

Information and Communication Technology

for Rwandan Schools

Secondary 1

Teacher's Guide

**Approved
by
Rwanda
Education
Board**



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Introduction

Background: The Competence-based Curriculum

The revised ICT syllabus on which this Teachers' Guide has been developed is competence-based. This means that this is an enhanced curriculum. In addition to knowledge in a learner, it emphasises the development of the learners' competences.

The ICT syllabus is emphatic on what the learner can do. In this way the learner is able to apply the knowledge and skills acquired. In this competence-based curriculum, the teacher is required to use the learner-centred approach during the teaching and learning process. The focus should be on application rather than recall.

The structure of the competency-based curriculum ensures that the learner is able to apply relevant and modern ICT technologies. Technology is dynamic. New developments take place all the time. For this reason, it is important that learners are up-to-date on modern technologies in terms of application, user devices, and their relevance to daily life.

The syllabus is in line with recommendations, guidelines, and vision for our country as provided in different government policies that relate to education and its role in development. Of particular interest is the *Education Sector Strategic Plan 2013 and Vision 2020* that gives guidance on the quality education and emphasises on the role of science, technology and innovation, in education.

The syllabus addresses the *Second Economic Development and Poverty Reduction Strategy (EDPRSII)* and the draft *ICT policy in Education 2014* to offer ICT to learners at all levels. It is also in line with the NICI III plan. This is the strategic plan for ICT development in Rwanda in line with Vision 2020.



In addition to knowledge, a competence-based curriculum develops learners' competencies.

Why teach and learn ICT?

Application of ICTs in society

Information and communications technology (ICT) is an important part of modern life. It is being applied in every aspect of human society. The government is keen on the application of ICTs in every sector in order to achieve efficiency in governance and sustainable development.

Globally, the application of ICTs has become key in attaining sustainable development and efficient government services. It is also notable that acquiring skills in ICTs also give the learner an edge to participate in economic development at the global scene.

Empowering the Learner with ICT Skills

This course on ICT is intended to empower the learner with skills on varied subjects. They include computers, the Internet, telecommunication technologies, and mobile telephony. The learner also gets exposure on the application of ICT in various sectors including banking, education, medical, security, and manufacturing among others.

In this course, the learner will get introduced to common application software such as word processing, spreadsheets and presentations. Other areas are programming, Internet security, and graphic and multimedia manipulation. The learner also gets some exposure to skills of spatial data analysis and manipulation through Geographical Information Systems (GIS).

The Structure of this Teacher's Guide

This Teacher's Guide gives the basis for teaching and learning ICT in Senior 1. It also spells out the objectives of learning the course, the pedagogical approach, and the assessment approach. The course is divided into learning units. For each unit, the following are provided:

- A brief introduction.
- Content map for the unit
- Reference to the Students' Book for Senior 1
- Number of lessons
- The key competencies to be developed: These make up the expected outcomes after the completion of the unit,
- The learning objectives: These are the knowledge, skills, attitudes, and values to be developed.
- Preparation by the teacher

- The content to be covered: This presents the concepts to be covered in line with the competence-based syllabus.
- Key terms to be introduced and explained to the learner
- Suggested learning materials
- Suggested learning and teaching activities the class will be involved in.
- Additional content for the teacher
- Cross-Cutting issues to be integrated in the teaching and learning activities
- Suggestions for accommodating Special Education Needs (SEN)
- Support for the development of positive attitudes
- Suggestions for supporting multi-ability learning
- Suggestions for assessments
- Suggested formative and summative assessment
- Links to other subjects
- Additional remedial and consolation and extension exercise
- Answers to the exercises in the Students' Book
- A sample lesson plan

The competences to be developed

Competencies refer to abilities or skills that the learner is expected to demonstrate after a learning process. Competencies indicate that the learner has the capability to perform to the expected standards in a given field of expertise.

Basic competences are stated in the comprehensive subject competences and in the given objectives for the subject units covered in the course. The generic and the basic competencies to be developed during the teaching and the learning process are briefly described below. Every teacher is expected to create teaching and learning activities or tasks that will create opportunities for learners to acquire the given skills.

Generic competences

1. **Critical and problem solving skills:** These are essential skills. Developing these skills in a learner will help him or her think independently, become creative, and seek to discover solutions to problems encountered in everyday life.
2. **Creativity and innovation:** The development of these skills in a learner will help him or her become resourceful in society. A learner equipped with creativity and innovation is able to think beyond the knowledge acquired at the classroom level. He or she is likely to take initiative in tasks and activities. He or she is able to come up with ideas or strategies in solving problems that are experienced from day to day.

3. **Research:** Skills to carry out research are critical as they help learners to gather and analyse information. In this way they are able to explore and discover answers to arising questions.
4. **Communication in official languages:** The skill of communication is key to the teaching and learning process. It serves as the medium of instruction during the learning activities. It is expected that all teachers, regardless of the subjects they are teaching will guide the learners to use the proper language. The teachers should guide the learners to communicate clearly and to share ideas effectively in both spoken and written language. New vocabulary and its usage should also be explained to the learner.
5. **Cooperation skills:** Learners should be sensitised about the importance of teamwork in any activity. In most learning and teaching activities and projects, they will be expected to work with others. It is important that they embrace team spirit in order to achieve their targets.
6. **Interpersonal skills:** The ability of every learner to relate with others is key in any task. In this way they will be able to respect the opinion of others and treat each other courteously.
7. **Management skills:** The ability of every learner to be organized and achieve the set targets is important in the learning process. Learners will be assigned tasks and projects in pairs, groups or as individuals. It is expected that they will be able to manage time as well as other resources at their disposal optimally and achieve to the expected standards.
8. **Life skills:** These are abilities that enable an individual to live a healthy life and cope with situations that arise in day-to-day situations.
9. **Lifelong learning:** This refers to the acquisition of skills that enable a learner to keep themselves informed in knowledge and skills. In this way, learners keep themselves up-to-date in varied knowledge fields.

Broad ICT competences at the end of ordinary level

As spelt out in the ICT competence-based curriculum, the aim of this course is to:

- Transform Rwandan citizens into technology skilled human capital for the socioeconomic development of the nation.
- Provide a solid foundation of technological understanding for learners to integrate into society and the world of work.
- Familiarise learners with the use of ICT tools and their impact of ICT in daily life.
- Familiarise learners with communication and research techniques by combining skills, attitudes and values.

- Demonstrate communication, research, practical problem solving, observation, creativity and innovation in everyday life.
- Organise and manipulate information using common application software namely word processing, the Internet, spreadsheets, presentations, graphics, and multimedia.
- Manipulate spatial data using Geographical Information Systems.
- Develop computational thinking and logical reasoning through computer programming.

Developing ICT competences in a Learner

This ICT course is expected to contribute to a learner's development of critical thinking, research and problem solving, creativity and innovation, communication and cooperation skills. This is achievable. Learners will learn about both hardware and software. Learners will also be sensitised to handle ICT safely, securely, and ethically. They will be expected to learn computing tools. The topics to be covered include word processing, spreadsheets, presentations, Geographical Information Systems, graphics and multimedia and application software.

Through ICT, learners will be expected to identify problems in information processing. They may require to carry out research, analyse the existing factors and develop solutions to the identified problems.

Learners will be equipped to use appropriate identified methods to solve problems. They will be expected to explore, test, evaluate and refine solutions to societal problems

Pedagogical Approaches

In a competence-based curriculum, teaching and learning activities are centred on the learner. For this reason the learner should be actively involved in the learning process. This can be achieved through engaging them so that they can participate actively. Guide them to contribute to discussions. Involve them in group or pair activities and let them take leadership positions in the groups. Every learner should get an opportunity to either chair and take notes, or give the group presentation.

It is also important to appreciate each learner as an individual. Some are slow, others are fast, others are average, while others may have special needs. Plan and execute every lesson with all the needs and abilities of the learners in mind. You may have to use different strategies to take care of each group of learners. Be flexible to accommodate all the learners. Although the learner is the element of focus during every lesson, your role, of guidance, is key for effective teaching and learning to take place.

What is your role as the teacher?

The competence-based curriculum is learner-centred and learner-oriented. This transformative approach ensures that student learns by doing. They do not just get knowledge for recall. In this way, the teacher becomes a facilitator. He or she shifts from giving instructions and takes up the role of giving guidance. This could be achieved in the following ways:

- Allow learners to experience ICT content through the use of available resources. This will help to meet each of the learner's needs.
- Identify the needs of each of the learners, and find ways to meet those needs at the individual level.
- Make the lessons participatory. Organise the learners into pairs or small groups so that the level of interaction is high. Working in groups will nurture teamwork and cooperation.
- Always give learners an opportunity to explore a concept before giving details on it. Use the oral question-and-answer method. Regardless of the answer a learner gives, your role is to encourage them to be participatory.
- Structure the teaching and learning activities in a way that will help the learners enrich their own knowledge, skills, and attitudes.
- Expose learners to different technologies. The use of teaching aids such as models, digital content, and simulators will go a long way to enrich the learning process.
- During the practical lessons, guide the students carefully. Give clear instructions. Use demonstrations as a guide on how to proceed with the activity. Once you have given clear instructions, allow the learners to embark on the activities. Indicate to them that they are free to seek clarifications at any one time. Ensure that every student participates in the activities.
- Institute remedial strategies in and outside the classroom/computer laboratory to accommodate slow learners and those with special needs. Help them to keep pace with fast and average learners.
- During practical lessons, guide learners to work individually, in pairs, or in groups. This will be dependent on the availability of computers and other ICT resources. Regardless of the situation ensure that every learner gets an opportunity to work with the equipment or resource.

What is the Role of the Learner?


All the teaching and learning activities must be learner centred. The following are ways in which you could engage the learners to ensure that the process is based on their interests, experiences, and needs:

- Ask them to make observations.
- Ask them to suggest appropriate learning resources.
- Ask them to propose ways in which they could improvise learning resources.
- Encourage them to ask questions directing them to the teacher as well as to their fellow learners.
- Ask them open-ended questions that will encourage discussions and debate.
- Ask them to suggest activities they could carry out for selected topics.
- Encourage them to participate in the planning of the activities.
- Guide them to search for information relevant to the topics to be learnt.
- Guiding them to make observations and report their findings.
- Guide them to work collaboratively with others as a team.
- Guide them to consider the ideas of others.
- Allow them to communicate their ideas, findings and explanations effectively.
- Engage them in constructive debates through dialogue with both the teacher and the rest of the learners.
- Guide them to defend their work and explanations effectively without offending members of the group.
- Allow them to apply their learning experiences to real-life situations.
- Appreciate the initiative of the learners and urge them on.
- Use the learners' explanations to drive the lessons and delve deeper into topics.
- Encourage the learners to be open-minded and share freely their thoughts on concepts.
- Prompt them to further explain, or clarify their response and findings.
- Present situations that may seem to contradict the learners' experience in order to encourage discussion.
- Nurture curiosity among students by encouraging them to ask questions.

Special Needs Education and Inclusive Approach

Every learner has a right to access education regardless of their varied needs. For this reason, every learner is expected to benefit from the educational program in this competence-based syllabus. Hence the need to give emphasis to special needs education.

In a class of learners, there may be children who are enabled differently in the way they live and learn. This difference could be emotional, physical, sensory or intellectual. The difference may pose a challenge for the learner. In embracing globally recognised human rights, these learners have a right to receive education. The expectation is that the school with such different learners will subsequently enrol them and set strategies to provide them with a platform to learn and benefit from education.




It is expected that where such cases exist, the teacher will consider the affected learner's needs during the teaching and learning process. In each unit presented in this Teachers' Guide, suggestions have been given on how to assist such learners. The assessment strategies adopted and the activities should take into consideration the needs of these learners.

Incorporating Cross-Cutting Issues during the learning and teaching process

Depending on the topic you are handling, the Cross-Cutting Issues to be integrated in the teaching and learning activities include the following:

- (a) **Genocide studies:** Provide young people with an understanding of the circumstances that led to the genocide and the remarkable story of recovery and re-establishing national unity. Genocide studies help the learners to comprehend the role of every individual in ensuring nothing of the sort ever happens again.
- (b) **Environment sustainability:** The growing awareness of the impact of the human race on the environment has led to the recognition of the need to ensure our young people understand the importance of sustainability as they grow up and become responsible for the world around them. Hence environment and sustainability is a very important Cross-Cutting issue. Learners need basic knowledge from the natural sciences, social sciences and humanities to understand and interpret principles of sustainability. They also need skills and attitudes that will enable them in their everyday life to address the environment and climate change issue and to have a sustainable livelihood.
- (c) **Gender:** There is a strong moral imperative to afford every individual their basic human rights and gender inequality results in women and girls being treated less favourably than men. A strongly negative impact of unequal treatment which affects the nation as a whole is the fact that it results in women being held back and their talents and abilities not being fully realised. With a good understanding of the principles of Gender Equality, it is intended that future generations will ensure that the potential of the whole population is realised.
- (d) **Comprehensive sexuality education (HIV/AIDS, STI, Family Planning, Gender equality and reproductive health):** Comprehensive sexuality education which is age-appropriate, gender-sensitive and life skills-based can provide young people with the knowledge and skills to make informed decisions about their sexuality and lifestyle. Preparing children and young people for the transition to adulthood has been one of the humanity's great challenges with human sexuality and relationships at its core.



Few young people receive adequate preparations for their sexual lives. This leaves them potentially vulnerable to coercion, abuse and exploitation, unintended pregnancy, and sexually transmitted infections (STIs) including HIV/AIDS. Many young people approach adulthood faced with conflicting and confusing messages about sexuality and gender. This is often exacerbated by embarrassment, silence, disapproval and open discussion of sexual matters by adults (parents, teachers) at every time when it is most needed.

Comprehensive sexuality education supports a rights-based approach in which values such as respect, acceptance, tolerance, equality, empathy and reciprocity are inextricably linked to universally agreed human rights.

- (e) **Peace and values education:** The need for peace and values education in the curriculum is obvious. Peace is clearly critical for society to flourish and for every individual to focus on personal achievement and their contribution to the success of the nation. Values education forms a key element of the strategy for ensuring young people recognise the importance of contributing to society, working for peace and harmony and being committed to avoiding conflict.
- (f) **Financial education:** Financial education makes a strong contribution to the wider aims of education. It makes learning relevant to real life situations. It aims at a comprehensive financial education program as a precondition for achieving financial inclusion target and improves the financial capability of Rwandans. Financial education has a key role of not only improving knowledge of personal but also transforming this knowledge into action.

It provides the tools for sound money management practices on earnings, spending, saving, borrowing and investing. Financial education enables people to take appropriate financial services both formal and informal that are available to them and encourages financial behaviours that enhances their overall economic wellbeing.

- (g) **Standardisation Culture:** Standardisation culture develops the learners' understanding of the importance of standards as a pillar in economic development and in the practices, activities and lifestyle of citizens. It is intended that the adoption of standardisation culture should have an impact upon health improvement, economic growth, industrialisation, trade and general welfare of the people. While education is the foundation and strength of a nation, standards are one of the key pillars of sustainable economic development.
- (h) **Inclusive Education:** Ensuring that all learners are engaged in education and that they are welcomed by other students so that everyone can achieve their potential. Inclusive practice embraces every individual regardless of gender or ability including those with learning difficulties. The almost focus of inclusive curriculum is one

ensuring participation in education of learners with different learning styles and other difficulties. To be successful, it entails a range of issues including teachers positive attitudes, adapting the learning resources, differentiation of teaching and learning methods and working together. Overall the benefits of an inclusive curriculum extend to all learners.

Assessment Approaches

As a teacher, how do you evaluate the progress made during the teaching and learning processes?

The process of assessment provides the teacher with the opportunity to gauge how each learner is fairing on in the learning process. The teacher will be expected to evaluate the learner, collect and interpret data related to the learner's progress, and make judgment about a learner's achievements measured against the defined standards.

Assessment is a fundamental process in the progression made during the teaching and learning processes. In this competence-based curriculum, the evaluation must focus on the competencies gained by the learner. The learner is expected to demonstrate ability to use the knowledge and skills gained to identify and develop a solution to a given real-life situation. Note that the evaluation will be done at the following levels:

- School-based assessment
- National assessment (LARS)
- District examinations
- National examinations

Types of Assessment

Formative and continuous assessment (assessment for learning)

This type of assessment will involve the use of both formal and informal methods to gauge whether any learning is taking place. The teacher is encouraged to integrate this type of assessment in the learning and teaching process. Having interacted closely with the learners in his or her class, the teacher is expected to be in a position to establish measures or standards that each learner should be able to achieve.

At the planning stage of a lesson, the teacher should establish the targets to be achieved by each learner during the learning and teaching process. The targets should be competence-based, and should be guided by the expectations of the syllabus. At the end of each unit, the teacher should use these to gauge how each learner has performed.

It is desirable that the teacher ensures that each learner will have mastered the stated key unit competencies, both the subject and generic, as spelt out in the syllabus before proceeding to the next unit. Continuous assessment enables the teacher to gain a broad understanding of how the learner is making progress in all aspects of learning. In this type of assessment, the teacher could use varied methods, either singly or as a

combination. Appropriate methods include observation, manipulation of learning resources, use of ICT tools in task and practice, write, and question and answer (oral questioning).

Summative assessment (assessment of learning)

Assessment is used to gauge the progress the learner is making in acquiring the competencies spelt out in the syllabus. In this way, assessment then becomes summative. The teacher is able to place the progress made by the learner in acquiring skills and knowledge.

Summative assessment enables the teacher to evaluate whether the laid out learning objectives have been achieved or not. Upon establishing this status, the progression of the learner to the next level is determined. If the objectives have not been achieved, remedial measures could be taken to correct the situation and consequently make further recommendations.

Summative assessment could be internal or external. Internal assessments are school-based. They should be conducted at the end of the term, and at the end of the academic year. Based on internal guidelines, the average scores for the subject will be weighted and subsequently be included in the final national examinations grade.

Record Keeping

The teacher will be required to gather facts and evidence from the assessments conducted on the learners. The strengths and weakness of the learner should be stated clearly. These will then be used to gauge the learner's performance and progress achieved. The teacher will assign an indicator against the set guidelines.

The assessment methods used should generate data that is computed into scores. These should then be recorded and filed in a portfolio. The records should include the papers, assignments, activities, projects undertaken during the learning and teaching activities. Attendance to the learning activities should also be well documented to serve as evidence that the learner participated in the process as expected. Decisions made regarding the progress of the learner, or required remedial actions should be based on these records.

Sharing the progress report with parents/guardians

It is important to share the learner's progress with parents and guardians. The most helpful approach is to share the progress of the learners with their respective parents or guardians. The progress records should, therefore, be shared with the learner together with his or her parents or guardian. Both areas of progress, as well as areas that need improvement should be shared. In case of any remedial action to be taken, the teacher

should discuss the arising issues with the parents/guardian and arrive at the best action for the learner.

Development of Assessment Tests

When developing an assessment test, it is important to ensure that the intended questions measure up to the expected standards, and that they are competency-based. The following are important factors to consider before developing questions for a test:

- (i) Plan what is to be tested.
- (ii) Specify what is to be tested. This is done by identifying the topic areas to be tested from the syllabus.
- (iii) Elaborate what is to be tested in order to show the units or topics to be tested. Outline the subject concepts to be considered in developing the test.
- (iv) Identify the learning outcomes to be measured by the test.
- (v) Determine the number of questions to be developed in each level of Bloom's taxonomy. Consequently prepare a table specifying the questions.
- (vi) Determine the marks to be allocated for each question.
- (vii) Ensure that the verbs used in writing the questions do not require memorization or recall answers. The verbs should test broad competencies as stated in the syllabus.

Note that in a competency-based curriculum, questions from higher levels of Bloom's taxonomy should be given more weight than those from knowledge and comprehension level.

Structure and format of the examination

ICT competences for the Ordinary Level makes ICT content a practical-oriented subject. The learner is expected to display a high level of hands-on-skills. There are two (2) papers for Information and Communication Technology (ICT) in the Ordinary level. The first paper tests theoretical knowledge, skills, and attitudes.

Learners will be assessed on their competences to effectively use computing tools and how to locate, extract, record and interpret, exchange, retrieve, manipulate, store and use information through technology. There will be an emphasis on ICT fundamentals, safety and security, application software, programming for juniors, and network and data communication, as identified in the syllabus.

The practical paper will be arranged on the same topic areas namely ICT fundamentals, safety and security, application software, programming for junior secondary, and network and data communication, to test learners' hands on skills.

The practical paper will have questions related to manipulation of computing

tools and solving real life problems using application software, communication using technological tools, and developing logical reasoning through programming. The content distribution table will assist in the choice of the content to be assessed. Note that not all topic areas and subtopic areas are to be covered.

