** Guide learners to identify what URL is. Select learners into groups of five or less, to explore how to recognise URLs so as to aid learners to locate a resource on the web. **B6.6.3.1.2. Illustrate how to jump directory to URLs.** Give learners a project on how to jump directory to URLs. **B6.6.3.1.3. Demonstrate how to return to a URL.** Guide learners to investigate how to return to a URL. **B6.6.3.1.4. Show how to find items on a page.** Guide learners to discuss how to find items on a page. Guide learners to present their ideas or findings to class. **B6.6.3.1.5. Illustrate how to print pages.** Guide learners on how to print pages e.g. selected pages, only selected pages etc. **NB: This is to help the learner with fundamental principle of problem-solving skills and creativity in computing and Computer Science.**	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development

SUB-STRAND 4: FAVOURITE PLACES AND SEARCH ENGINE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.4.1. Demonstrate searching for information on the Web.	**B6.6.4.1.1. Show how to create a favourite link.** Guide learners to create an Internet favourite link. **B6.6.4.1.2. Demonstrate deleting favourite links.** Guide learners to delete a favourite link they have created. **B6.6.4.1.3. Create favourite folder.** Guide learners to create a favourite folder or subfolder. Help learners go through the necessary steps to create a favourite folder. **B6.6.4.1.4. Use the links toolbar and Favourite Places.** Guide learners to use the links toolbar. **NB: This is to help the learner with fundamental principle of problem-solving skills and creativity in computing and computer science.**	1. Creativity and innovation. 2. Communication and collaboration 3. Cultural identity and global citizenship. 4. Personal development and leadership. 5. Digital literacy. **Subject Specific Practices** 1.Skill development

SUB-STRAND 5: USING ONLINE FORMS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.5.1. Demonstrate the Usage of Forms	**B6.6.5.1.1. Demonstrate the types and uses of form elements.** Explore the uses of check boxes, radio buttons, textboxes etc. **B6.6.5.1.2. Demonstrate the filing of forms offline**. Guide learners to open and save a page. Lead them to fill the forms offline. **B6.6.5.1.3. Demonstrate uploading of files.** Lead learners to explore the upload button by adding pictures, audio, pdf etc. **B6.6.5.1.4. Illustrate retrieving text, pictures, sounds and programmer**. Lead learners to explore the download button by downloading pictures, audio, pdf etc. **B6.6.5.1.5. Discuss thoroughly security on the form submission.** Guide learners to investigate and identify security issues when typing account details online (Antivirus, Credit card details, personal passwords etc.) **NB: This is to give a foundation to the learner in computing and computer science which is more concerned with uses of and development of programming together with fundamental principles of problem-solving and creativity.**	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1.Skill development

SUB-STRAND 6: CUSTOMIZING YOUR BROWSER

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.6.1. Show how to Customize a Browser	**B6.6.6.1.1. Identify reasons for customising a web browser.** Discuss the reasons needed for customising an item (i) to gain access to quick commands or information (ii) for side by side browsing (iii) for beautifications. **B6.6.6.1.2. Illustrate how to set themes.** Explore on customisation , locate the more settings , Under appearance. **B6.6.6.1.3. Show how to customise the toolbar.** Lead learners to explore customising a browser… e.g. themes, wallpaper, tools etc. **B6.6.6.1.4. Set bookmarks.** Demonstrate the meaning of bookmarks – Bookmarks make you save shortcuts to your favourite webpages and navigate to them in seconds from anywhere. **B6.6.6.1.5. Show how to set cookies and demonstrate the steps in turning on cookies in a browser**. Guide learners to turn on cookies in a browser : 1. From the Tools menu, select Internet Options and enable session cookies, click the Privacy tab. 2. From the Settings section of the tab, click Advanced. **NB: Locate and click the checkbox next to Always allow session cookies.**	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Communication 2. Skill development