Table: Structure and format of ICT assessment

Topic Areas	Theory	Practice
Topic Area-1	X%	Z%
Topic Area-2	Y%	T%
	50%	50%

ICT tools required for practical assessment

In assessing ICT competences, different types of equipment will be used to test the ability of learners. The computer is the key tool used to test ICT skills during practical examinations. Learners will have been exposed to other technological devices in this syllabus to offer competences required by society.

Depending on the availability of devices, the practical paper could use them as well. During the national examinations, for both computer, portable devices, and other ICT tools, the practical paper will be conducted at the individual level. Every student will have his or her equipment.

Teaching and Learning Resources

Materials needed for successful teaching and learning activities

The successful execution of ICT lessons will require learners to have computers which are the standard equipment for this subject. Together with computers, other ICT tools and application software have been identified in the syllabus and where they will be needed. Various resources for the teaching and learning of the ICT competence-based curriculum are as follows:

- **Computer laboratory:** At least two learners for one computer. Mobile lab(laptops) is highly recommended where possible.
- **Printer and scanner.**
- **Telephony systems.**
- **Broadcasting technology:** Television and radios per school.
- **Projectors:** Presentation is a key element of the competence-based curriculum where learners work. Teaching materials will be mostly displayed using a projector for both ICT as a subject, and for other subjects using ICT as a tool. To assist

learning and teaching ICT as well as integration of ICT in all subjects five(5) projectors are required per school.

- **Laptop per teacher:** Teachers needs to prepare learning and teaching materials and organise content so as to use the classroom time effectively. One laptop per teacher is required.
- **Internet connectivity.**
- **Network devices:** Switch, router, wireless access point, server, and crimping tools.
- **Software:** In most cases skills expected from this competence-based curriculum do not rely on any version of operating system or any version of application software. However, the latest version of most software at the time of implementation will be used.
 - ✓ **Operating system:** A licensed copy of the Windows Operating System. Linux distributions are to be used if all applications reflected in the syllabus are supported. For portable devices most recent operating system is recommended.
 - ✓ **Word processing, spreadsheets and presentation:** A licensed copy of latest version of Microsoft Office.
 - ✓ **ArcGIS software** for spatial data manipulation.
 - ✓ **Graphics and multimedia:** A digital camera, Photoshop, Microsoft Picture Manager, and Movie Maker.
 - ✓ **Tux typing:** This is for enhancing typing skills and speed for learners.
 - ✓ **Browsers:** Chrome, Mozilla Firefox, Epiphany, and Opera.
 - ✓ **Social media:** Twitter, Facebook, Skype, Flickr, Instagram, IM (Instant Messaging) applications, Google+ and Linkedin.
- **Financial Transactions**
 - ✓ **ATM:** ATM Simulators for experimenting with the process of accessing, depositing and checking balances of an account using a debit/credit card. Organised visit is recommended if any ATM device is nearest the school.
 - ✓ **Telephones** for mobile banking and managing money.
 - ✓ **Billing machine or simulators.**
 - ✓ **Programmable calculator.**
- **Interactive board:** Two interactive boards per school.

Human Resources

For a successful execution of the lessons, all educators at all levels of learning must get involved.

The following points are key:

- (i) Teachers who are directly involved with the learners will be expected to play their active role as discussed earlier. The teachers will be expected to utilize their pedagogical content knowledge (PCK) and teaching experience to the fullest.
- (ii) The teacher in ICT will be expected to demonstrate a high level of understanding of ICT concepts. He or she should be qualified in ICT/Computer Science OR related fields. He or she must have a high moral standing; a role model for learners. He or she should be able to guide learners to make responsible and ethical decisions.
- (iii) School headteachers and directors of studies should be able to use the competency-based syllabus, and make a follow-up in all aspects of learning. They should also be able to assess the teaching and learning of ICT, and ensure that the methods and approaches applied in the school are adequate and effective.

The Skills and attitudes required for the ICT teacher

He or she should have the following skills, values, and qualities:

- (i) Show a high level of knowledge of the content.
- (ii) Inspire children and the community the devotion of learning and use of ICT
- (iii) Be able to engage learners in variety of learning activities.
- (iv) Be able to use multiple teaching and assessment methods.
- (v) Be able to adjust instruction to the level of the learners.
- (vi) Be able to use creativity and innovation in the teaching and learning process.
- (vii) Be a good communicator and organiser.
- (viii) Be a guide/facilitator and a counsellor.
- (ix) Manifest passion and impartial love for learners in the teaching and learning process.
- (x) Relate the use of ICT with other subjects and real life situations.
- (xi) Have good classroom management skills.
- (xii) Exhibit a passion for teaching and interacting with children.

Self-Assessment

A good teacher will always assess him/herself. As you assess each learner's progress, assess your teaching performance. Ask yourself the following questions:

- Were the learners interested in the topic I presented?
- Was the topic applicable in their day-to-day life? Did they identify with the teaching and learning experience?
- For how long did I talk during the lesson? For how long did I allow the learners to talk? Did I ask the learners relevant questions?

- Did I listen keenly to their responses?
- Did I use appropriate teaching aids?
- Did the teaching aids arouse curiosity and stir interest in the learners?
- What teaching and learning activities did I present to the learners?
- Did the teaching and learning activities support multi-ability learning?
- Were the activities varied?
- What teaching and learning resources did I use? Were they relevant, affordable and familiar to the learners?
- Did I take care of learners with special learning difficulties?
- Did I evaluate the learners appropriately and adequately?

Being critical of your performance will help you improve your teaching in the subsequent lessons.

Content Structure

General presentation

The ICT subject is taught in the lower secondary education level, that is, S1, S2 and S3 respectively. At every level where it is taught, the ICT syllabus is structured into Topics, Subtopics and Units. Each unit is structured as follows:

1. The **number of periods** that are expected to be taught.
2. **Key unit competency:** Its achievement is pursued in all teaching and learning activities undertaken by both the teacher and the learners.
3. The key competency for each unit is broken down as follows:
 - (a) **Learning Objectives relating to Knowledge and Understanding** tend to use lower order thinking skills. They are considered to be prerequisites to the learning objectives relating to skills, attitudes and values.
 - (b) **Learning Objectives relating to Skills, Attitudes and Values** are also known as Higher Order Thinking Skills. These Learning Objectives are considered to be the ones targeted in a competence-based curriculum.
4. The **content** that is to be covered.
5. The **Learning Activities:** The teacher is to engage the learners in the learning process. The process must be participatory. Learners must be fully engaged.
6. Links to Other Subjects, Assessment Criteria and the Materials (or Resources) that are expected to be used in its teaching and learning.

Key competences at the end of Secondary One

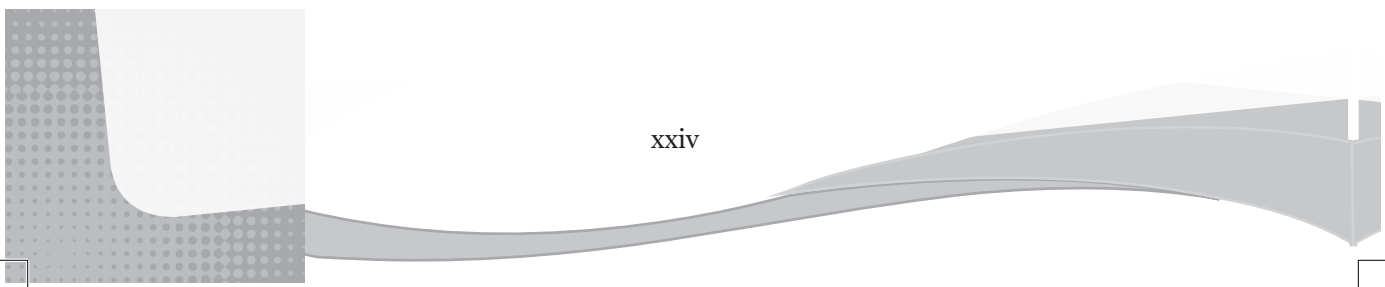
By the end of Secondary one, the learner should be able to:

- (i) Explain the foundation of Information and Communication Technology.

- (ii) Explain the evolution, categories, parts and role of computers.
- (iii) Navigate the Windows environment and work with Windows Explorer to introduce techniques of folder and file management.
- (iv) Maintain a computer in good working condition and use it safely, securely and ethically.
- (v) Create and manipulate a document using word processing basic features.
- (vi) Manipulate text and use advanced formatting methods and simple objects in a document.
- (vii) Define and Recognise basic features of GIS, differentiate elements/components of the interface of the GIS application and query a map and organise map layers.
- (viii) Understand the rationale of a computer network and use the Internet efficiently and effectively.
- (ix) Create a music sprite and add music with scratch and audacity.

Distribution of the content by topic areas, subtopic areas, and the number of lessons allocated

Topic areas	Sub-topic areas	Number of periods (Period=40 minutes)				% Subtopic areas	% Topic areas
		S1	S2	S3	Total		
Introduction to ICT	ICT fundamental	18	10	4	32	15%	19%
	Safety and security	4	4	0	8	4%	
Application Software	Word Processing	20	8	14	46	19%	59%
	Spreadsheets	0	26	8	34	16%	
	Presentation	0	0	6	6	3%	
	GIS	12	8	10	28	14%	
	Graphics and multimedia	0	0	16	16	7%	
Computer network and Data communication		8	6	6	20	9%	9%
Programming for juniors(Scratch)		10	10	8	26	13%	13%
Total		72	72	72	216	100%	100%





Information and Communication Technology Foundation

Introduction

This topic introduces the learner to ICT. It is expected that at the end of this topic, the learner should be able to explain ICT related concepts and terms, list ICT tools and their appropriate use in daily life.

1.1 Content Map for the Unit

Topic	ICT Foundation	
Topic Area	Introduction to ICT	
Subtopic Area	ICT Fundamentals	
Number of periods	6 + Homework	
Introduction	ICT Foundation	
Classroom organization	Whole class orientation then work in groups. Individual activities.	
Equipment required	Computers, CD/DVD, video player, projector, text book, and digital materials.	
Activities	Practical activities, discussions, field trips.	
Competences practice	Team work, Communication skills and Research.	
Language competences and practice	<ul style="list-style-type: none"> • Defining • Explaining • Writing 	<ul style="list-style-type: none"> • Communicating • Group discussions • Report
Additional vocabulary (Key terms to be explained to the student)	<ul style="list-style-type: none"> • Hardware • Data gathering • Telecommuting • Distance Learning • Analog data 	<ul style="list-style-type: none"> • Software • E-Business • Signals • Digital data
Numeracy	Constituting groups with a manageable number of learners	

Study skills (including language competences)	<ul style="list-style-type: none"> • Note taking/ Writing • Organization of ideas • Listening to audio lessons • Watching video lessons • Presentation/ Reporting skills • Observation skills
Revision	<ul style="list-style-type: none"> • Learning Activities and Revision Exercise in the ICT Senior 1 Student's Book
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work in groups, carrying out activities, assessing whether the objective are met, Continuous Assessment Tests and oral questions. • A summative evaluation at the end of the unit to examine the extent the intended learning objectives have been accomplished.
Learning outcomes	<p>The learner should be able to:</p> <ul style="list-style-type: none"> • Explain correctly the foundations of Information and Communication Technology (ICT). • Explain ICT related terms. • Explain factors affecting accuracy of information. • Explain the different types of communication. • Perform basic manipulation of ICT equipment. • Describe the importance of ICT to the society. • Identify the advantages and disadvantages of ICT. • Explain how ICT is used in different areas.

1.2 Subtopics/Content to be covered

Introduction

- **Data:** Definition and types of data, data gathering, analog and digital.
- **Information:** Definition, factors (accuracy, relevance, age, completeness, and presentation)
- **Communication:** Definition, elements of communication, and types/ways of communicating.
- **Technology:** definition, types of technologies.

ICT

- Definition of ICT
- ICT equipment: radio, television, phones, tablets, ATMs, [Billing machines], satellite, projector, and computers.
- Use and interact with ICT equipment (radio, television, phones, computers)

Importance of ICT

- General use of ICT in education, health, business, and communications among others.
- Advantages and disadvantages.
- Current use of ICT in Rwanda: education, health, business, and communication among others.

1.3. Reference to the Students' Book for Senior 1

Refer to the ICT for Senior 1, Students' Book, pages 1 to 21.

1.4. Key Unit Competency

By the end of this unit, the learner should be able to explain the foundation of Information and Communication Technology (ICT).

1.5. Learning Objectives

Knowledge and understanding

By the end of the unit, the learner should be able to:

- (i) Explain ICT related concepts and terms.
- (ii) List ICT tools and their appropriate use in daily life.

Skills to be imparted in this unit

By the end of the unit, the learner should be able to:

- (i) Use ICT-related terms appropriately.
- (ii) Use ICT equipment namely radio, mobile phones, televisions and computers in the relevant context by turning on and off, navigating and accessing their features/contexts.
- (iii) Identify areas where ICT is used.
- (iv) Select appropriate ICT tools.
- (v) Evaluate the advantages and disadvantages of using ICT in society.

Attitudes and values to be developed in this unit

By the end of the unit, the learner should be able to:

- (i) Appreciate the role played by ICT in the evolution of society.
- (ii) Enjoy using ICT and appreciate the benefits and effectiveness of different ICT tools.

1.6. Teacher Preparation

- (i) Plan and make notes for the lesson.
- (ii) Study and master the content to be taught. Refer to the Students' Book for Senior 1, pages 1 to 21.
- (iii) Practise how to use ICT equipment. Ensure that all the required equipment and resources are in working order.

1.7 Key Concepts to be Covered

- **Data** refers to raw facts that have been entered into a computer but have not been processed, for example, statistics, symbols, basic facts, figures, numbers or simply records.
- Two main types of data are **analog** and **digital**.
- **Data gathering** is the systematic collection of data for a specific purpose from various sources. It includes use of questionnaires, interviews, observation, existing records, and electronic devices among others.
- **Information** can be defined as processed facts or data that is meaningful and useful to the user.
- Factors that affect the quality of information include **accuracy, relevance, timeliness/age, completeness, and presentation**.
- **Communication** refers to the exchange of information through a transmission channel.
- The elements of communication include the following: source /sender, content, communication channel, receiver and feedback.
- There are three basic types of communication namely: **verbal** and **non-verbal**.
- **Technology** refers to the application of scientific knowledge to the practical purposes in the human environment, for example, industries and learning institutions among others.
- Types of technology are assistive Technology, Medical Technology, and Information technology (IT). Other include education, military, food, banking, weather forecasting, and broadcasting technology among others.

- **ICT** is an abbreviation for **Information and Communication Technology**. It refers to information technology and telecommunication that includes the Internet, computer hardware, software, telecommunications equipment, transmission and presentation of information.
- ICT equipment: radio, television, phones, tablets, Automated Teller Machines (ATMs), billing machines, satellite, projector, and computer.
- General use of ICT in education, health, business and communication among others.
- The advantages and disadvantages of ICT.
- The current use of ICT in Rwanda: Education, Health, Business and Communication among others.

1.8. Additional Content for the Teacher

Advantages of using mobile phones in schools

- The teacher can easily research on relevant information using the mobile phone.
- Fast communication between teachers and parents or guardians especially when an emergency arises.
- Mobile phone is a teaching and learning aid since they have programs that are similar to those found in a laptop or desktop computer used for learning.
- Mobile phones contain many applications such as MP3 player, digital camera and GPS all on one gadget making it convenient for a student.
- They can share information through social media. This includes questions, images, notes, and educative video and audio clips.

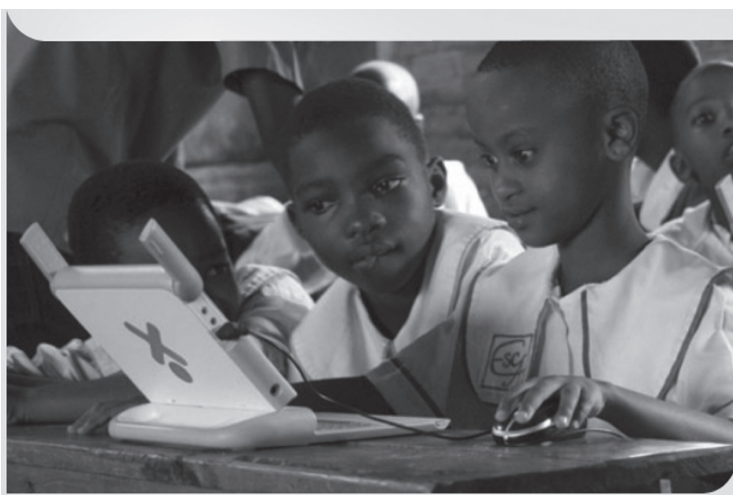


Fig. 1.1: The use of ICT in education

Disadvantages of using mobile phones in schools

- **Interruptions:** A ringing phone can disrupt a lesson and also the concentration of the learners. In the classroom, if a phone beeps, students will be tempted to read messages when learning is going. This will distract the class and interfere with the level of concentration.
- **Theft:** students get tempted to steal the good smart phones from their friends.
- **Cheating:** Mobile phones can be used to cheat in exams through sharing of answers, taking photos of quizzes or tests, or checking answers online during testing. Other students take notes or textbooks photos for reference during exams.

Application areas of computers

- (a) **Manufacturing and Production:** ICT-based systems such as Computer Integrated Manufacturing (CIM), Computer Aided Design (CAD) and Computer Aided Engineering (CAE) are used in monitoring and controlling the production process in factories.
- (b) **Research:** Through the Internet, researchers can access voluminous research materials easily. For example, it is possible for a researcher to download software used in research, materials and books from the Internet. Using plastic money for example credit cards, one can buy packages such as SPSS, books, or even access multimedia encyclopedias from anywhere in the world.
- (c) **Entertainment:** ICT can be used in following ways as far as entertainment is concerned:
 - (i) Music industry – distribution of the music, composing and editing of music.
 - (ii) Movies – distribution, composing, watching, editing of movies online.
 - (iii) Playing computer games.
 - (iv) Using social media, for example, Facebook, Twitter, Google+ (Google plus).

1.9 Suggested Learning Materials

- Computers
- CDs/DVDs of documentaries on the use of different ICT hardware and software in different organisations.
- A videoplayer
- Projector
- The ICT for Senior 1 Students' Book

- Other relevant digital learning materials such as radio, television, laptops, phones, tablets, billing machines, projector.

1.10 Suggested Low Cost or no Cost Materials

- Free downloads of relevant materials from the Internet.
Note: Always establish the authenticity of the website to avoid downloading infected files.
- Visit neighbouring schools and request access to their resources.
- Request for assistance in setting up a demonstration on the use of different ICT equipment.

1.11 Suggested Teaching Methods

- Discussion
- Educational visit
- Practical activities
- Demonstration
- Question-and-answer method
- Listening to audio and watching video recorded content

1.12. Suggested Teaching and Learning Activities and Exercises to Support Delivery of Content and Development of Student Competences

- Class discussions on different ICT concepts.
- Group discussions on different ICT concepts.
- Students to share their experiences on use of different ICT equipment.
- Student to watch video/ documentaries on the use of ICT equipment in different organisations.
- Invite resource persons from the education, health, business and communication sectors to give talks.
- Question-and-answer method during discussions on foundation of ICT.
- An essay writing competition on the use of ICT in daily life.

1.13 Cross-Cutting Issues to be integrated in Teaching and Learning Activities

- **Electronics wastes (E-Waste):** This term refers to discarded electrical or electronic equipment/components. The hardware that makes information technology possible is becoming an increasingly serious environmental threat. Millions of

computers, monitors, printers, and peripherals are discarded every year, many of them in irresponsible and wasteful ways. Much of the e-waste produced in the richer nations is exported to developing nations where it is disassembled by hand and re-used, often exposing workers to harmful levels of mercury and other toxins.

- **Create short health breaks during the lesson.** The break could be as short as three to five minutes. Use the break to sensitise students on social issues such as environment, HIV/AIDS, dangers associated with premarital sex, and drug and substance abuse. You could download relevant short video clips and spend a few minutes to engage the students on the message.

1.14 Suggestions for Accommodating Special Education Needs (SEN)

The teacher should identify learners with special needs and help them to cope during the teaching learning activities.

Type of impairment	Support for the learner
Sensory impairment (visual)	<ul style="list-style-type: none"> • Teacher to write legible letters on the board. • Learners with poor vision could sit next to those with good vision to be assisted where necessary.
Sensory impairment (hearing)	<ul style="list-style-type: none"> • Teacher should make an effort to project his/her voice to be audible to the learners. • Allow learners to sit close to the teacher.
Motor impairment	<ul style="list-style-type: none"> • Do the activities in one place to avoid unnecessary movement from place to place.
Gifted or talented learners	<ul style="list-style-type: none"> • Assign learners extra work. • Assign the learners more challenging work.

1.15 Suggestions for Supporting Multi-Ability Learning

Fast learners	<ul style="list-style-type: none"> • Request learners to sit next to slow learners to help them. • Give them extra tasks to perform.
Slow learners	<ul style="list-style-type: none"> • Remedial teaching. • Teacher takes time to go over the procedure and use the language the learners will understand. • Use other learners to assist them to do the task.

1.16 Support to Learning Activities

Individual work, group work, pair work, and whole class work.

- In groups operate a radio, television, phone, computer, and projector.
- As individuals, compare the use of a radio and television in ICT.
- Outline the advantages of using a projector over the chalkboard.
- Guide the students to attempt the questions in the Senior 1 Student's Book.

1.17 Support for the Development of Positive Skills, Values and Attitudes

- Some life skills to develop in the learner include decision making, effective communication, problem solving and creative thinking.
- Some values to be developed include responsibility, appreciation, respect, cooperation, and curiosity.
- Working in groups encourages development of attitudes such as cooperation.
- Develop curiosity by letting the learners discover how to change radio and TV channels.
- Have desire to explore the ICT equipment.
- Creativity can be encouraged by letting them use different ICT equipments to make a presentation in class.
- Develop responsibility by showing care and concern for ICT equipment.

1.18 Support to Formative and Summative Assessment

- Revision Exercise in Senior 1 Students' Book, page 21.
- Oral questions.
- Continuous Assessment Test.

1.19 Links to Other Subjects

- English: Communication skills. ICT is linked to English in the channel of communication as the learner is able to communicate well. The student also learns vocabulary in ICT. One can also use ICT to learn English language. There are ICT applications (Apps) designed to assist learners to study English at basic and advanced levels.
- Physics: The maintenance of ICT equipment requires knowledge in physics.
- Entrepreneurship. Application areas of ICT in business is applied in Entrepreneurship
- Biology and Health sciences: Application of ICT in health services and also in the teaching and learning of Biology and Health Sciences.

1.20 Additional Remedial, Consolidation and Extension Activities

- An essay writing competition on the use of ICT in daily life. Reward the winning essay with an ICT accessory such as a flash memory.
- Learners to give short summary reports on the topic of ICT. Reward the student with the best communication skills with a pen or any other stationery.

1.21 A Sample Lesson Plan

See Appendix 1, pages 151 to 178.

1.22 Answers to the questions and activities in the Students' Book

Learning Activity 1.1 (Refer to the Students' Book, page 2)

1. **Group work:** This question can be done in groups of five students. Let each group appoint a chairperson and a secretary. Let the students discuss and agree on who will make the presentation. The role of presenting can be rotational during varied activities so that every student gets an opportunity to present to the class. This activity will develop their communication skills. It will also build their self confidence.
2. **Students to answer this question as individuals.**
 - Analog and digital.
3. **Students to answer this question as individuals.**
 - Analog clock and analog thermometer. Other examples are given in the Students' Book. Other students may give other examples not mentioned in the course book. Ensure the answers given are accurate.
4. **Students to answer this question as individuals.**
 - Digital clock and digital thermometer. Other examples are given in the Students' Book.
 - Other students may give other examples not mentioned in the course book.
 - Ensure the answers given are accurate.

Learning Activity 1.2 (Refer to the Students' Book, page 4)

Group work. The students to work in groups of five. Give this activity as a take away. You could give students a week to work on it.

Learning Activity 1.3 (Refer to the Students' Book, page 6)

- **Group work for questions 1 and 2.** The students to work in groups of five. Give this activity as a take away. You could give students two weeks to work on it.
- **Individual work for question 3:** Ensure the answers given are correct.

Learning Activity 1.4 (Refer to the Students' Book, page 7)

- **Group work for question 1.** The students to work in groups of six. Give this activity as a take away. You could give students two weeks to work on it.
 - **Individual work for question 2.** The students to share their lists with the rest of their classmates.
3. **Define the terms data and information. (Individual work.)**
 - Data can be defined as raw facts that have been entered into a computer but have not been processed.
 - Information can be defined as processed facts or data that is meaningful and useful to the user.
 4. **Using an illustration, differentiate between analog and digital data. (Students to work in groups of five.)**
 - **Analog data** continuously varies with time. It is processed using computers which process the continuously changing variable quantities. Analog data can be represented as a wave form. (See the correct illustration (Figure 1.1 in the Students' Book page 3.)
 - **Digital data**, unlike analog data, does not vary continuously with time. It is discrete in nature.
 5. **State factors that affect the quality of information. (Individual work.)**
 - Accuracy
 - Relevance
 - Timeliness/Age
 - Completeness
 - Presentation
 6. **Explain two ways of communication. (Students to work in groups of five.)**
 - **Verbal or oral communication:** This refers to a way of communication where spoken words are used to pass messages. It involves both speaking and listening.
 - **Non-verbal communication:** This is a type of communication where messages are passed by use of body language, facial expressions, gestures,

and posture. Its responses can sometimes contradict verbal communication thus changing the effectiveness of the message.

Learning Activity 1.5 (Refer to the Students' Book, page 12)

- **Class visit for question 1 and 2.** Arrange a visit to neighbouring supermarket, shop or restaurant where the students can observe how billing machines are used.
- Ask the students to be observant if they visit supermarkets, shops or restaurants with their parents or guardians. Ask them to observe how billing machines are used. Ask them to share their observations in class.
- **Individual work for question 3:** A billing machine is used to calculate the total amount payable and to print bills and receipts.

Learning Activity 1.6 (Refer to the Students' Book, page 13)

Individual work: 1. A computer; processes; software; information.

Pair work: 2. C is monitor; D is system unit; E is speaker; F is mouse; G is keyboard

Learning Activity 1.7 (Refer to the Students' Book, page 16)

- **Group work.** The students to work in groups of five. Give this activity as a take away. You could give students a week to work on it.
- Give them the opportunity to make short presentations in class.

Learning Activity 1.8 (Refer to the Students' Book, page 18)

- **Pair work.** The students to work in pairs. The students could take a week to write the short paper. Let them hand it in for marking. The students who score the best mark could present their paper in class.

Learning Activity 1.9 (Refer to the Students' Book, page 18)

- **Pair work.** The students to work in pairs. The students could take a week to write the short paper. Give them the opportunity to make short presentations in class.

Learning Activity 1.10 (Refer to the Students' Book, page 19)

- **Class work.** Pose this question to the class. Let the pupils give examples of use of mobile telephony in Rwanda. Write the examples they give on the board.
- Ask them to find out more examples during their free time. They could take two days. Let them give their findings in class.

Learning Activity 1.11 (Refer to the Students' Book, page 21)

- **Pair work.** The students to work in pairs. The students could take three days to compile a list of online libraries. Let them access books online Let them share their findings and experience with the rest of the class.

Answers to the Revision Exercise 1 (Students' Book for Senior 1, page 21)

This should be done individually as an assessment test. Students to hand in their papers for marking.


1. Accuracy
2. Verbal and non-verbal
3. Sender and Receiver. Accept other correct answers.
4. Information and Communication Technology
5. Computer and Television. Accept other correct answers.
6. E-learning: Accept other correct answers
7. **Differentiate between verbal and non-verbal communication.**
Verbal communication is the use of spoken words to communicate a message
Non-verbal communication involves use of body language, facial expressions, gestures, and posture.
8. **Define a tablet as used in ICT.**
A tablet is a portable computer fitted with a touch screen display, circuitry and battery in a single device.
9. **State any three application areas of the Internet.**
 - Research
 - Online Books
 - Communication
 - Library
 - Socializing
10. **Explain the impact of ICT in the business sector of Rwanda.**
 - Mobile banking and financial services: Mobile service providers have introduced money transfer and other financial services.
 - Village banking: Banks are using telecommunication facilities to take banking services to remote areas.
 - E-business: ICT is a great medium of transacting businesses which is achieved through electronic payment systems such as credit cards and SMS banking, online advertisements like Google advertisements and online shipping.

- Market survey: Rwandans have real time updates about the Stock exchange daily market status in order for them to develop an efficient investment mind.
 - E-SOKO. This project empowers farmers to make informed market pricing decisions and that leads to more successful farming.
11. **Explain how each of the following affects the quality of information:**
- (a) **Age:** Information changes over time and so out-of-date information can be irrelevant; therefore information needs to be up-to-date to avoid cases of giving the wrong picture of what is happening.
 - (b) **Accuracy:** This is the measure of how close data is to the original form. Accurate data should be the same as the original.
 - (c) **Completeness:** Information should be comprehensive since partial information may only represent a small part of the picture. If part of the information is missing then one will not be able to make use of it or make accurate decisions.

1.23 Teacher Support on Assessment: Additional Questions and Answers

1. **State two disadvantages of using a mobile phone in school. (Individual work.)**
 - Theft
 - Disruptions
 - Interruptions
 - Cheating in examinations
2. **List two areas where ICT is applied. (Individual work.)**
 - Manufacturing and Production
 - Research
 - Entertainment
3. **Outline three advantages of using mobile phones in schools. (Students to work in groups of five.)**
 - Students can easily research on relevant information through the mobile phone.
 - Fast communication of students with their guardians.
 - A mobile phone is a teaching and learning aid since it has programs that are similar to those found in a laptop or desktop computer used for learning.
 - Mobile phones contain many applications such as Mp3 player, digital camera and GPS all on one gadget making it convenient for a student.

- Students can share information through social media such as questions, notes, and images among other educational resources.
4. **Define the term technology. (Individual work.)**
It refers to instructional approaches that are systematically designed and applied in specific ways.
 5. **Definition of the term ICT: (Individual work.)**
ICT is an abbreviation for Information and Communication Technology which refers to information technology and telecommunication that includes computer hardware, software, telecommunications equipment, transmission and other technologies in the processing and dissemination of information.
 6. **Identify three examples of ICT equipment. (Students to work in pairs and list as many examples as possible.)**
 - Radio
 - Television
 - Mobile phones
 - Tablets
 - Billing machines
 - Satellite
 - Projector
 - Computers
 - ATM
 - Any other appropriate answer.
 7. **Explain two uses of ICT in academic institutions. (Students to work in groups of five.)**
 - **CAL:** This is an acronym for Computer Aided Learning, which is also known as computer-based training (CBT). It is the integration of ICT into the learning process. It involves the use of computers in education and training.
 - **CAI:** This is an acronym for Computer-Aided Instruction, which includes the use of computers to teach academic skills to students and to help them develop communication, language and skills. It includes computer modelling and computer tutors, for example, typing tutor.
 - **CAA:** This is an acronym for Computer Assisted Assessment. It is a computerised innovation used in marking multiple choice examination papers where a box is marked in pencil to indicate the candidates' preferred answer.
 - **E-learning:** It is the delivery of educational programs, training or learning materials by electronic means. It involves the use of electronic devices such as mobile phones, tablets, computers and the Internet.
 8. **Explain three uses of ICT in Medical sector in Rwanda. (Students to work on this question as a take away project. They could work in groups of five.)**
 - ICT is used in the medical sector to keep records of patients.

- 
- It is used in Intensive Care Unit (ICU) to control life support machines.
 - ICT can also be used to assist patients in receiving medical diagnosis and advice from foreign medical experts through the use of computerised expert systems.
 - Many doctors, pharmacists and medical practitioners are using the Internet to update their medical knowledge. This is achieved through, research on areas of interest. Refresher courses are also available and can be used to improve their medical knowledge for better service delivery.
 - ICT-based equipment such as Magnetic Resonance Imaging (MRI), X-Rays and CT-Scan (Computed Tomography Scan) are being used for diagnosing complicated diseases.

9. **List four applications of ICT in the banking industry. (Students to work in pairs and list as many examples as possible.)**

- Electronic Funds Transfer (EFT)
- Internet banking
- Mobile banking
- Automated Teller Machine (ATM).
- Database Management.
- Cheque clearing
- Customers are also enabled to access their bank details through SMS alerts.



Computer Systems

Introduction

Computer systems consist of three entities, namely software, hardware and the user. The three work together to achieve a common goal. This topic therefore covers the computer hardware and software. It also covers the evolution of computers and the areas where computers are used. It is expected that at the end of this topic, the learner should be able to appreciate the role played by computers in the evolution of the society, and their impact in the society among others.

2.1 Content Map for the Unit

Topic Area	Introduction to ICT		
Unit title	Computer Systems		
Subtopic Area	ICT Fundamentals		
Number of periods	6 + Homework		
Introduction	Computer Systems		
Classroom organization	Whole class orientation then work in groups/ pairs. Individual activities.		
Equipment required	Computers, video player, projector, Students' textbook, and digital materials.		
Activities	Discussions, project, field trips, role play		
Competences practice	Team work, Leadership skills, Practical skills, Communication skills and Research.		
Language competences practice	Defining Group discussions	Communicating Writing	Explaining Reporting
Additional Vocabulary (Key terms to be explained to the student)	Plotter Track ball ALU Hardware Firmware Primary storage	Flatbed plotter CPU Control Unit Software Microcomputer Secondary Storage	Drum plotter CU Utilities Live Integrated circuits GIGO

Numeracy	Ability to follow evolution of computer over the years
Study skills (including language competences)	<ul style="list-style-type: none"> • Note taking. • Presentation skills • Observation skills • Listening to audio lessons • Organization of ideas. • Reporting skills • Watching video lessons
Revision	<ul style="list-style-type: none"> • Learning Activities, and the Revision Exercise in ICT Senior 1, Student's Book.
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work in groups, practical exercises, assessing whether the objectives are met, continuous assessment tests and oral questions. • A summative evaluation at the end of the unit to establish whether the learning objectives have been met.
Learning outcomes	<p>The learner should be able to:</p> <ul style="list-style-type: none"> • Plug and unplug different external hardware. • Explain the invention and evolution of computers. • Precisely distinguish between different types and parts of computers. • Explain how computers are used in different areas. • Classify computer software. • Explain the various components of a computer system. • Identify the various computer parts and their categories.

2.2 Subtopics/Content to be covered

Computer

- Definition of a computer, functions of computers (input, processing, storage and output), and characteristics of a computer.

Computer components: Hardware

- Central Processing Unit (ALU, register and CU), and peripherals (input and output)
- Ports and connectors
- Storage (primary storage, secondary storage/mass storage and tertiary storage), and characteristics and measurements of storage.

Computer components: Software

- System software (operating system, utilities, programming languages, firmware).
- Application software (customized and off the shelf software).
- The computer system (user, software, hardware and data).

Computer family

- Microcomputer (definition and categories), minicomputer, mainframe and super computer.

History of computers

- Invention (Charles Babbage, ENIAC).
- Generations of computers (valves, transistors, integrated circuits, microprocessors and artificial intelligence).

Advantages and disadvantages of using a computer

- **Areas of computer use** (education, business, office work, entertainment, communication, media, storage, security, traffic control, medicine and weather forecasting among others).

2.3 Reference to the Students' Book: Senior 1, Students' Book, pages 22 to 69.

2.4 Key Unit Competency

By the end of the unit, the learner should be able to explain the evolution, categories, parts and role of computers.

2.5 Learning Objectives

Knowledge and understanding

By the end of the unit, the learner should be able to:

- (i) Explain computer-related terms.
- (ii) Identify the different parts, functions and characteristics of a computer.
- (iii) Identify different ports and connectors.
- (iv) Explain computer invention and its generations.
- (v) Identify advantages, disadvantages and areas where computers are used.

Skills to be imparted in this unit

By the end of the unit, the learner should be able to:

- (i) Use computer-related terms appropriately.

- (ii) Convert from one unit of storage measurements to another.
- (iii) Connect different ports to their corresponding connectors.
- (iv) Differentiate computer systems and computer parts.
- (v) Explain the invention and evolution of computers.
- (vi) Differentiate technologies used in different generations of computers.
- (vii) Analyse advantages and disadvantages of different generations and areas of computer use.

Attitudes and Values to be developed in this unit

By the end of the unit, the learner should be able to:

- (i) Appreciate the role played by computers in the evolution of society and their impacts on daily life.
- (ii) Appreciate how different technological advances have impacted on the evolution of computers.

2.6 Teacher Preparation

- Make notes and prepare a lesson plan for each topic.
- Obtain different resource materials to cater for the varied abilities of the learners.
- Organise the students into groups, taking care of the special education needs in the class.
- Ensure all the connectors and ports are in good condition before availing them to the students for practical exercise.
- Watch and listen to the video and audio content to be presented to the students to ensure that the content is within the syllabus.
- Test the projector, the video player, and any other equipment to be used during the lesson. Ensure that they are in good working condition.

2.7 Key Concepts to be covered

- The computer system is a collection of components that work together to process data and manage information.
- The components of a computer system are the hardware, software and the liveware.
- Hardware are the tangible components of a computer.
- Software refers to computer programs. It is a set of instructions that enable the computer hardware to perform the assigned tasks.
- The two main classification of software are system and application software.

- The computer family refers to the category of computers with the same operational design and compatible processors.
- Computers have evolved through generations.
- Computer technology is applied in almost every sector.

2.8 Additional Content for the Teacher

Types of Keyboard

- (a) **QWERTY Keyboard:** The name comes from reading the first six keys appearing on the top left letter row of the alphabet keys on the keyboard (**Q, W, E, R, T, and Y**). The QWERTY design is based on a layout created for the Sholes and Glidden typewriter and sold to Remington in 1873. It became popular with the success of the Remington No. 2 of 1878, and remains in use on electronic keyboards. The QWERTY keyboard has only one vowel (the letter A) on the home row, even though most English words contain a vowel, forcing the fingers to travel off the home row for most words.

QWERTY KEYBOARD

~	!	@	#	\$	%	^	&	*	()	-	+	Delete	
1	2	3	4	5	6	7	8	9	0	{	}		\	
Tab	Q	W	E	R	T	Y	U	I	O	P	[]		\
Caps	A	S	D	F	G	H	J	K	L	:	"	'	Enter	
Shift	Z	X	C	V	B	N	M	<	>	?	/	Shift		
Ctrl		Alt									Alt		Ctrl	

- (b) **AZERTY Keyboard:** It is similar to QWERTY keyboard, except that the Q and W keys have been switched with the A and Z keys, respectively. It is named an AZERTY keyboard because, like the QWERTY keyboard, the first six letters in the first row of alphabetical keys spell “AZERTY.” This type of computer keyboard is commonly used in France, Belgium, Lithuania, and various French-speaking countries in North Africa.

AZERTY KEYBOARD

	1	2	3	4	5	6	7	8	9	0	°	+	←										
	&	é	~	#	,	{	([-		è	·	_	ç	^	à	@)]	}	+	=	→
Tab	A	Z	E	R	T	Y	U	I	O	P	{	}		\									
Caps	Q	S	D	F	G	H	J	K	L	M	%	µ	*	Enter									
Shift	>	W	X	C	V	B	N	?	:	:	/	§	!	Shift									
Ctrl		Alt										Alt		Ctrl									

- (c) **Dvorak Keyboard:** It is a keyboard with a different layout of keys than the QWERTY arrangement. Dr. August Dvorak and William Dealy developed the Dvorak keyboard in 1936. Dvorak keyboard is referred to as the **simplified keyboard** since most frequently used letters are in the middle row, the frequently used letters are in the top row and the bottom row has the least frequently used letters. Most of the frequently used letters are on the right side of the keyboard and support right-hand dominance.

DVORAK KEYBOARD

	!	@	#	\$	%	^	&	*	()	-	+	Delete
	1	2	3	4	5	6	7	8	9	0	-	=	
Tab	?	<	>	P	Y	F	G	C	R	L	{	}	
	/	,	.								[]	\
	A	O	E	U	I	D	H	T	N	S	"	'	Enter
Shift	:	;	Q	J	K	X	B	M	W	V	Z		Shift
Ctrl		Alt										Alt	Ctrl

- (d) **Multimedia Keyboard:** It is a keyboard that contains some special keys used to access frequently used programs such as the Internet, music, and e-mail. A typical example contains buttons that control various computer processes, such as turning on the computer's power, putting the CPU to sleep, and waking it up again.

Most of these keyboards also have a hotkey for the computer's calculator program, as well as a key to open the computer's access screen for navigation of applications and files, and volume control key for reducing and increasing the sound when listening to music or playing video.

- (e) **Overlay Keyboard:** It is an input device that consists of a board with a series of keys on it that are typically unmarked and not assigned to any particular meaning. It is essentially a blank keyboard that can then be programmed to have each key represent a particular input signal. This type of device is often used in the fast food industry in which each key can be assigned to a different food, to make input fast and easy. An overlay keyboard can also refer to a **virtual keyboard** that appears on a touch screen, allowing someone to enter input through it.
- (e) **Bluetooth Keyboard:** Bluetooth is a wireless communications protocol that allows sending of data over short distances. Bluetooth can work with multiple devices simultaneously. Connections between devices are simple to make and are usually performed automatically. A Bluetooth keyboard is one that uses the Bluetooth wireless protocol to connect the keyboard to a mobile device, such as a cell phone or a Personal Digital Assistant (PDA).