SUB-STRAND 7: ELECTRONIC EMAIL

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.7.1. Demonstrate the use of Electronic Mail	**B6.6.7.1.1. Show how to create and access e-mail messages.** Guide learners to receive email. **B6.6.7.1.2. Illustrate how to reply to and forward received messages.** Guide learners to use forward and reply buttons in email. **B6.6.7.1.3. Demonstrate how to delete messages.** Guide leaners to delete email messages. **B6.6.7.1.4. Illustrate filing of e-mail messages**. Guide learners to create folders in the Inbox and sorting emails into them. **B6.6.7.1.5. Create address list.** Guide learners to create an address list. **B6.6.7.1.6. Demonstrate attaching files to e-mail messages.** Guide learners to attach files to email. **B6.6.7.1.7. Demonstrate some e-mail tips.** Assist learners in writing email using techniques as NOT writing in caps. Check the extension of files before downloading and use the subject line for summary etc. **NB: This is to help the learner with the fundamental skills of creativity in computing and computer science.**	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Skill development 2. Communication

SUB-STRAND 8: INTERNET OF THINGS (IOT)

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.8.1. Demonstrate the use of Internet of Things (IOT)	**B6.6.8.1.1. Describe other hardware used in IoT Internet of Things**. Guide learners to discuss the IoT hardware in groups. **B6.6.8.1.2. Give more examples of internet of things with a consumer part and an industrial/business segment.** Guide learners to list at least five gadgets used for IoT (e.g. Nest Smart Thermostat, Samsung SmartThings Hub, August Smart Lock, etc.) **B6.6.8.1.3. Mention at least five more terms and acronyms of IoT .** Guide learners to describe IoT use. **NB: This is to help the learner to fundamental knowledge of hardware such as robots and sensors).**	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Communication 2. Skill development

SUB-STRAND 9: DIGITAL LITERACY

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.9.1. Demonstrate proficiency in Digital Literacy	**B6.6.9.1.1. Demonstrate how to handle private and personal information.** Guide learners on how not to post detailed personal information online. **B6.6.9.1.2. Devise various techniques on how to protect oneself from online identity theft.** Guide learners to use strong passwords or passphrases in online sites, etc. **B6.6.9.1.3. Debate a spam and solicited messages.** Guide leaners to differentiate spam from solicited messages. B**6.6.9.1.4. Differentiate between virtual friends and real friends.** Guide leaners to characterise virtual and real friends.	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Skill development 2. Communication

SUB-STRAND 10: INTERNET ETIQUETTE

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.6.10.1. Demonstrate the application of Internet Etiquette	**B6.6.10.1.1. Explain Internet etiquette and how to deal with it.** Guide learners to explain Internet etiquette and elaborate on some rules associated with it. **B6.6.10.1.2. Investigate on the responsible use of computers.** Guide learners to investigate the responsible use of computers. i. Information privacy ii. Copyright. Hardware, Software and information theft.	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Communication 2. Skill development

STRAND 7: HEALTH AND SAFETY IN USING ICT TOOLS
SUB-STRAND 1: HEALTH AND SAFETY IN USING ICT TOOLS

CONTENT STANDARDS	INDICATORS AND EXEMPLARS	SUBJECT SPECIFIC PRACTICES AND CORE COMPETENCES
B6.7.1.1. Demonstrate how to apply Health and Safety measures in Using ICT Tools	**B6.7.1.1.1. Identify five (5) major health hazards associated with the use of ICT tools. Discuss Eye strain, Eye irritation and Eye fatigue.** Guide learners to discuss some major health hazards associated with the use of ICT tools. **B6.7.1.1.2. Demonstrate solutions for the health related problems in ICT.** Guide learners to brainstorm finding the solutions to the health hazards associated with the use of ICT tools.	1. Creativity and innovation 2. Communication and collaboration 3. Cultural identity and global citizenship 4. Personal development and leadership 5. Digital literacy. **Subject Specific Practices** 1. Communication 2. Skill development

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