2.9 Suggested Learning Materials

- Computers.
- CDs/DVDs and any other digital content on invention and evolution of computers, types and parts of a computer, how computers are used and computer connection.
- Projector or smart board
- Senior 1 Students' Book
- Video player

2.10 Suggested Low Cost or No Cost Materials

- Free YouTube downloads on various concepts in the unit.
- Ask learners to bring practical question materials they would want to share.
- Make use of available hardware resources to perform practical on ports and connectors.

2.11 Suggested Teaching Methods

- Discussions
- Practical activities
- Question-and-answer method
- Explanation
- Demonstration
- Audio and video media

2.12 Suggested Teaching and Learning Activities and Exercises to Support Delivery of Content and Development of Student Competences

- Teacher explains key concepts in the chapter.
- Teacher demonstrates to the learners how to plug and unplug different external peripherals on the ports.
- Learners discuss different computer concepts in their groups.
- Teacher provides video/digital content on different parts of a computer system.
- Learners observe the content provided by the teacher.
- Teacher asks the students oral questions during demonstrations or explanation as the students provide answer.
- Teacher assesses the practical exercise being done by the students and provide guidance where necessary.

2.13 Cross-Cutting Issues to be integrated in Teaching and Learning Activities

Address the following emerging issues:

- Peer Pressure: Students in Senior 1 are likely to be influenced by peer pressure. Refer to the Students' Book, pages (viii) to (ix).

- Create short health breaks during the lesson. The break could be as short as three to five minutes. Use the break to sensitise students on social issues such as environment, HIV/AIDS, dangers associated with premarital sex, and drug and substance abuse. You could download relevant short video clips and spent a few minutes to engage the students on the message.

2.14 Suggestions for Accommodating Special Education Needs (SEN)

Identify learners with special needs and help them to cope during the lesson.

Sensory impairment (Visual)

- Group the learners with those who have good vision to assist them where necessary.
- Use large font size and eligible font styles when projecting digital content.
- Provide more video or audio content than written once.

Sensory impairment (Hearing)

- Project your voice to ensure you are audible to all the learners.
- Ask them questions to assess if they understand the concepts.
- Learners to sit close to the teacher.

Motor impairment

- Assign them computers near the door so that they don't have to walk along distance before getting to their computers.
- Avoid undertaking tasks or exercises that involve a lot of movements.

Gifted or talented learners

- Assign them more challenging tasks.
- Encourage them to do peer teaching.

2.15 Suggestions for Supporting Multi-Ability Learning

Fast learners

- Let them sit next to slow learners so that they can assist them.
- Give them more exercises.

Slow learners

- Use simple English that the students can understand.
- Avoid giving so many procedures to the students at the same time.
- Organise for remedial lessons.
- Group them with the fast learners and encourage peer teaching.
- Closely monitor their work and notes.

2.16 Support to Learning Activities

The following are some suggestion for the learning activities: group work, project work, pair work and individual work.

Project

Let the students write an essay on:

- The pros and cons of using computers.
- How ICT has impacted on the society.
- How the abacus computer was used for calculations.

Group

- Give the students past papers on computer systems.
- Give the students the questions, learning activities and the revision exercise in the Students' Book.

Pairs

- In pairs, the students should plug and unplug the different computer peripherals in their respective ports.

As individual

- Attempt the assignments in the ICT Senior 1 Students' Book.

2.17 Support for the Development of Positive Skills, Values and Attitudes

- The following are some life skills to be developed in this unit: critical and creative thinking, effective communication and problem solving.
- Values and attitudes to be developed include responsibility, appreciation, cooperation, and curiosity. They are developed in the following ways:
 - (i) Working in groups encourages the attitude of cooperation.
 - (ii) Curiosity can be developed by letting the learners discover on how different ports can be used.
 - (iii) Creative and critical thinking is developed by giving them a project.
 - (iv) Responsibility can be developed by assigning every group a leader and activity to be handled by each student in the group.

2.18 Support to Suggested Formative and Summative Assessment

- Learning Activities and the Revision Exercise in Senior 1 Students' Book.
- Oral questions.

- Project documentation.
- Practical questions.
- Revision questions from past papers.

2.19 Links to other Subjects

- Physics: Studying valves and transistors (circuit board).

2.20 Additional Remedial, Consolidation and Extension Activities

- Assess the essay written by the students and reward the winner.
- Assess the group activities and provide guidance.
- Assess the practical activities and give guidance.

2.21 A Sample Lesson Plan

See Appendix 1, pages 151 to 178.

2.22 Answers to the Questions and Activities in the Students' Book

Learning Activity 2.1 (Refer to the Students' Book, page 23)

1. **Group work:** Divide the class into groups of five students. If there is a typewriter in the school, make arrangements to have them observe how it is used. Let them compare the computer to the typewriter, stating the advantages and disadvantages.
2. **This question can be answered in class during the lesson.** Let the students explain the meaning of GIGO (Garbage In Garbage Out). Let them give examples of incidences of GIGO they may have experienced during their interaction with the computer.
3. Questions 3 and 4 can be done individually. Let them write out and fill in the answers in their exercise books.

Learning Activity 2.2 (Refer to the Students' Book, page 26)

Part 1 of this activity could be done as individual work.

Let the students hand in the completed activity for marking.

1. **A computer**
A computer is an electronic device that accepts data, processes it using a set of instructions, stores it and produces information.
2. **Explain three characteristics of a computer.**
 - (i) **Speed:** A computer can carry out processing of instructions at a very high

speed. It can perform in a few seconds the amount of work that a human being can do within a long duration.

- (ii) **Accuracy:** Computers are very precise in processing data as long as they are fed with correct data and instructions.
- (iii) **Versatility:** Computers can perform more than one task at the same time.
- (iv) **Reliability:** Computer provided very high speed processing accompanied by an equally high level for reliability.
- (v) **Power of Remembering:** A computer can store and re-produce information any time because of its large secondary storage space.
- (vi) **No IQ:** A computer possesses no intelligence of its own. It therefore can only perform what it is programmed to do.
- (vii) **Diligence:** A computer is a machine and therefore it does not suffer from human traits such as tiredness, bad attitudes and mood swings among others. It also does not lose concentration after working continuously for a long time. Hence computers can do the same tasks over and over again without getting tired.
- (viii) **Storage:** Computers have a lot of a storage space within it. It also has a variety of removable storage locations that could be used to back up data and can store tremendous amount of data.

3. **State two functions of the Arithmetic Logic Unit.**

- Arithmetic operations such as addition (+), subtraction (-), division (÷) and multiplication (*).
- Logical operations such as OR, AND, NOT, and FOR among others.

4. **Explain three types of registers used in a computer.**

- **Instruction register:** They temporarily hold an instruction before it is converted to machine readable format.
- **Address register:** It temporarily stores the address of the next instruction to be processed.
- **Accumulator register:** It temporarily holds the last processing step of the Arithmetic Logic Unit (ALU).
- **Storage register:** It temporarily holds information waiting to be output.

5. **The CPU is also called the Brain of the computer**

Part 2 of this activity could be done in groups of five.

- Supervise the group discussions.
- Assess the work done by each group.
- Advise the groups accordingly where the information given is misleading.

- Give each group a chance to make a short presentation to the rest of the class. Presentations build their communication skills as well as develop their self confidence.

Learning Activity 2.3 (Refer to the Students' Book, page 41)

Part 1 of this activity could be done as individual work.

You could treat it as a Continuous Assessment Test (CAT). Let the students hand in the completed activity for marking.

1. **Define the term input device.**
These are hardware components that are used to enter data and instructions into a computer.
2. **Differentiate between softcopy output devices and hardcopy output devices.**
Softcopy output devices are devices that produce information that can be seen, listened to but not tangible while hardcopy output devices are devices which produce output that is recorded on a tangible media such as paper.
3. **The three categories of input devices are:**
 - (i) **Keying devices:** They enable entry of data to the computer through the use of a set of keys.
 - (ii) **Pointing devices:** They are devices that control the movement of a cursor or a pointer on the computer screen to select icons or commands.
 - (iii) **Scanning devices:** They are devices that capture data from the source directly to the computer by converting it into a digital format.
 - (iv) **Voice input devices:** These are devices used to input data in form of spoken words into the computer.
4. **State three differences between impact printers and non-impact printers.**

Impact Printers	Non-impact printers
• Slow while printing.	• Fast.
• Multiple copy production is possible when carbonated paper is used.	• Multiple copy production is not possible.
• Make use of ink ribbon.	• Use toner or cartridge.
• Striking mechanism is used to produce print on paper.	• It uses thermal or electrostatic principle.
• Poor quality of print produced.	• High quality print produced.

5. **Describe how the trackball functions.**

It is a pointing device with a ball on the top that is rotated with the finger preferably the thumb, or the palm of the user's hand to control the pointer on the screen. It has the left and the right button that is clicked to perform an action.

6. **Explain three factors to be considered when purchasing an output device.**

- The nature of output expected.
- The initial and maintenance cost of the device.
- The quality of output produced.
- Speed of output and the volume of data to be produced.

7. (a) An example of a keying device is the keypad, keyboard. Accept other correct answers.

(b) Mention how projectors can be used.

- They are used in teaching a crowd of people.
- They are used to project video in a big screen during entertainment.

Part 2 of this activity could be done in groups of five.

- For questions 1 and 2, let the Students to have a group chair and secretary. These roles should be played by students on a rotational basis. This will give every student a chance to play each of the identified roles. Let them discuss and make short presentations in class.
- For question 3, make arrangements to acquire video clips or images of input and output devices. Share them with the groups.
 - Supervise the group discussion.
 - Assess the work done by each group on the areas highlighted in the question.
 - Advise the groups accordingly where the information given is misleading.
 - Provide a video player and projector for the students to watch the digital content on input and output devices.

Learning Activity 2.4 (Refer to the Students' Book, page 50)

Part 1 of this activity could be done as individual work.

Give it as a Continuous Assessment Test (CAT). Let the students hand in the completed activity for marking.

1. A storage device has a maximum storage capacity of 1.44MB. How many characters can be stored in this device given that 1 character = 1 byte?

- 1KB = 1024 bytes
- 1MB = 1024 KB
- 1.44MB = (1.44 * 1024 * 1024) bytes
= 1509949.44 bytes
- 1 character = 1 byte

Hence the number of characters that can be stored in this device is approximately 1509950 characters.

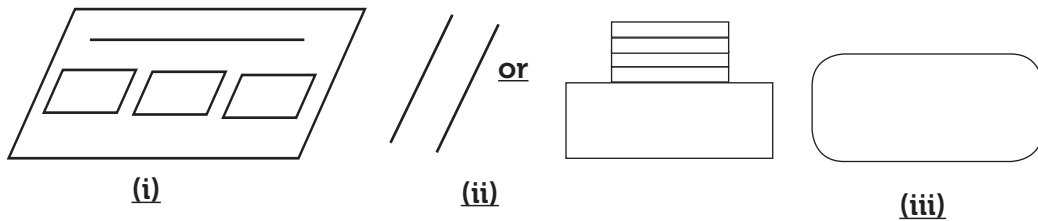
2. State two characteristics of primary memory.

- It is volatile that is the content is lost any time power is switched off.
- It stores data temporarily.
- Its content is user-defined.
- The storage capacity is normally lower than that of secondary storage devices.

3. A port is an interface on a computer on which a device can be connected.

4. Identify and draw the symbols of the following ports:

- (i) PS/2 for keyboard (ii) Parallel port (iii) Monitor port



5. Differentiate between parallel port and serial port.

Parallel port can transmit eight bits of data at a time while serial port can transmit one bit of data at a time.

6. Describe the structure of a hard disk.

- A hard disk consists of one or several inflexible circular disks called platters which are coated with a magnetic material, normally Iron II Oxide.
- Data is stored on each platter on tracks that are concentric. These platters are held vertically above each other by a spindle forming cylinders. The platter(s), read/write heads and the mechanisms of moving the heads across the surface of the disk are sealed permanently in an airtight metallic casing to protect the assembly from damage.

Part 2 of this activity could be done in groups of five.

- Supervise the group discussions.
- Give each group a chance to present their findings.

- Let them name the female and male ports in a system unit. Let them also draw the symbols in each port. The groups could make posters and hang them on their walls.

Learning Activity 2.5 (Refer to the Students' Book, page 51)

Part 1 of this activity could be done as individual work.

Give it as a Continuous Assessment Test (CAT). Let the students hand in the completed activity for marking.

1. **Define the term software:** It is a set of instructions that either enable the computer hardware to perform their assigned tasks or help the user to accomplish specific tasks.
2. **Differentiate between application software and system software:** System software is designed to manage computer resources and provide the resources to the user. Application software enable the user to accomplish a given task.
3. **Explain three types of system software.**
 - **Operating System (OS):** This is a group of programs that provide a platform for loading other programs known as application programs and act as an interface between the hardware and the application programs.
 - **Utility software:** They are system software that are used to perform routine functions aimed at optimizing, analysing and maintaining the operations of a computer.
 - **Firmware:** These are software programs that are stored in computer's Read Only Memory (ROM) where they are available for immediate use. They are hard-coded (fixing a program in such a way that the code cannot be changed without modifying the program) and stored on a silicon chip and therefore are not affected by loss of power.
 - **Programming Language Software:** These are formal constructed languages designed to communicate instructions to a computer to create programs that control the operations of a machine.
 - **Networking software:** It is system software that is used for configuration and enhancement of interactions in a computer network. They enable different nodes to exchange data and they also have security features that protect the network from malfunctioning.
4. **Define the term firmware.**

These are software programs that are stored in computers Read Only Memory (ROM) where they are available for immediate use. They are hard-coded and

stored on a silicon chip and therefore are not affected by loss of power, hence the term firm.

5. Two examples of operating systems are Windows and Linux. Accept other correct answers.
6. **State two roles of an operating system.**
 - Provide platform for loading other programs.
 - Provide an interface between the user programs known as application software and the hardware.
7. **Categorise the following software as either application or system software**
 - (i) **Sugar** Operating system
 - (ii) **Antivirus** Utility software
 - (iii) **Scratch** Programming language
 - (iv) **Word processor** Application software

Part 2 of this activity could be done in groups of five.

- Let the students do questions (i) to (iii) in groups.
- Let them share the answers they come up with.

Learning Activity 2.6 (Refer to the Students' Book, page 55)

Part 1 of this activity could be done as individual work.

1. **Examples of microcomputers are:**
 - **Desktop computers:** These are computers designed to be used while placed on top of a desk or a table.
 - **Laptop computers:** These are portable computers that look like a briefcase and have all input/output, processing and memory devices inside the system unit. These computers are designed to be used while placed on the user's lap.
 - **Palmtop:** They are also referred to as handheld computers, or PDAs. They are designed to fit in the palm of the hand and easily fit in pockets.
2. **State two differences between super computers and mainframe computers.**

Supercomputers	Mainframe computers
<ul style="list-style-type: none">• The largest in size.	<ul style="list-style-type: none">• The second largest in physical size.
<ul style="list-style-type: none">• They are the most powerful and expensive.	<ul style="list-style-type: none">• Less powerful and expensive than supercomputers.

- | | |
|---|--|
| <ul style="list-style-type: none"> • They are the fastest in data processing | <ul style="list-style-type: none"> • They are slower in processing data compared to supercomputers. |
|---|--|

3. **Mention two application areas of supercomputers:** These computers are mainly applied in scientific research work, for example, in weather forecasting, advanced military applications and mobile phone economy among others.
4. **Describe minicomputers.**
 - They are small in size, cheaper and have low processing speed compared to super and mainframe computers.
 - Their storage capacity is higher than that of microcomputers and they are popularly used to computerize processes in manufacturing industries and production lines as well as Autopilots in Aeroplanes. They are also used as servers in large and medium-sized organizations.
5. **State two differences between a notebook and a laptop.**
 - A laptop has more ports and other plug-in options to allow for connection of additional peripherals compared to a notebook.
 - A laptop has both USB port and an inbuilt Digital Versatile/ Compact Disk drive whereas a notebook only contains the USB port.

Part 2 of this activity could be done in groups of five.

- Let the students do questions (i) in groups. Give them a chance to make short presentations in class.
- Let them observe the computers available in the school and suggest the computer family they may belong to.

Learning Activity 2.7 (Refer to the Students' Book, page 61)

Part 1 of this activity could be done as individual work.

Give it as a Continuous Assessment Test (CAT). Let the students hand in the completed activity for marking.

1. **Who was known as the father of modern computers? Give a reason for your answer.**

Charles Babbage is known as the father of modern computers. This is because he invented a computer that could be programmed just like modern computers.
2. **State two advantages of the fourth generation computers.**
 - (i) They are smaller because of high level of circuit integration hence they are portable.
 - (ii) They are cheaper since they are readily available in the market.

- (iii) They have very high processing speeds compared to the previous generations.
3. The technology for fifth generation computers was the **Artificial Intelligence (AI)**.
4. **Mention three characteristics of the third generation computers.**
- (i) They used Integrated Circuits (ICs) technology.
- (ii) Magnetic disks and magnetic tapes were used for secondary storage.
- (iii) Keyboards were used for data input.
- (iv) Monitors were used for data output.
- (v) Common Business Oriented Language (COBOL) and Formula Translator (FOTRAN) programming languages were used for programming.
5. **Some examples of computers in the First Generation are:** Electronic Discrete Variable Automatic Computer (EDVAC), Universal Automatic Computer (UNIVAC), Electronic Numerical Integrator and Calculator (ENIAC) and Mark 1.
6. **AI is the abbreviation for Artificial Intelligence.** It is the science of developing machines that mimic human behaviour such as reasoning, learning, hearing, seeing and communicating.
7. The technology used by the first generation of computers was vacuum tubes or **thermionic valves** technology for amplification and as switching devices.
8. The first generation of computers used **punched cards** for data input.
9. The second generation of computers used **transistor** technology.
10. The third generation of computers used **Integrated Circuits** technology.
11. The second generation of computers used **punched cards** for data input.

Part 2 of this activity could be done in groups of five.

- Let the students do questions (i) to (iii) in groups. Give them a chance to make short presentations in class.
- Give them a chance to make a presentation to the rest of the class.

Answers to the Revision Exercise 2 (Refer to the Students' Book, page 68)

Give this exercise as a test to be done individually.

1. **Examples of ports:** PS/2 (Keyboard and mouse); USB 2.0 (flash drives and keyboard); (Accept other correct answers.)
2. **State the function of registers in a computer:** They are used to hold data, instructions or information awaiting processing or output.

3. **With the aid of a diagram, explain the fetch-execute cycle.**
 - For the diagram, refer to Figure 2.1 in the Students' Book, page 25.
 - **Fetch phase:** The processor obtain instruction from the memory through the address bus.
 - **Decode phase:** The processor converts instruction to a format that can be understood by the computer.
 - **Execute Phase:** It issues appropriate signals that is used to perform the expected action.
4. **Give two limitations of a voice input device.**
 - Homophones: Some words sound the same.
 - Words have to be separated since recognition rate is slow.
 - They can only understand limited vocabulary.
5. **Mention two ways in which computers have been modified to enable the physically challenged people in the society make use of computers.**
 - Introduction of braille keyboard for the blind.
 - Use of voice input devices for the blind and other physically challenged people.
 - Introduction of touch sensitive screen.
6. **Explain three factors to be considered when purchasing an input device.**
 - Initial and maintenance cost.
 - Nature of the input expected.
 - The volume of input expected in relation to the speed of the device.
 - The method of input used by the device.
7. **USB**
8. **Read Only Memory**
9. **Random Access Memory**
10. **Differentiate between RAM and ROM.**

RAM	ROM
It is volatile.	It is non-volatile.
Content is user defined.	Content is obtained from the manufacturer.

Content is held temporarily.	Content is held permanently or semi-permanently.
------------------------------	--

11. **Differentiate between ports and connectors.**

A port is an interface on a computer on which a device can be connected while a connector is a part of a cable that plugs into a port or interface to connect two devices.

12. **HDMI Micro**

13. **Differentiate between tertiary storage device and secondary storage device.**

Tertiary storage is used for storing data at very large-scale compared to secondary storage device.

14. **State two advantages of off-the-shelf software.**

- (i) They are cheaper than in-house developed software.
- (ii) They are readily available in the market.
- (iii) They are robust, meaning that they have been thoroughly tested and hence they work with no or minimal error.

15. **A laptop computer is more expensive than a desktop computer of the same specification. State two reasons for this.**

- They have inbuilt battery that stores power for use unlike a desktop which must be connected to the UPS.
- The technology required for miniaturizing is high.

16. **State two ways in which computers are used in education.**

- Students are able to register for courses offered outside their country without having to travel to the country offering the courses. This is referred to as **online learning**, and it is done through the Internet.
- **Computer Aided Learning (CAL):** It is the integration of ICT into the learning process. It involves the use of drill and practice, problem solving tutorials and educational games in education and training.
- **Computer Based Simulation (CBS):** It is the modeling of a real life situation using a computer. It can be used to mimic real learning situation. For example it can be used to mimic a chemistry experiment.

17. **HDMI; VGA**

2.23 Teacher Support on Assessment: Additional Questions and Answers

1. **Differentiate between analog and digital computers. (Pair work.)**

Digital computers process data that is in discrete (distinct) form while analog computers process data that varies continuously with time.

2. **List three ways in which computer can be classified. (Individual work.)**

- Purpose.
- Functionality.
- Physical size and processing power.

3. **Describe an overlay keyboard. (Pair work.)**

- It is a type of input device that consists of a board with a series of keys on it that are typically unmarked and not assigned to any particular meaning.
- It is essentially a blank keyboard that can then be programmed to have each key represent a particular input signal. An overlay keyboard can also refer to a virtual keyboard that appears on a touch screen.

4. **State two ways in which computers are used in health. (Students to work in groups of five. Give the question as a takeaway assignment to take three days.)**

The following are some of the uses of ICT in the health care:

- (i) Drug innovation and design: The advancement of information and biotechnologies is radically transforming drug innovation and design and is altering the economics of the drug discovery pipeline.
- (ii) Knowledge enrichment, research and education – Many doctors, pharmacists and medical practitioners are using the Internet to update themselves, do research on specific questions and on areas of interest and even take refresher courses to increase their medical knowledge for better services to the patients .
- (iii) ICT is being used in the design of automated cardiovascular machines used in the gymnasium for exercises to improve the general body health.
- (iv) ICT-based equipment such as Magnetic Resonance Imaging (MRI), X-Rays and CT-Scan (Computed Tomography Scan) are being used for diagnosing complicated diseases.

5. **State one advantage of a Drovak keyboard. (Pair work.)**

It is a simplified keyboard since most frequently used letters are in the middle row, the frequently used letters are on the top row and the bottom row has the least frequently used letters; hence typing is faster.

6. **With aid of a diagram, differentiate between analog data and digital data. (Pair work.)**

Digital data is in discrete (distinct) form while analog data varies continuously with time. Refer to Figure 1.1 in the Students' Book 1, page 3 for the diagrams.

7. **Define the term a computer. (Individual work.)**

A computer is an electronic device that accepts data, processes it using a set of instructions, stores it and produces information.

8. **State two differences between Compact Disk and Digital Versatile Disk. (Pair work.)**

- Compact disk has a lower storage capacity compared to digital versatile disk.
- Digital versatile disk produce high quality sound and pictures since it is of higher technology that compact disk.

7. **Mention three advantages of general purpose software. (Pair work.)**

- (i) They are easy to use and therefore can be used by people with little or no computing knowledge.
- (ii) They are robust.
- (iii) They have comprehensive documentation to guide the user.
- (iv) They are cheaper than customised software.

9. **State two characteristics of integrated software. (Pair work.)**

- (i) Data produced in one program can be used easily in another.
- (ii) The programs come together in one package.
- (iii) Menu, icons and other features are similar in each program in the suite.

9. **Define the term virtual memory. (Pair work.)**

Virtual memory refers to the use of part of the hard disk as main memory for storing tasks from or to the processor.

10. **Define the term artificial intelligence. (Pair work.)**

It is the science of developing machines that mimic human behaviour such as reasoning, learning, hearing, seeing and communicating.

11. **State two characteristics of the second generation computers. (Pair work.)**

- (i) They used transistor technology. A transistor is a semiconductor device with three terminals and it is capable of amplification and switching of signals.
- (ii) They used magnetic core for internal memory.
- (iii) The magnetic tape was introduced as a secondary memory.
- (iv) Assembly language was used for programming.
- (v) They used punched cards for input of data.
- (vi) Printouts were used for output of information.

12. Name the storage device developed in the following generations: (Individual work.)

- | | | |
|-------|----------------|---------------|
| (i) | 2nd Generation | Magnetic tape |
| (ii) | 3rd Generation | Magnetic disk |
| (iii) | 4th Generation | Optical disk |

13. Explain three types of computer buses. (Students to work in groups of five.)

- (i) **Data bus:** This is a two-way (bidirectional) bus that carries data signals to and from the microprocessor.
- (ii) **Address bus:** This is also called memory bus. It is a one-way (unidirectional) bus that carries the address of the memory location or a port which needs to be accessed by the microprocessor.
- (iii) **Control bus:** This is also called a command bus. It is a unidirectional bus that transports and synchronises signals coming from the control unit and travelling to all the other hardware components.

14. State two advantages of USB port. (Pair work.)

- More than eight devices can be daisy chained on a single port.
- They can connect different types of devices regardless of their method of data transfer.

15. (a) Define the term integrated software. (Pair work.)

These are software that combines several standard software into a package.

(b) List two examples of integrated software. (Individual work.)

Microsoft (MS) Office, Corel Office, Lotus SmartSuite, Open Office, iWork package and Libre Office.



Computer Navigation

Introduction

Computer navigation equips the learner with skills that enable them interact with desktop features such as icons, start menu, and recycle bin. The user can customise in the control panel such as the themes, mouse pointer and desktop icons among others. Creation and manipulation of files and folders will be covered to enable learners manage their work.

3.1 Content Map for the Unit

Unit 3:	Computer Navigation
Topic Area	Introduction to Information and Communication Technology
Subtopic Area:	ICT Fundamentals
Number of periods	6 + Homework
Introduction	Computer Navigation
Classroom organization	Whole class orientation then work in groups. Individual activities.
Equipment required	<ul style="list-style-type: none"> Computers, video player, projector, textbook and digital materials.
Activities	<ul style="list-style-type: none"> Practical activities, discussions, demonstration.
Competences practice	<ul style="list-style-type: none"> Team work, Leadership skills, Communication skills.
Language competences practice	<ul style="list-style-type: none"> Defining Explaining Writing Communicating Group discussions Reporting
Vocabulary acquisition (Key terms to be introduced and explained to the student)	<ul style="list-style-type: none"> Customise Screen Programs CPU Suites Toolbar Clipboard Accessories Applications Bitmap Graphic tablet Windows

Numeracy	<ul style="list-style-type: none"> • Setting the date and time for the computer. • Using the computer calculator. • Inputting numeric data into the computer.
Study skills (including language competences)	<ul style="list-style-type: none"> • Note taking • Organization of ideas • Reporting skills • Observation skills
Revision	<ul style="list-style-type: none"> • Learning Activities and the Revision Exercise in ICT Senior 1 Student's book.
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work in teams, carrying out activities, practical and recording of observation, Continuous Assessment Tests (CATS) and oral questions.
Learning outcomes	<ul style="list-style-type: none"> • <i>The learner should be able to:</i> • Add items to the start menu and quick launcher. • Explain the different parts of a taskbar. • Customise the desktop. • Create a folder hierarchy and move folders using different techniques. • Restore deleted files and folders from the recycle bin. • Use the control panel to customise the working environment. • Create files using notepad and save them in a given location. • Navigate window and manage files and folders. • Connect or insert storage devices to the computer. • Save and retrieve files and folders on or from different secondary storage devices.

3.2 Subtopics/Content to be covered

Desktop

- Definition, desktop icons, taskbar, (start button, task manager, system tray, quick launch) customise the desktop, taskbar.

- Explore and customise the start menu.
- Recycle bin (definition, role, send and restore files from the recycle bin).

Control panel

- Desktop background and theme, mouse pointer, desktop icons and gadgets, windows colour, screen saver, screen resolution, date and time, keyboard layout.

Windows

- Definition, types of windows (application window and document window)
- Windows accessories (Windows explorer, calculator, games and paint)
- Windows control buttons

Folders: Create, rename, cut and paste, copy and paste drag and delete.

Files: Create, save, rename, open, delete, cut and paste, copy and paste

3.3 Reference to the Students' Book: Senior 1 Students' Book Pages 70 to 93.

3.4 Key Unit Competency

By the end of this unit, the learner should be able to navigate the windows environment and work with windows explorer to introduce the techniques of folder and file.

3.5 Learning Objectives

Knowledge and understanding

By the end of this unit, the learner should be able to:

- Recognise the desktop and taskbar elements.
- Explain the role of saving files in folder.
- Identify the process of managing files and folders.
- State the purpose of the recycle bin and why deleted files are kept in the recycle bin.

Skills to be imparted in the learner

By the end of this unit, the learner should be able to:

- Explore and customise the desktop, taskbar and start menu.
- Restore deleted files and folders.
- Use the control panel to customise the working environment.
- Navigate window and manage files and folder hierarchically correctly.

- (v) Use computer storage devices to move data between computers.
- (vi) Use search techniques to find files and folders.
- (vii) Analyse storage devices so that decisions can be made on what storage device should be used based on its characteristics.

Attitudes and values to be developed

By the end of this unit, the learner should be able to:

- (i) Adjust the computer working environment properly.
- (ii) Be aware of deleting files and folders.
- (iii) Appreciate the importance of correctly managing files and folders so that files can be located.

3.6 Teacher Preparation

- (i) Read and master the content to be taught before lesson.
- (ii) Make notes and prepare a lesson plan before each lesson.
- (iii) Ensure that all computers are in good working conditions before every lesson.
- (iv) Attempt the procedures in the content before presenting them to the students.

3.7 Key Concepts to be covered

- Desktop is the first screen that appears when a computer boots up. It consists of icons, the taskbar and other features.
- Icons are images that represent application programs, folders and files.
- Taskbar is a bar usually at the bottom of a computer screen showing currently running programs.
- Start button, task manager, system tray and quick launcher are some parts of a taskbar.
- Explore and customise the start menu.
- Recycle bin is a container that temporarily stores deleted files and folders before they are permanently deleted.
- Control panel is a graphical user interface found on the Start Menu which allows users to view and manipulate basic system settings and controls.
- Desktop background and theme, mouse pointer, desktop icons and gadgets, windows colour, screensaver, screen resolution, date and time, and keyboard layout are example of features that can be customized.
- A gadget is a small application that is capable of performing different tasks and is found on user's desktop screen and is.

- Screen resolution refers to the clarity of the text and images displayed on the screen.
- A window is an open application on a computer's display screen showing the program currently running.
- There are two types of windows, namely application and document windows.
- Windows Explorer refers to the graphical file management utility that displays the drives and contents of folders and files in the computer.
- Windows explorer, calculator, games and paint are some common windows accessories.
- A folder is a specific storage location in a storage media.
- Folders are used to organize and store related files.
- Create, rename, cut & paste, copy & paste, drag and delete are operations that can be done on a file or folder.
- A file is a collection of data items which are stored together.

3.8. Additional Content for the Teacher

Types of Files

While managing files, it is important to know the type of each file. Files can be classified as application-based or system-based.

Application-based files

These are files created using an application programs such as MS-Word, MS-Excel, MS- Access, and MS-Publisher among others. They are indicated by a three or four-letter file extension, such as **.doc** for Microsoft Word document and **.xls** for Microsoft Excel document. These extensions are automatically allocated to the file based on the application software used.

System-based files

These are files that assist the Operating System in performing its tasks. Some examples of system files are **.sys**, (System file) and **.Pdr** (Port driver) among others. If they are corrupted or deleted, the Operating System will not function as expected. For example, in some cases the operating system stops responding to commands or they stagnate at a given point during booting.

Functions of Files

- **Storage of data:** Files are basically used to store related data. It is important to know the type of data available so that related files are kept together. Files help to:
 - (i) Locate important data quickly.

- (ii) Move groups of data more easily, rather than having to search for individual files, when needed.
- (iii) Facilitate sharing of appropriate data and protection of private files.
- (iv) Back up important data more easily and quickly.
- **Organisation of information:** There are two main approaches to organizing data files which are: Program/ application based or project based.
 - (i) Program/application-based: It is a type of organization in which files are arranged by their file extension type. An example of this approach is storing all application- based files together.
 - (ii) Project-based: It is a type of organization in which files are arranged according to their work projects. In this approach, files of different extension types can be grouped in a single folder. These files are organized by their content, rather than by the extensions.

3.9 Suggested Learning Materials

- Computers with appropriate software.
- A video player, projector.
- ICT for Senior 1 Students' Book and other relevant resource materials.

3.10 Suggested Low Cost Or No Cost Materials:

- Free tutorial downloads from the Internet (Always establish the authenticity of the website to avoid downloading infected files).
- Ask learners to bring practical question materials they would want to share.

3.11 Suggested Teaching Methods

Some of the teaching methods that can be applied in this chapter include

- | | |
|------------------------------|-----------------|
| • Question-and-answer method | • Explanation |
| • Practical | • Demonstration |

3.12 Suggested Teaching and Learning Activities and Exercises to Support Delivery of Content and Development of Student Competences

- Teacher explains key concepts in the chapter.
- Teacher demonstrates to the learners on the procedures of navigating the computer appropriately.
- Learners add items to the start menu, add elements to the quick access launch of the taskbar.
- Learners customize desktop features.

- Learners explore the use of recycle bin.
- Learners create files, folders and manipulate the files and folders.
- Learners enhance the use of keyboard and mouse by playing games, using paint and Tux Typing Tutor.
- Learners save or retrieve files and folders on secondary storage devices.

3.13 Cross-Cutting Issues to be integrated in Teaching and Learning Activities

Sexually transmitted infections: They are also referred to a sexually transmitted infections (STIs). They are passed from one person to another through unprotected sexual contact or genital contact. Examples of sexually transmitted infections include: Genital herpes, Gonorrhoea, Syphilis, HIV and Trichomoniasis.

Prevention of STIs: The following are some of the measures to prevent STIs.

- ✓ **Sex and HIV Education:** Programs should be introduced to create awareness to the youth on sex and HIV.
- ✓ **Abstinence:** This means do not practise any type of sexual activities that is either having vaginal, oral, or anal sex. (**Emphasise abstinence.**)
- ✓ **Being faithful:** This means having a sexual relationship with one partner.
- ✓ **Use of protection:** Use of condoms correctly every time you have sex.
- ✓ **Avoid getting drunk on alcohol and using drugs:** When one is under the influence of alcohol and drugs it may lead to risky sexual behaviour.
- Create short health breaks during the lesson. The break could be as short as three to five minutes. Use the break to sensitise students on social issues such as environment, HIV/AIDS, dangers associated with premarital sex, and drug and substance abuse. You could download relevant short video clips and spend a few minutes to engage the students on the message.

3.14 Suggestions for Accommodating Special Education Needs (SEN)

The teacher should identify learners with special need and help them to cope during the teaching /learning activities.

Type of impairment	Support for the learner
Sensory impairment (visual)	<ul style="list-style-type: none"> • The affected learner could sit next to learners with good vision so they can be helped where necessary. • Guide the learner on how to customize the desktop features to suite them.

Sensory impairment (hearing)	<ul style="list-style-type: none"> • Project your voice to ensure that you are clearly heard by everybody. • Let the learners sit close to the teacher.
Motor impairment	<ul style="list-style-type: none"> • Assign these students computers near the door to avoid unnecessary movements.
Gifted or talented learners	<ul style="list-style-type: none"> • Give extra work. • Encourage them to assist slow learners.

3.15 Suggestions for Supporting Multi-Ability Learning

Fast learners	<ul style="list-style-type: none"> • Encourage them to do peer teaching to assist slow learners. • Give them more exercises.
Slow learners	<ul style="list-style-type: none"> • Use the language the learners will easily understand. • Organize for remedial lessons. • Use fast learners to assist them to understand the concepts.

3.16 Support to Learning Activities

The learning activities given in this chapter could be done as a group work, pair work, individual work and whole class work.

Group/Pair:

- In groups explore and customise the start menu.
- Insert gadgets on the computer desktop.

As individual:

- Create a folder on the desktop called RWANDA
- Create a file and store it in the RWANDA folder.
- Copy and paste the folder in the Local Disc C:

3.17 Support for the Development of Positive Skills, Values and Attitudes

The following are some life skills to develop in this unit: critical thinking, effective communication and problem solving.

Some values and attitudes to be developed include responsibility, appreciation, cooperation, and curiosity.

They are developed in the following ways:

- Cooperation is developed by encouraging group discussion.
- Curiosity can be developed by letting the learners explore the software.
- Responsibility can be developed by assigning every group a leader and activity to be handled by each student.

3.18 Support to Suggested Formative and Summative Assessment

- Learning Activities and the Revision Exercise in the ICT Senior 1 Students' Book
- Oral questions.
- Continuous Assessment Test.
- Practical questions.

3.19 Links to Other Subjects: Relate managing of files and folders to Personal Management skills

3.20 Additional Remedial, Consolidation and Extension Activities

- Give tasks related to creating, saving and managing folders.

3.21 A Sample Lesson Plan

See Appendix 1, pages 151 to 178.

3.22 Answers to the Questions and Activities in the Students' Book

Learning Activity 3.1 (Refer to the Students' Book, page 93)

Part 1: Individual work: Students to hand in the work for marking.

1. Subfolder
2. Boot
3. Recycle bin
4. Clock; CPU meter; calendar; and currency.
5. **Define the term task manager:** It is a system monitor program used to provide information about the processes and programs running on a computer, as well as the general status of the computer.
6. **Define the terms desktop icons and control panel:**
 - **Desktop icons:** These are images that represent application programs, folders and files. They are usually manipulated using pointing devices.

- **Control panel:** It is a graphical user interface found on the Start Menu which allows users to view and manipulate basic system settings and controls.

7. **State and explain three parts of a taskbar.**

- **Start button:** It is the button in the far left bottom corner of taskbar. It displays the start menu.
- **Task manager:** It is a monitor program used to provide information about the processes and programs currently running on a computer, as well as the general status of the computer. Task manager can be used to terminate processes and programs, as well as change the processes priority.
- **System tray/Notification area:** This is a part of the taskbar that displays small icons on the opposite side of the Start button. Examples of icons displayed include: The clock, date and time, antivirus and the icons of programs running in the background.
- **Quick launch:** It is a part of the taskbar near the Start button where shortcuts to programs are added. This toolbar stays visible for shortcuts to be easily accessed, even when a window is open.

8. **Outline the procedure followed to rename a folder.**

To rename a folder, do the following;

- (i) Click on the folder to be renamed.
- (ii) From the **Organize** tab, select the **Rename** option from the drop down menu.
- (iii) The original name will be highlighted and surrounded with a box.
- (iv) Type the new name and press **Enter**.

Alternatively, do the following:

- (i) Right click on the folder to be renamed.
- (ii) Select **Rename** option from the pop-up menu.
- (iii) Type the new name over the old name then press **Enter**.

9. **State any two window control buttons.**

- Minimize
- Restore Down
- Maximize
- Close

10. **List three accessories found in MS windows.**

- Windows Explorer
- Games
- Calculator
- Paint

Part 2: Individual work

Assess if the following have been done:

- Use of the taskbar shortcut to set date and time of the computer
- Background of the computer changed to **Windows classic**
- File called **Senior1** created on the Desktop, deleted and restored.

Revision Exercise 3 (Refer to the Students' Book, page 93)


Give this exercise as a test to be done individually. Let the students hand in the work for marking.

1. Describe each of the following terms: **Save; Save As.**
 - **Save:** It updates an active or existing document in a given location.
 - **Save As:** It allows one to store a document for the first time in a given location.
2. Differentiate between a file and a folder as used in computers.
A file is a collection of related data while a folder is a storage location of related files.
3. Explain how to customise the task bar.
 - (i) Right Click the task bar.
 - (ii) Click on the properties.
 - (iii) A dialog box below appears and can be used to customise the task bar as desired.
4. Explain the role of the Recycle Bin.
 - It stores deleted files and folders temporarily.
 - It allows restoring of accidentally deleted files and folders.
5. Explain how gadgets are inserted on the computer desktop.
 - (i) Right click on the desktop.
 - (ii) Click on **Gadgets**.
 - (iii) Double click on the gadget to insert on the desktop.

3.23 Teacher Support on Assessment: Additional Questions and Answers

1. Differentiate between application based files and system based files. (Pair work.)

Application-based	System-based
Assist the end-user to accomplish a given objective.	Assist the Operating System in performing its tasks.

- 
2. **Name the files represented by the following extension: (Individual work.)**
 - (i) **.doc** Word document
 - (ii) **.xls** Spreadsheet
 - (iii) **.exe** Executable file
 3. **State three functions of files. (Pair work.)**
 - (i) Locate important data quickly.
 - (ii) Move groups of data more easily, rather than having to search for individual files, when needed.
 - (iii) Facilitate sharing of appropriate data and protection of private files.
 4. **Define the term project-based organization of information. (Pair work.)**

It is a type of organization in which files are arranged according to their work projects.
 5. **Describe application-based method of organizing information. (Pair work.)**

It is a type of organization in which files are arranged by their file extension type.



Safe, Secure and Ethical Use of computers

Introduction

Computers are expensive and should be handled with care to ensure that they give the users value for their money. There are safe and insecure ways of using computers. The insecure ways can be harmful to the user's health and the computer equipment. The way computers are handled can determine whether they will function in the expected way or not. There are precautions to be observed when handling computers.

4.1 Content Map for the Unit

Unit Title	Safe, Secure and Ethical Use of Computers
Topic Area	Introduction to ICT
Subtopic Area	Safety and Security
Number of periods	4 + Homework
Introduction	Safe, Secure and Ethical Use of Computers
Classroom organization	<ul style="list-style-type: none"> • Whole class orientation then work in groups. • Individual activities.
Equipment required	<ul style="list-style-type: none"> • Computer Laboratory, Projector, the Internet, cleaning tools, detergent liquid and Students' course book.
Activities	<ul style="list-style-type: none"> • Practical activities, discussions, field trips, role play.
Competences practice	<ul style="list-style-type: none"> • Team work, leadership skills, communication skills and practical skills.
Language competences practice	<ul style="list-style-type: none"> • Defining • Explaining • Writing • Communicating • Group discussions • Reporting
Vocabulary acquisition (Key terms to be introduced and explained to the student)	<ul style="list-style-type: none"> • Computer Laboratory, Blower, Fire extinguisher, Brushes, Swabs, Vacuum Cleaner.

Numeracy	<ul style="list-style-type: none"> • Knowledge on a strong password that includes numbers in addition to letters and characters.
Study skills (including language competences)	<ul style="list-style-type: none"> • Note taking/writing • Organization of ideas • Presentation/ reporting skills • Observation skills
Revision	<ul style="list-style-type: none"> • Learning Activities and the Revision Exercise in the ICT Senior 1 Students' Book.
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work in teams, carrying out activities, assessing whether the objectives are met, continuous assessment tests and oral questions. • A summative evaluation at the end of the unit to examine the extent to which the intended learning objectives have been accomplished.
Learning outcomes	<p>The learner should be able to:</p> <ul style="list-style-type: none"> • Identify, follow and appreciate the basic safety guidelines to prevent cuts, burns, electrical shocks and damage to eyesight among others when using computers. • Observe and apply the correct safety and security procedures when using computer equipment. • Appreciate the importance of ergonomics. • Appropriately make use of different cleaning detergents to clean different computer equipment.

4.2 Subtopics/Content to be covered

Safe Lab Procedures

- General safety and health safety, electrical safety, fire safety, proper use of cleaning tools and fire extinguishers.

Maintaining your computer

- General precautions, power connectivity and precautions for connecting the mouse, keyboard, and other external peripherals.

Maintenance precautions: System unit, monitor, keyboard and mouse.

4.3 Reference: ICT for Senior 1, Students' Book, pages 42 to 101.

4.4 Key Unit Competency

By the end of this unit, the learner should be able to maintain a computer in good working condition and use it safely, securely and ethically.

4.5 Learning Objectives

Knowledge and understanding

By the end of the unit, the learner should be able to identify and follow the basic safety guidelines to prevent cuts, burns, electrical shocks, and damage to eyesight, when using computers.

Skills to be imparted in this unit

By the end of the unit, the learner should be able to observe and apply the correct safety and security procedures when using ICT.

Attitudes and values to be developed in this unit

By the end of the unit, the learner should be able to:

- (i) Appreciate and follow the basic safety guidelines to prevent cuts, burns, electrical shock and damage to eyesight when using computers.
- (ii) Show concern about computer vulnerability.

4.6 Teacher Preparation

- (i) Create lesson plan based on schemes of work.
- (ii) Make notes and demonstration materials before each lesson.
- (iii) Attempt the learning activities in Senior 1 Student book before giving them to the students.
- (iv) Avail different resource materials to cater for the varied abilities of learners.

4.7 Key Concepts to be covered

- A computer laboratory, simply known as a computer lab, is a special room set aside for safe installation and use of computer equipment.
- Computers should be handled with utmost care because they are delicate and expensive to acquire.
- Safety precautions to be taken in the computer lab include: general, health, electrical and fire.

- Computers should be cleaned using the right procedure and with recommended detergents.
- Tools used for cleaning a computer include: cleaning clothes, brushes and swabs, blowers, vacuum cleaners and canned air.



- Fire extinguisher refers to a metallic cylinder usually red in colour containing a substance or agent that puts out a small fire.
- The general precautions and power connectivity should be factored in when maintaining the computer.
- Maintenance precautions differ from one computer component to another.
- Use of water should be avoided when cleaning computer components.

4.8 Additional Content for the Teacher

Fire extinguishers

Other types of fire extinguishers include:

1. **Water Extinguishers:** This extinguisher is used for fires involving organic solid materials such as charcoal, wood, cloth, paper and plastics among others. It should not be used on fire caused by fat, oil or electricity. When using it, the jet of the extinguisher should be aimed at the base of the flame. The colour code for the extinguisher is **Red**.
2. **Powder Extinguisher:** Powder can be used on fires involving organic solids and liquids such as grease, fats, oil, paint and petrol among others. The colour code for the extinguisher is **Blue**.
3. **Foam Extinguisher:** This puts out fires involving burning solids and liquids such as paint and petrol. It can also be used on fires involving non-flowing liquids and liquefied gas.

It is safe on fires caused by electricity but a one-meter safety distance should be adhered to. The colour code for this extinguisher is **Cream**.

4. **Wet Chemical Extinguisher:** It is used for putting out fire involving cooking oils and fats such as lard, olive oil, sunflower oil, maize oil and butter among others. The colour code for this extinguisher is **Canary Yellow**.



Fig. 4.1: Types of fire extinguishers

Note: Different fuels create different fires that require different types of fire extinguishers. Some types of fire extinguishing agents can be used on more than one class of fire. Fires are classified as follows:

- **Class A** fires are caused by ordinary burning materials such as wood, paper, cloth, trash, and plastics. Water-based and foam-based extinguishers are used for Class A fires.
- **Class B** fires are caused by flammable liquids such as petrol, diesel oil and paint. Class B fires do not include fires involving cooking oils and grease. Foam-based extinguishers are suitable for Class B fires. Foam fire extinguishers create a cooling blanket effect, covering the burning materials and preventing further burning.
- **Class C** fires are caused by gases that burn.
- **Class D** fires are caused by burning metals such as potassium, sodium, aluminium, and magnesium. Dry powder extinguishers are used on Class D fires.
- **Class E** fires involve electrical equipment such as motors, transformers, and appliances. Cream based extinguishers containing carbon dioxide are suitable for Class E fires.
- **Class K** fires are caused by cooking oils and greases such as animal fats and vegetable fats. Specially made wet chemical fire extinguishers are made for Class K fires.

Note that you may come across different sources of information that may classify fires differently.

Others ways of putting out fire include:

1. **Fire Blanket:** A fire blanket is made of fire-resistant materials. It is particularly useful for putting out flammable liquid fires or for wrapping round a person whose clothing is on fire.
2. **Hose reel:** It is used to put out fire caused by organic solid materials such as wood, cloth, paper, plastics and coal. It uses water to extinguish fire.
3. **Fire buckets:** It is a simple bucket that can be used to supplement a water extinguisher or as a first attack if an extinguisher is not immediately available. It can be filled with dry sand or water and is used as an absorbing agent or to block a flow of flammable liquid. It is painted bright red and has the word **FIRE** written on it.

fire blanket



hose reel



fire bucket



Figure 4.2: Other types of fire extinguishers

Safety in case of a fire

- Ensure that regular fire drills are conducted in school. Call in experts to demonstrate how fire accidents are managed.
- In case there is a fire in school and you do not have the skills to manage it, the students and staff must be evacuated as the First Action. Fire experts could then be called to extinguish the fire.

4.9 Suggested Learning Materials

- Computer laboratory
- The Internet
- Cleaning tools
- Detergent liquid
- Senior 1 Students' Book

4.10 Suggested Low Cost or No Cost Materials

- Free tutorials on identified websites but always establish the authenticity of the website to avoid downloading infected files.

- Ask learners to bring any learning materials they would want to share, for example, computer equipment cleaning detergents and brushes among others.
- Visit neighbouring schools and request access to their resources.
- Request the computer technician to give a computer cleaning demonstration to the students.

4.11 Suggested Teaching Methods

- Discussion
- Educational visit
- Practical activities
- Demonstration
- Question-and-answer method

4.12 Suggested Teaching and Learning Activities and Exercises to Support Delivery of Content and Development of Student Competences

- Class discussion on safe, secure and ethical use of computers.
- Group discussion on safe, secure and ethical use of computers.
- Students to share their experiences on ethical use of computers.
- Listening to audio lessons and watching relevant documentaries or video clips on safe, secure and ethical use of computers
- Invite a resource person from health, computer engineering and firefighting organisations to give talks.
- Question-and-answer method during discussion on safe, secure and ethical use of computers.
- An essay writing competition on safe, secure and ethical use of computers.

4.13 Cross-Cutting Issues to be integrated in Teaching and Learning Activities

Address the following emerging issues:

- Sensitise the learners about the importance of using a strong password.
- Give explanation on why water and food are prohibited in a computer environment. Switching on a socket with wet hands could cause electrocution.
- Caution them against using a computer for extended periods without taking a break.
- Mention the importance of connecting a computer to the mains through the Uninterruptible Power Supply (UPS) to protect the computer against unstable power supply.
- Create short health breaks during the lesson. The break could be as short as three to five minutes. Use the break to sensitise students on social issues such as environment, HIV/AIDS, dangers associated with premarital sex, and drug and

substance abuse. You could download relevant short video clips and spend a few minutes to engage the students on the message.

4.14 Suggestions for accommodating Special Education Needs (SEN)

The teacher should identify learners with special needs and help them to cope during the teaching learning activities.

Type of impairment	Support for the learner
Sensory impairment (visual)	<ul style="list-style-type: none"> • Teacher to write large legible letters on the board. • Learners with impairment should sit next to learners with good vision to be helped where necessary.
Sensory impairment (hearing)	<ul style="list-style-type: none"> • Teacher should speak loudly to be audible to the learner. • Allow learners to sit close to the teacher.
Motor impairment (Movement)	<ul style="list-style-type: none"> • Do the activities in one place to avoid situations requiring learner to move from place to place.
Gifted or talented learners	<ul style="list-style-type: none"> • Assign learners extra and more challenging work. • Encourage fast learners to assist the slow learners.

4.15 Suggestions for Supporting Multi-Ability Learning

Fast learners	<ul style="list-style-type: none"> • Request learners to sit next to slow learners to help them. • Give them extra tasks to perform.
Slow learners	<ul style="list-style-type: none"> • Remedial teaching. • Teacher take time to go over the procedure and use the language the learners will understand. • Use other learners to assist them to do the task.

4.16 Support to Learning Activities

Individual work, pair work, group work and whole class work.

Group:

- In groups, learners to practise on power connectivity, taking all the necessary precautions.
- The learners to compare safety precaution in the chemistry lab with those observed in the computer lab.

As individuals: To attempt the question in Learning Activity 4.1 (Part 1) on page 101 of the Senior 1 Students' Book.

4.17 Support for the Development of Positive Skills, Values and Attitudes

Some life skills to develop include problem solving, decision making, effective communication and creative thinking. Some values to be developed include responsibility, appreciation, respect, cooperation, and curiosity.

- Attitude of cooperation is developed through working in groups.
- Develop curiosity by letting the learners discover the position of fire extinguishers in the computer lab.
- Have desire to explore the safety secure and ethical precautions taken in other laboratories in the school.
- Develop responsibility by showing care of the computer resources.

4.18: Support to Suggested Formative and Summative Assessment

- Learning Activities and the Revision Exercise in Senior 1 Students' Book.
- Oral questions.
- Continuous Assessment Test

4.19: Links to other subjects

Physics, Biology and Chemistry: Safety precautions to take when in the Laboratory.

4.20: Additional Remedial, Consolidation and Extension Activities

Learners to work in groups. Let them research on security matters in relation to computers. They could present their findings to the rest of the class.

4.21: A Sample Lesson Plan : See Appendix 1, pages 151 to 178.

4.22 Answers to the Questions and Activities in the Students' Book.

Assignment 4.1 (Refer to the Students' Book, page 101)

Part 1 of this activity could be done as individual work. Mark the papers and award marks

1. List three maintenance precautions applied on the keyboard.
 - Keyboard keys should not be punched down with excessive force since this may damage the components underneath.

- The outside parts a keyboard should be wiped with a dampened lint-free cloth
 - When cleaning the keyboard, avoid dripping cleaning liquids onto or into the keyboard.
 - Do not remove the keyboard keys when cleaning it; instead use canned air and a soft-bristled brush to clean hard-to-reach areas.
2. **UPS** is the abbreviation for Uninterruptible Power Supply
3. **State two health safety practices applied in a computer laboratory.**
- The screen resolution should be properly adjusted; and where necessary use anti-glare screens to prevent eye strain.
 - Use ergonomics chairs, tables, keyboards and mice among others to ensure good posture.
 - Ensure there is proper ventilation in the computer lab to ensure good health of the user.
 - Always take a break to prevent the fatigue or repetitive strain injury.
4. **Give three fire safety measures applied in a computer laboratory.**
- Ensure that the computer lab is equipped with fire extinguishers that are regularly serviced.
 - Ensure that the computer lab has an exit door for use in case of emergency or fire outbreak.
 - Ensure that the computer lab has fire or smoke detectors and alarms for warning in case of fire outbreak.
5. **Identify any three cleaning tools used in a computer laboratory.**
- | | |
|---------------------------|-----------------------------|
| • Cleaning cloth | • Brushes |
| • Swabs | • Blower |
| • Portable vacuum cleaner | • Non-static vacuum cleaner |
| • Canned air | |
6. **What are some of the electrical safety measures observed when working in a computer laboratory?**
- Ensure that the cables are insulated to avoid short circuit or electrical shock to the user that may be caused by the naked wires.
 - Follow proper guidelines when dealing with power supplies and Cathode Ray Tube (CRT) monitors since they contain high voltage that can lead to injuries and electrical fires.
 - Always turn off and wait for the printer to cool off before repairing since some components retain a high voltage even after the printer is turned off.

- Always connect computers using Uninterruptible Power Supply (UPS) to protect computers from being damaged by power instabilities.

Part 2

- Questions (i), (iii) and (iv) of this activity could be done in pairs.
- Question (i) could be done after class hours. Students could also volunteer to do it during their breaktime.
- Visit the groups as they carry out the activity. Assess the work and advise accordingly.
- Questions (ii) and (iv) could be done in groups

Answers to the Revision Exercise 4 (Students' Book page 101)

Administer this revision exercise as a test. Mark the papers and award marks

1. When marking the students' discussions, refer to figure 4.2 on page 96 of the Students' Book. Accept other correct answers given.
2. **State five general safety precautions practised in a computer lab.**
 - Reinforce weak access points by use of padlocks, burglar proof doors and metallic grills to ensure proper security of computer resources.
 - It should be well ventilated to ensure the right amount of temperature and humidity.
 - Always shut down the computer using the correct procedure. This is because improper shutting down of the computer can lead to either data loss, or crashing of the hard disk.
 - Always consult the teacher or technician before performing technical operations.
 - **Do not** run in and out of the computer lab. This may cause knocking down of computer equipment hence causing damage.
 - Always cover the computers with dust covers after use to avoid dust accumulation on the machines.
 - **Do not** carry food or drinks to the computer lab. This is because spilling food or drinks on computer parts can cause damage.
3. **Explain the reason for the use of lint-free swabs to clean the computer keyboard.**

They are recommended because they don't leave fluff on the keyboard which can cause the movable parts of the keyboard to malfunction if the fluff is left to accumulate on the keyboard.
4. **Explain three ways of maintaining a computer monitor.**
 - Never spray cleaners directly onto the screen. Use lint-free cloth dampened

with a recommended cleaner to wipe the screen and a dry cloth to dry the screen.

- Clean the outside of the monitor with recommended cleaning solvents.
- Avoid pressing too hard on the LCD screen when cleaning it.
- Avoid cleaning the inside of the monitor. Always consult an experienced technician.

5. **Explain why non-static vacuum cleaners are recommended for use in a computer lab.**

They are used to suck up dirt and dust loosened by brush or canned air.

4.23 Teacher Support on Assessment: Additional Questions and Answers

1. **List two types of fire extinguishers. (Individual work)**

- Water extinguishers
- Powder extinguishers
- Wet chemical extinguishers
- Foam extinguishers

2. **Differentiate between foam extinguishers and wet chemical extinguishers.**

Foam	Wet chemical
<ul style="list-style-type: none">• This puts out fires involving burning solids and liquids such as paint, petrol and non-flowing liquefied gas.	<ul style="list-style-type: none">• It is used for putting out fire involving cooking oils and fats such as lard, olive oil, sunflower oil, maize oil and butter among others.

3. **Gasana found a computer system on fire in the computer laboratory and extinguished it using a bucket of water. Explain the danger of using this method of extinguishing fire.**

- Water contains ions that conduct electricity, if the water splashes back he may get electric shock.
- Water can cause damage to computer component.

4. **Outline the uses of fire blanket extinguisher.**

- Quenching flammable liquid fires
- To cover a person whose clothing is on fire

5. **The following is a list of sources of fire. Identify a type of fire extinguisher that would be used to smother each of the fires.**

- (a) Liquefied gas – Foam. (b) Petrol – Foam
(c) Paper – Water (d) Oil – Powder



Word Processing Basics I

Introduction

A word processing application is used for the purposes of creating textual documents such as letters, memos, reports, minutes, and typesetting examination papers, among others. A word processor has in-built features, for example, formatting features and proofing features that make them suitable for use in creating documents.

5.1 Content Map for the Unit

Unit 5	Word Processing Basic I
Topic Area	Application Software
Subtopic Area	Word Processing
Number of periods	10 + Homework
Introduction	Word Processing Basics I
Classroom organization	<ul style="list-style-type: none"> • Whole class orientation then work in groups or pairs. • Individual activities.
Equipment required	<ul style="list-style-type: none"> • Computers, Projector, Soft document, hard copies, text books and the Internet.
Activities	<ul style="list-style-type: none"> • Practical activities and discussions.
Competences practice	<ul style="list-style-type: none"> • Team work, Communication skills, Practical skills, Leadership skills and Research
Language competences practice	<ul style="list-style-type: none"> • Defining • Explaining • Communicating • Group discussions • Writing
Vocabulary acquisition (Key terms to be introduced and explained to the student)	<ul style="list-style-type: none"> • Scrolling • Selection • Formatting • Ribbon • Bullets • Spell checker • Editing • Thesaurus • Tabs • Numbering

Numeracy	<ul style="list-style-type: none"> • Using the rulers in Word Processing. • Inputting/keying in numerical data into the computer. • Changing the font size in a document. • Proofing numerical data.
Study skills (including language competences)	<ul style="list-style-type: none"> • Note taking/ Writing • Presentation • Organization of ideas • Reporting skills
Revision	<ul style="list-style-type: none"> • The Learning Activities and Revision Exercise in the ICT Senior 1 Students' Book.
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work in teams, carrying out activities, assessing whether the objectives are met, continuous assessment tests and oral questions. • A summative evaluation at the end of the unit to examine the extent to which the intended learning objectives have been accomplished.
Learning outcomes	<p>The learner should be able to:</p> <ol style="list-style-type: none"> Define the term Word Processing. Explain clearly the role of Word Processing application. Outline the steps followed when opening a Word Processing application. Demonstrate the ability to start a computer Word Processing application. Demonstrate the ability to identify different parts of a Word Processing window. Explain different commands used when working with a document. Examples are create, save, rename, and open among others. Demonstrate the ability to create, save, rename, open a document in MsWord. Demonstrate the ability to select text and graphics in Ms Word document and apply different commands on it. Outline the steps followed when formatting text.

	<p>(x) Demonstrate the ability to apply proofing commands to eliminate errors from a document.</p> <p>(xi) Outline the functions of different shortcut keys used in MsWord documents.</p>
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5.2 Subtopics/Content to be covered

Word processing

- Definition and role of word processing applications.
- Starting word processing application.

Word processing environment: Title bar, tabs, menu, scroll bars, ruler and status bar.

Working with Word documents

- Create, save, open, and renaming existing documents.
- Working area/zone.

Text Selection

Select character, word, sentence, paragraph and the whole document.

Basic text formatting

- Font colour, size, bold, italic, underline, face and change case.
- Paragraph indents, spacing and lists, alignment, borders, shading and sorting.

Proofing features: Spelling and grammar check and thesaurus.

Moving a section of text and moving through the text

- Copy, cut and paste text.
- Move through the document using keyboard shortcuts.
- Scrolling through the text, deleting text, undo and redo changes and find and replace.

5.3 Reference

Refer to the ICT for Senior 1, Students' Book, pages 102 to 130.

5.4 Key Unit Competency

By the end of this unit, the learner should be able to create and manipulate a document using basic word processing features.

5.5 Learning Objectives

Knowledge and understanding

By the end of the unit, the learner should be able to:

- (i) Identify the basic features of a word processing environment.
- (ii) Explain the role of word processing applications.
- (iii) State the steps used to create, rename, save and open a document.
- (iv) Explain how written text should be organised.
- (v) Recognise errors in a document and identify the appropriate proofing features to correct the errors.
- (vi) Identify different methods to move through the written text.

Skills to be imparted in this unit

By the end of the unit, the learner should be able to:

- (i) Explore the environment of word processing applications.
- (ii) Use the basic features of word processing (create, rename, save and open a new document).
- (iii) Organise written text.
- (iv) Apply different methods to move text and move through the text (Use of shortcuts).
- (v) Use formatting tools to improve the presentation of a document.
- (vi) Use proofing features of spell and grammar checks and the thesaurus to correct errors in a document.

Attitudes and values to be developed in this unit

By the end of the unit, the learner should be able to:

- (i) Appreciate the basic features of a word processing environment.
- (ii) Show confidence in improving presentation by replacing hand-written documents with printed ones.
- (iii) Show interest in organizing text.
- (iv) Appreciate the formatting and proofing features of word processing to produce error-free and well-presented documents.

5.6 Teacher Preparation

- (i) Read and master the content to be taught.
- (ii) Attempt the learning activities before presenting them to the student.

- (iii) Ensure that all computers are in good working conditions before every practical class.
- (iv) Make notes and prepare a lesson plan before each lesson.
- (v) Obtain different resource materials to cater for the varied abilities of the learners.

5.7 Key Concepts to be Covered

- A word processing application is a software that enables a user to create, save, edit, format and print text documents.
- The roles of word processing applications include; creating and manipulating text and pictures, as well as creating documents for uploading into the Internet.
- Open MS Word program using the right procedure.
- Title bar, tabs, menus, toolbars, scroll bar, ruler and status bar are some parts of Ms Word application window.
- Save, open, rename and create are commands used when working with documents.
- Select a character, word, sentence, paragraph and whole document.
- Changing font colour, size and face.
- Changing case.
- Indents, spacing, alignment, creating borders, shading, and sorting are some examples of paragraph formatting.
- Spell checking a document and using thesaurus feature are examples of proofing feature.
- Cut, copy and paste text are methods of moving text.
- Use short cut keys to move through the document.
- Scrolling through the text enables the user to reveal other section of the document that was not displayed on the screen.
- Delete, undo, redo, find and replace are features used for editing text.

5.8 Additional Content for the Teacher

Proofing Features

- **Autocomplete:** It is a feature that automatically displays a screen tip when the first few characters of an AutoText are typed.
- **Autocorrect:** It is a feature that automatically detects and replaces wrongly spelt words or those formatted in a case which is inappropriate. To customize the AutoCorrect Feature do the following:
 - ✓ Click the **File** tab. Under **Help**, click on **Options** and select **Proofing**.
 - ✓ Click **AutoCorrect Options**.

- ✓ Type the wrongly spelt word in **Replace** box then type the correct word under **With** box. Click **OK**.

Shortcut keys

Press Keys	To execute the following
Ctrl + B	Bold the highlighted text
Ctrl + F	Open the find dialog box
Ctrl + M	Indent the paragraph
Ctrl + T	Create a hanging indent
Ctrl + Shift + L	Create a bullet point of the default bullet
Ctrl + 1	Change to single spacing
Ctrl + 2	Change to double spacing
Ctrl + 5	Change to 1.5 spacing.
Ctrl + Shift + F	Opens the font dialog box.
Control + W (OR) Alt + F4	Close the current window.
Print Screen (prt sc)	Copy the contents on the screen to the clipboard.
Alt + Print Screen (prt sc)	Copy the contents of the current window to the clipboard.
Ctrl +Enter	Creates a hard page break

Printing a document

Printing is the process of producing a hardcopy output on paper. To print a document do the following:

- (i) Click on **File Tab** on the menu bar.
- (ii) Click **Print** command. A print dialog box appears as shown in figure 5.1. The dialog box has two task panes; the left pane displays the various print options while the right pane displays the preview of the document.
- (iii) Print Preview the document to ensure that all the required information is within the printable area and that the work is presented as desired. To make changes on the page layout at this point, click on the **Page Setup** button then click **OK** to apply the changes made.
- (iv) Select the desired print options. The various available options include:
 - **Copies:** Enables the user to specify the number of copies to be printed.

- **Printer:** It is used when specifying the type of printer to be used. The default printer name will always be displayed on the box. The user can make a selection by clicking on the arrow in the box to display the various printers available then click on the name of the desired one.
- **Print button:** When clicked, it executes the printing action.
- **Pages:** It is used to specify the pages to be printed if the document is large. For example, the document could contain 10 pages but the user would only want to print pages 1, 4, and 7.
- **Page setup:** Displays the page setup dialog box for the user to make the necessary changes.

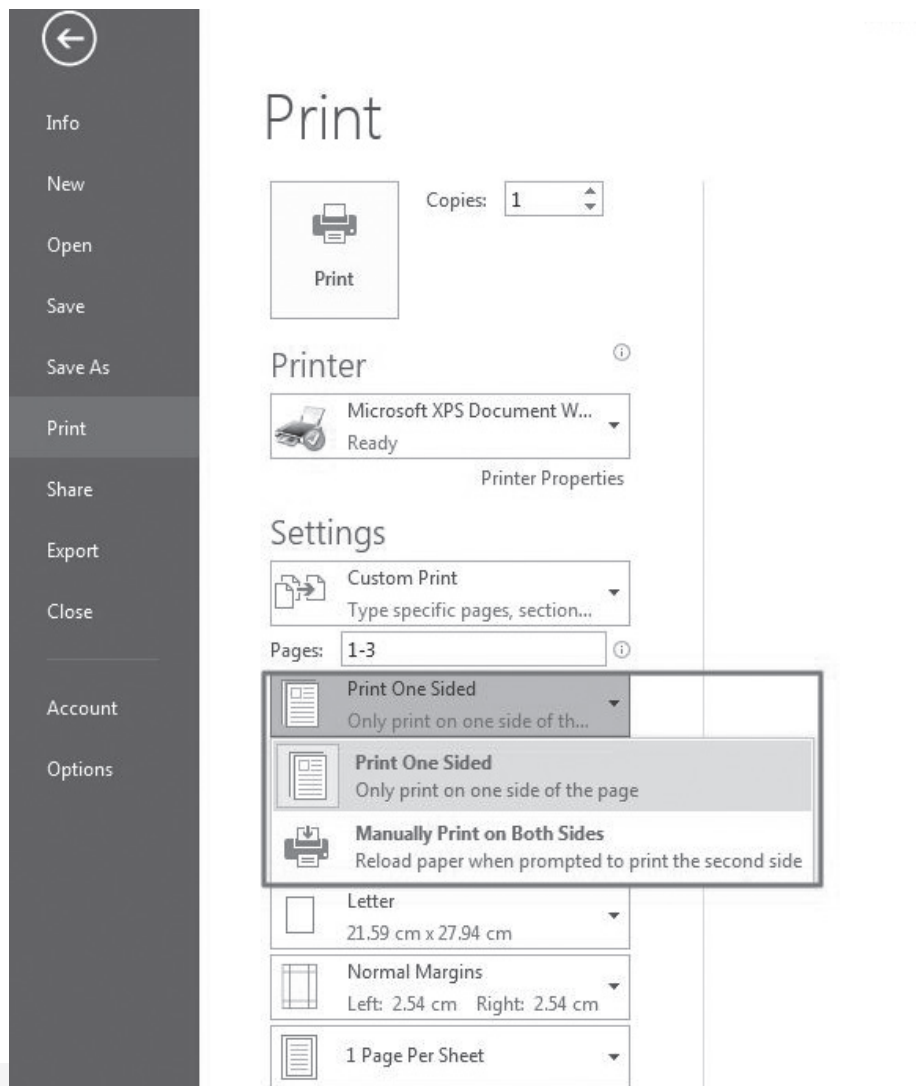


Figure 5.1: A print dialog box showing the different print options.

(v) Click on the **Print** button. **Note that:**

- To quickly print a document, click on the **QuickPrint** icon on the Quick Access Toolbar.
- Printing can also be achieved through the **Print Preview** and **Print** icon on the **Quick Access Toolbar**.

5.9 Suggested Learning Materials

- Computers with Microsoft Office 2013.
- Projector/Smart board.
- The ICT for Senior 1 Students' Book.
- Other relevant digital learning materials such as laptops, soft copy documents and their hardcopies.
- The Internet.

5.10 Suggested Low Cost or No Cost Materials

- Open source software downloads from the Internet. (Always establish the authenticity of the website to avoid downloading infected files.)
- Free tutorials on identified websites.
- Ask learners to bring any learning materials they would want to share.

5.11 Suggested Teaching Methods

- Discussion.
- Demonstration.
- Practical.
- Question-and-answer method.

5.12 Suggested Teaching and Learning Activities and Exercises to Support Delivery of Content and Development of Student Competences

- Class discussions on word processing applications.
- Group discussions on word processing applications.
- Practical exercises on a given text and performing the following: Selection, basic text formatting, indents and lists formatting, moving text, indents and lists.
- Learners perform spelling and grammar checks and use thesaurus feature to correct errors in a document.
- Students to share their experiences on the different documents which can be created using a word processor.
- Question-and-answer method during discussions on different features of word processing.

5.13 Cross-Cutting Issues to be Integrated in Teaching and Learning Activities

- Students in Senior 1 are in adolescence. They face many social challenges. Take time to sensitise them on varied topics. You could, for example, address the body changes they could be experiencing as they transition from preteens to young adults. There are some who get affected by the changes and could suffer low self esteem or even depression. You could give a talk on this topic. You could also download relevant materials, including video clips that address this social issue.
- When a person has excessive poor self-esteem this can lead to depression.
- Depression is disease that is one of the leading mental health problems in the world of today. When low self esteem is prevented occurrence of depression is averted. The following are the symptoms of depression:
 - ➔ Loss of appetite and weight: In some cases there could be excessive consumption of food and weight gain.
 - ➔ Lack of enjoyment in all activities, including the most desirable things.
 - ➔ An uncaring attitude towards people.
 - ➔ A state of intense sadness: This is accompanied by persistent crying.
 - ➔ Insomnia: Which is characterised by having difficulties falling a sleep, intermitted waking up in the night or waking up early in the morning when one is very tired.
 - ➔ Energy levels getting very low: this can be reflected on the face, the face being sad and with lack of care.
 - ➔ Slow or agitated movements or conversation.
 - ➔ Feelings of failure and blame: One feeling like a failure and blaming oneself.
 - ➔ Recurrent thoughts of death and suicide which can at times lead to the act itself.

5.14 Suggestions for Accommodating Special Education Needs (SEN)

The teacher should identify learners with special needs and help them to cope during the teaching and learning activities.

Type of impairment	Support for the learner
Sensory impairment (hearing)	<ul style="list-style-type: none">• Teacher should make an effort to speak loudly to be audible to the learner.• Allow learners to sit close to the teacher.

Type of impairment	Support for the learner
Sensory impairment (visual)	<ul style="list-style-type: none"> • Ensure that the window is zoomed to a higher percentage to make information on the screen more legible. • Learners to sit next to those with good vision to help where necessary. • Use large eligible font styles when projecting digital contents.
Motor impairment	<ul style="list-style-type: none"> • Pair them with students who are not motor-impaired. • Assign these students computers near the door so that they don't have to walk along distance before getting to their computers.
Gifted or talented learners	<ul style="list-style-type: none"> • Assign learners more challenging exercise. • Encourage peer teaching. • Assign learners extra practical questions.

5.15 Suggestions for Supporting Multi-Ability Learning

Fast learners	<ul style="list-style-type: none"> • Request learners to sit next to slow learners to help them. • Give them extra activities to perform.
Slow learners	<ul style="list-style-type: none"> • Organize for remedial lessons. • Take time to go over the procedure and use the language the learners will understand. • Closely monitor the practical activities being done by these students.

5.16 Support to Learning Activities

- Individual work, group work, pair work, and whole class work.
- Give the students past papers covering Word Processing.
- Assess the questions, the learning activities and the revision exercise provided in the Students' Book. Decide which ones to assign as group work, pair work, or individual work.

5.17 Support for the Development of Positive Skills, Values and Attitudes

- Some life skills to develop include problem solving, decision making, effective communication and creative thinking.

- Some values to be developed include responsibility, appreciation, respect, cooperation, and curiosity.
 - ✓ Attitude of cooperation is developed through working in groups.
 - ✓ Develop curiosity by letting the learners discover other Font sizes, font face, borders and shading among others.
 - ✓ Develop responsibility by assigning every group a leader and activity to be handled by each student in the group.

5.18 Support to Suggested Formative and Summative Assessment

- Questions, Learning activities and the Revision Exercise in the Senior 1 Students' Book.
- Oral questions.
- Continuous Assessment Test.

5.19 Links to Other Subjects: English grammar in building of ICT vocabulary.

5.20 Additional Remedial, Consolidation and Extension Activities

- Give practical assignments to be wordprocessed, formatted and printed. Give guidance to the learners.

5.21 A Sample Lesson Plan: See Appendix 1, pages 151 to 178.

5.22 Answers to the Questions and Activities in the Students' Book.

Learning Activity 5.1 (Refer to the Students' Book, page 107)

This activity could be done as individual work. Treat it as a CAT. Mark the papers and award marks.

1. **Define the term word processing.**
This term refers to an application software that enables a user to create, save, edit, format and print text documents.
2. **Insert tab**
3. **Status bar**
4. **Give three examples of word processing applications.**
Examples of word processing applications are: Word Perfect, Word Star, Lotus Word Pro, AmiPro and Microsoft Word among others.
5. **State two roles of word processing applications.**
Roles of Word processing application are:
 - Create and manipulate text-based document.

- Create and manipulate pictures and objects.
 - Create a document to be uploaded to the Internet.
6. **Explain the use of any five tabs on the menu bar.**
- The following are the tabs found in Microsoft Word 2010 window:
- **File tab:** It is used for displaying a list of options to choose from such as New, Open, Save, Save As, Print and Close.
 - **Home tab:** It is used for formatting and editing text since it contains the text formatting and paragraph formatting among others.
 - **Insert tab:** It can be used to add pictures, tables and word art among others.
 - **Page Layout tab:** It is used for formatting an entire page or a paragraph.
 - **References tab:** It contains icons that are used for creating and manipulating tables of Contents, Footnotes, Captions, Citation, and Bibliography among others.
 - **Mailings tab:** It contains icons that are used during mail merging.
 - **Review tab:** It contains icons used for proofing and protection among others.
 - **View tab:** It contains icons that are used to show the document views, add macros, zoom and change the window appearance.
7. **State the function of a title bar.**
- It displays minimize, restore/maximize and close buttons as well as the name of the program and document.
 - It is used for moving the window from one part of the screen to another when the window is not maximised.
8. **Assess if the following have been labelled:**
- (a) Name of parts of the window labelled.
 - (b) Ensure that the following parts of the window have been labelled: Menu bar, Horizontal and vertical scroll bars, Quick Access Toolbar, Ribbon, Horizontal and vertical rulers, Status bar and Work Area
 - (c) Refer to figure 5.3 on page 104 in the Students' Book for the labelled graphic.

Learning Activity 5.2 (Refer to the Students' Book, page 111)

Part 1

- This activity could be done as individual work.
- Treat it as a CAT.
- Mark the papers and award marks.

1. Differentiate between Save and Save As commands.

Save	Save as
It is used for updating an existing document.	It is used for saving a document for the first time in a given location.

2. **Text selection** refers to the process of picking text or graphic with a mouse which is to be manipulated as a block.
3. **The function of the keyboard shortcut CTRL + N:**
This command is used for opening a new Word document while the Microsoft Word program is running.
4. **The function of the keyboard shortcut CTRL + N: Shift + ↑(Up arrow):**
This command is used for selecting one line of text up from the current cursor position.
5. **The combination keys CTRL + A:** Allows the user to select all text in a document.
6. **Selecting feature**
7. **Outline the procedure of renaming a document.**
 - Right-click on the document name then select rename from the resulting window.
 - Type the new name at the cursor position then press enter.

Part 2

- This activity could be done as individual work.
- Allow the students a week to type and present the document. Emphasise that they also pay attention to the cross cutting issue discussed in the text on sexually transmitted infections.
- Assess if the document is typed and saved as **STI**. (Guide the learners to correct any transcription errors made.)

Learning Activity 5.3 (Refer to the Students' Book, page 121)

Part 1

- This activity could be done as individual work.
- Treat it as a CAT.
- Mark the papers and award marks

1. Differentiate between subscripts and superscripts.

Subscripts	Superscripts
<ul style="list-style-type: none">This term refers to text that is made to appear slightly below the normal typing line. For example, in “H₂O”, the text 2 is a subscript.	<ul style="list-style-type: none">This term refers to text that is made to appear slightly above the normal typing line. For example in “cm³”, the text 3 is a superscript.

2. Borders

3. Vertical scroll bar

4. How can the paragraph indentation measurements be changed from inches to centimeters?

- Click on **File** tab.
- Select **Options** from the resulting menu.
- Select **Advanced** from the left pane of the word options dialog box.
- From the **Display** section change the units to centimeters in the **Show measurements in units of:** box.
- Click **OK** to close the dialog box and apply the changes.

5. The horizontal and vertical ruler

6. Differentiate between bullets and numbers.

Bullets	Numbers
<ul style="list-style-type: none">They form an unordered list.They are small solid shapes used just before a line of text such as an item in a list. They are used to mark beginning of a point.	<ul style="list-style-type: none">They form an ordered list.They are numbers that list different points. They may be set in Arabic or Roman.

7. Define the term sorting.

This is the process of arranging data in a particular order that is, either ascending or descending order.

8. Describe three types of indentations that can be applied in a document.

- Left indent:** This refers to a type of indent where lines of text in an entire paragraph are pushed away from the left margin by several units of measurements.
- Right indent:** This refers to a type of indent where lines of text in an entire paragraph are pushed away from the right margin by several units of measurements.

- **First line indent:** This refers to a type of indent where the first line in a paragraph is pushed away from the left margin by several units of measurements while the other lines in the paragraph remain at the left margin.
- **Hanging indent:** This refers to a type of indent where the first line of a paragraph remains at the left margin while the rest of the lines in the paragraph are pushed several units of measurements away from the left margin.

Part 2

Assess if the formatting of the document has been done correctly. Assess whether the following have been achieved.

- Heading “**Sexually Transmitted Infections**” typed in upper case, font size 20, in bold face, italicized, underlined, and centred.
- Line spacing of 1.5 in second paragraph.
- The word *Myth* is italicized.
- Case of the word “genitals” in paragraph 1, 2 and 4 changed to upper case.
- Document saved as **STD1**.

Learning Activity 5.4 (Refer to the Students’ Book, page 129)

Part 1

- This activity could be done as individual work.
 - Treat it as a test.
 - Mark the papers and award marks
 - Discuss the answers in class.
1. **Spelling and Grammar checker**
 2. **Proofing:** This term refers to reading an electronic copy of a document in order to detect and correct errors of text or art.
 3. **Subscript**
 4. **Bolding**
 5. **Differentiate between find command and replace command.**

Find	Replace
Used to locate a word or phrase within the current document.	Used to automatically substitute the located word with a new word.

6. Write the keyboard shortcut used to do the following:
- (i) Move to the end of the document: **CTRL + End**
 - (ii) Move to the beginning of the document: **CTRL + Home**
 - (iii) Open the find navigation pane: **CTRL + F**
7. Describe how the vertical scroll bar would be used to move up or down one screen: Click below or above the scroll box.

Part 2

- This activity could be done as individual work. It is a continuation of the document that was initially created in
- Assess if the following features are added in the document:
 - (a) New document created containing a copy of **STD1** document.
 - (b) First paragraph copied to the bottom of the document.
 - (c) Second paragraph moved to the paragraph after the words **STI or not**.
 - (d) The third paragraph deleted.
 - (e) Spell checking done on the document.
 - (f) All occurrence of the word “**STI**” in the document found and replaced with the word “**STD**”.
 - (g) Document saved as **STI3**.

Revision Exercise 5 (Refer to the Students’ Book, page 130)

Administer this Revision Exercise as a Test. Mark and review it in class.

1. Differentiate between: (a) Moving (b) Copying (c) Deleting

Moving	Copying	Deleting
<ul style="list-style-type: none"> • Moving refers to changing the position of text to a new location. 	<ul style="list-style-type: none"> • Copying refers to duplicating of text to a new location 	<ul style="list-style-type: none"> • Deleting refers to removing or erasing in a given location.
<ul style="list-style-type: none"> • The original text is moved to a clipboard, awaiting to be pasted to the new location. 	<ul style="list-style-type: none"> • The original text is copied to a clipboard, awaiting to be pasted to the new location. 	<ul style="list-style-type: none"> • No copy is left on the clipboard.

2. Distinguish between spell checking and thesaurus.

Spelling and grammar checker	Thesaurus
<ul style="list-style-type: none"> • It is a feature that contains an in-built dictionary for checking spelling mistakes and grammatical errors. 	<ul style="list-style-type: none"> • It is a feature that displays synonyms and antonyms of a selected word.

3. Differentiate between delete key and backspace key.

Delete key	Backspace key
<ul style="list-style-type: none">It erases character by character from the right side of the cursor position to the left.	<ul style="list-style-type: none">It erases character by character from the left side of the cursor position to the right.

4. Define the term selecting of text: It refers to picking text (could be a word, a sentence, a paragraph, or a whole document) that has to be edited or formatted.

5. Outline the procedure used for sorting data in a paragraph.

To sort data in a paragraph do the following:

- Select the paragraph.
- Click on **Sort** from the **Paragraph** group in the **Home** tab.
- Ensure that the words are separated by a comma or tab stops.
- Under **Sort** by select **Paragraphs**.
- Under **Type**: select **Text**.
- Choose either ascending or descending sort orders.
- Click **OK** to apply.

6. Differentiate between **End** key and **Home** key functions.

End key	Home key
<ul style="list-style-type: none">Used to move the cursor from the current position to the end of the current line.	<ul style="list-style-type: none">Used to move the cursor from the current position to the beginning of the current line.

7. The keys represented by the following symbols:

(i) **Pgdn**: Page down (ii) **PgUp**: Page Up

8. Define the term scrolling through text: This is the process of moving around a document without changing the position of the cursor.

9. Differentiate between **Undo** and **Redo** commands.

Undo is used to cancel or negate a series of the last command executed starting with the most recent in order to restore the status of the document while redo is used to nullify a series of negated commands.

10. Describe two types of typing modes that can be used in word processing application.

- **Insert mode**: It is a typing mode that adds text between words at the insertion point without replacing them as the user types.

- **Type over mode:** It is a typing mode that is used to overwrite characters from the position of the cursor to the right margin.

5.23 Teacher Support on Assessment: Additional Questions and Answers

1. Outline the function of each of the following shortcut keys as used in word processing. (Individual work.)
 - (a) **Ctrl + enter:** This command is used for creating a hard page break.
 - (b) **Ctrl + 1:** Single spacing.
 - (c) **Ctrl + W:** Close the current window.
 - (d) **Alt + print screen:** Copies the current window onto the clipboard.
2. Ann would like to use shortcut keys to perform each of the following tasks. State the shortcut keys that she would use. (Individual work.)
 - (a) Double space selected text: Ctrl + 2
 - (b) Open the font dialog box: Ctrl + Shift + F
 - (c) Open the print dialog box: Ctrl + P
3. Define the term printing. (Individual work.)
Printing is the process of producing a hardcopy output on paper.
4. List three options in the print dialog box. (Individual work.)
 - Copies
 - Printer
 - Print button
 - Pages
 - Page setup
5. Paul would like to change page orientation during printing. State the command that he would use to achieve his objective. (Individual work.)
Page setup command
6. State the reason why highlighting of text is necessary. (Individual work.)
It is done to distinguish the text or graphic from the rest of the content in the document.
7. Name the feature that is used for displaying synonyms and antonyms of a selected word. **Thesaurus** (Individual work.)
8. Name the keys that are represented by the following symbols: (Individual work.)

(i) **Ins:** Insert (ii) **Del:** Delete (iii) **Ctrl:** Control



Word Processing Basics II

Introduction

Microsoft Word Basic II deals with more advanced editing and formatting features. The learner is expected to interact with advanced proofing features such as word count, comment and track changes as well as advanced formatting features such as page layout, nested list, creating and using styles among other features.

6.1 Content Map for the Unit

Unit 6	Word Processing Basics II		
Topic Area	Application Software		
Subtopic Area	Word Processing		
Number of periods	10 + Homework		
Introduction	Word Processing Basics II		
Classroom organization	<ul style="list-style-type: none"> • Whole class orientation then work in groups/ pairs. • Individual activities. 		
Equipment required	<ul style="list-style-type: none"> • Computers, CD/DVD, video player, projector, Students' textbook, and digital materials 		
Activities	<ul style="list-style-type: none"> • Practical activities and discussions. 		
Competences practice	<ul style="list-style-type: none"> • Team work, Leadership skills, Communication skills, Practical skills and Research. 		
Language competences practice	<ul style="list-style-type: none"> • Defining • Explaining • Writing 	<ul style="list-style-type: none"> • Communicating • Group discussions 	
Vocabulary acquisition (Some Key terms)	<ul style="list-style-type: none"> • Page setup • Track Changes • Breaks 	<ul style="list-style-type: none"> • Margins • Comments • Styles 	<ul style="list-style-type: none"> • Nested list • Columns • Watermark

Vocabulary acquisition (Key terms to be introduced and explained to the student)	<ul style="list-style-type: none"> • Headers • Drop cap • Page numbers • Footers • Borders • Comments • Orientation • Margins
Numeracy	<ul style="list-style-type: none"> • Using the Microsoft Word rulers. • Setting the margins of a document. • Setting the page numbers in a document. • Setting tab measurements.
Study skills (including language competences)	<ul style="list-style-type: none"> • Note taking • Presentation skills • Organization of ideas • Reporting skills
Revision	<ul style="list-style-type: none"> • Learning Activities and the Revision Exercise in the ICT Senior 1 Student's book. • Past examination questions.
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work in groups, practical exercises, assessing whether the objectives are met, continuous assessment tests and oral questions. • A summative evaluation at the end of the unit to establish whether the learning objectives have been met.
Learning outcomes	<p>The learner should be able to:</p> <ul style="list-style-type: none"> • Track changes to indicate modification. • Use comments and carry out a word count check. • Type a document with borders, background, and watermark and perform the correct alignment. • Insert columns and use different breaks to make the document useful. • Add a useful header and create footers • Add nested list in a document. • Add page numbers.

6.2 Subtopics/Content to be covered

Manipulating a document: Page Setup: setting margins, orientation, page borders, background and watermarks.

Proofing Features: Track changes, adding comments and word count.

Columns and breaks

- Insert columns: Presets and user-defined.
- Breaks: Page, columns, text wrapping, next page and continuous.

Formatting Text

- Styles: Headings, create a style, apply a style and clear formatting.
- Nested lists (bullets and numbering)
- Drop caps
- Headers and footers
- Page numbers

6.3 Reference: Refer to the ICT for Senior 1, Students' Book, 131 to 151.

6.4 Key Unit Competency

By the end of this unit, the learner should be able to manipulate text, use advanced formatting methods, and add simple objects in a document.

6.5 Learning Objectives

Knowledge and understanding

By the end of the unit, the learner should be able to:

- (i) Explain the technique for manipulating a document.
- (ii) Recognise the proofing features for editing a document including using track changes.
- (iii) State when to use columns and breaks in a document.

Skills to be imparted in this unit

By the end of the unit, the learner should be able to:

- (i) Manipulate a document by managing the layout of the page and the entire document.
- (ii) Apply different methods of formatting text in a document.
- (iii) Use proofing features for editing a document, including track changes.
- (iv) Use columns and breaks to organise the document.

Attitudes and Values to be developed in this unit

By the end of the unit, the learner should be able to:

- (i) Show interest in formatting and manipulating a document.

- (ii) Appreciate advanced formatting and proofing features of word processing for editing a document including using track changes.

6.6 Teacher Preparation

- Attempt the learning activities before presenting them to the students.
- Ensure that all computers are in good working conditions before every practical class.
- Make notes and prepare a lesson plan before each lesson.
- Obtain different resource materials to cater for the varied abilities of the learners.

6.7 Key Concepts to be covered

- Manipulating a document is done by formatting and editing the document to make it error-free and appealing.
- Page margins are the blank spaces around the edges of a page.
- Orientation refers to the positioning of the page in relation to the text or graphics.
- Two types of page orientations are landscape and portrait.
- Page borders in a document.
- Background is used to create a more appealing background for online viewing. They are visible in all the views except Draft and Outline view.
- Watermarks are text or pictures that appear behind text in a document.
- Track changes is a feature that enables the user to view all the changes that have been made on a document.
- Adding comments to a document.
- Performing word count.
- Inserting columns in a document using either the preset options or user-defined ones.
- A break is inserted in order to demarcate the end of a part and beginning of another.
- The four main categories of breaks are section, page, column and text wrapping break.
- Types of section breaks are the Next page, Continuous, Even, and the Odd page section break.
- Styles are specially packaged sets that apply many formats at once.
- Use of bullets and numbering feature to add nested lists in a document.
- Drop cap is a large capital letter usually at the beginning of a block of text that has the depth of more than one line of regular text.

- Headers are lines of text or graphics that appear above the top margin of a page or selected pages.
- Footers are lines of text or graphics that appear below the bottom margin of a page or selected pages.
- Page numbering is a formatting feature that organises and serialises the pages of a document for ease of reference.

6.8 Additional Content for the Teacher

Proofing Features: Review tracked changes and comments

- Word displays tracked changes and comments by default when the **Track Changes** feature is activated.
- **Final Showing Markup** is the default option in the **Display for Review** list box.
- Changes such as insertion, deletion, move, formatting change, or comment can be tracked so that they are all reviewed later.
- The **Reviewing Pane** displays all the changes that appear in the current document, the total number of changes, and the number of changes of each type such as deletion, move and comments among others.

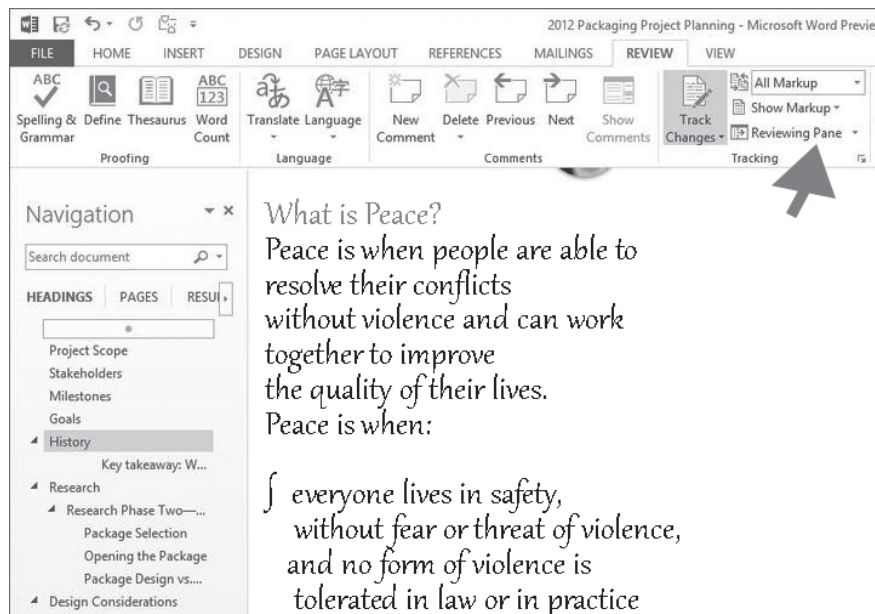


Fig 6.1: Reviewing pane displays all the changes made in the document.

- As the tracked changes and comments are being reviewed, they can be accepted or rejected. Until all the tracked changes and comments in a document are either accepted or rejected, even hidden changes will appear to viewers in documents when sent or displayed.

Summary review of tracked changes

The **Reviewing Pane** is a tool used for ensuring that all tracked changes have been removed from a document and does not show up to others who might view the document. The summary section found at the top of the **Reviewing Pane** displays the exact number of visible tracked changes and comments that remain in the document. To review changes made in a document do the following:

- Click on **Review** tab in the menu bar, under the **Tracking** group, click **Reviewing Pane** command or the dialog box launcher on it then select either **Reviewing Pane Horizontal** or **Reviewing Pane Vertical** option. The pane is displayed as shown in figure 6.1.

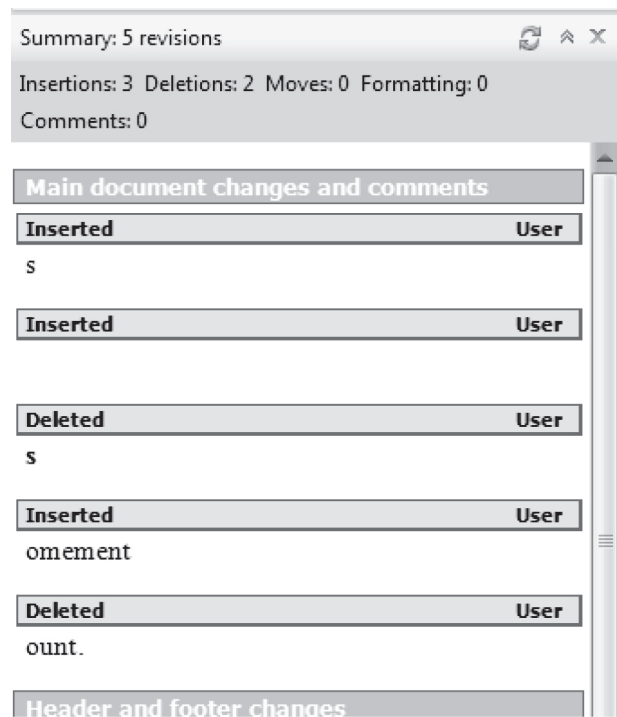


Fig. 6.2: Reviewing Pane: Displays the exact number of visible tracked changes and comments.

Review each tracked change and comment in sequence

To review each tracked change and comment, do the following:

- (a) Click on **Review** tab in the menu bar, in the **Changes** group, click **Next** or **Previous** command.
- (b) Do one of the following in the Changes group:
 - Click **Accept** to allow the changes.
 - Click **Reject** to discard the changes.

- Do this until there are no more tracked changes. If a comment is encountered, click **Delete** in the **comments** group to delete a comment.

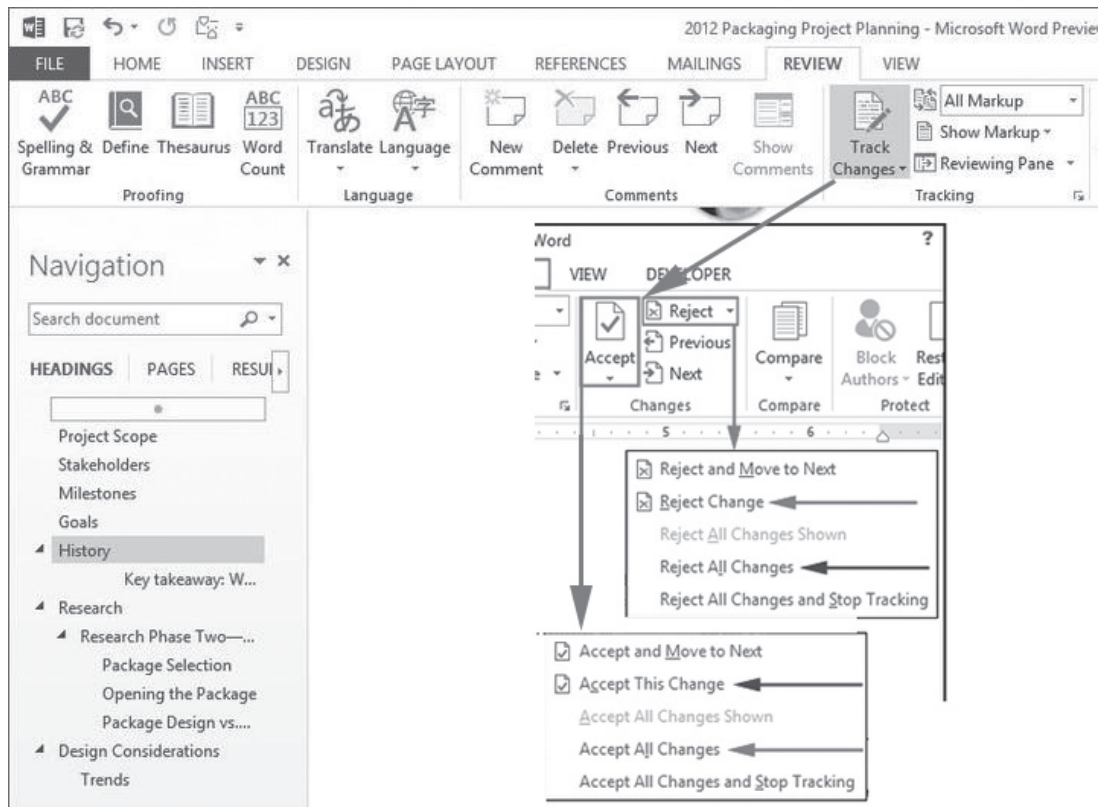


Fig. 6.3: Accepting and rejecting changes.

Accept Changes

- Click on **Review** tab in the menu bar, in the **Changes** group, click the arrow below the **Accept** icon.
- Do one of the following:
 - Accept and Move to Next.
 - Accept Change
 - Accept All Changes Shown.
 - Accept All Changes in Document.

Reject Changes

- Click on **Review** tab in the menu bar, in the **Changes** group, click the arrow below **Reject** icon.
- Do one of the following:
 - Reject and Move to Next

- Reject Change
- Reject All Changes Shown
- Reject All Changes in Document

Review changes by type of edit or by a specific reviewer

- Click on **Review** tab in the menu bar, in the **Tracking** group, click the arrow beside **Show Markup**. Select the desired option.

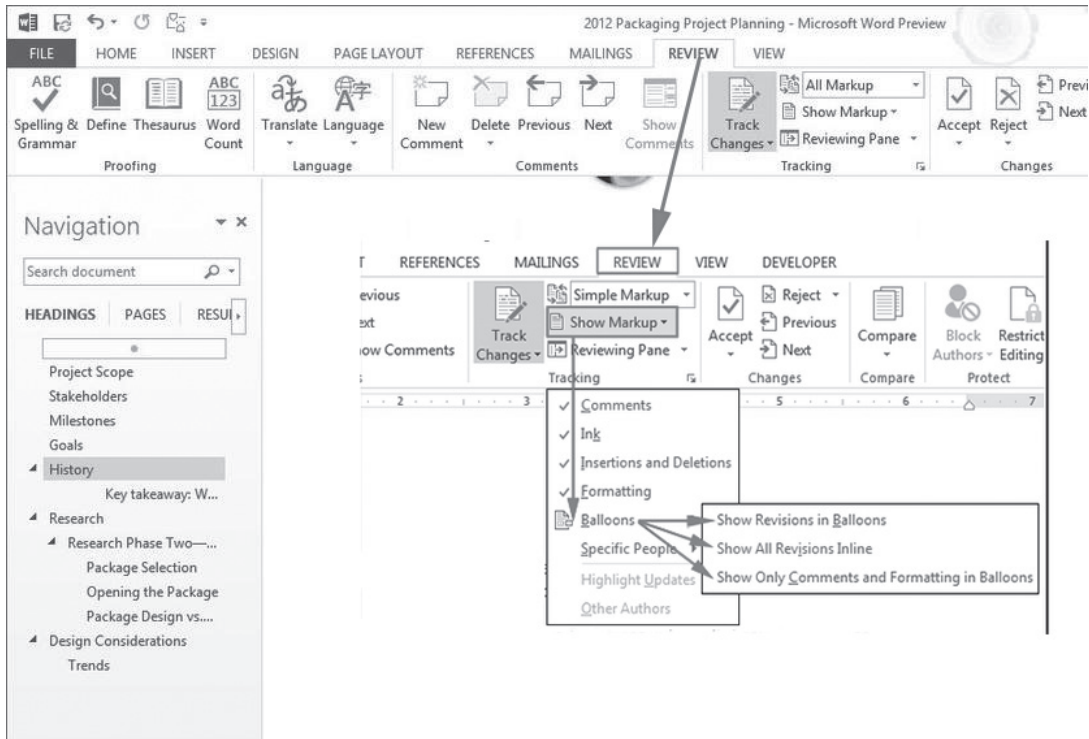


Fig. 6.4: Reviewing changes

To display the document without the tracked changes and comments, click on the **Review** tab in the menu bar, under the **Tracking** group, click **Display for Review** list box and select **Final** option.

Compare documents with the legal blackline option

The legal blackline option is used to compare two documents and displays only the changes made between them. The documents that are being compared are not changed instead the legal blackline comparison is displayed by default in a new third document. To compare, documents do the following:

- Click **Review** tab in the menu bar, under the **Compare** group, click **Compare** to display a drop-down menu. Select **Compare** Option. A dialog box appears as shown in figure 6.5.

- Select the original and revised document under the respective boxes.
- Click **OK**. The documents are displayed on the same window for comparison. Any change made is not displayed on either of the documents but it is automatically taken to a new document.

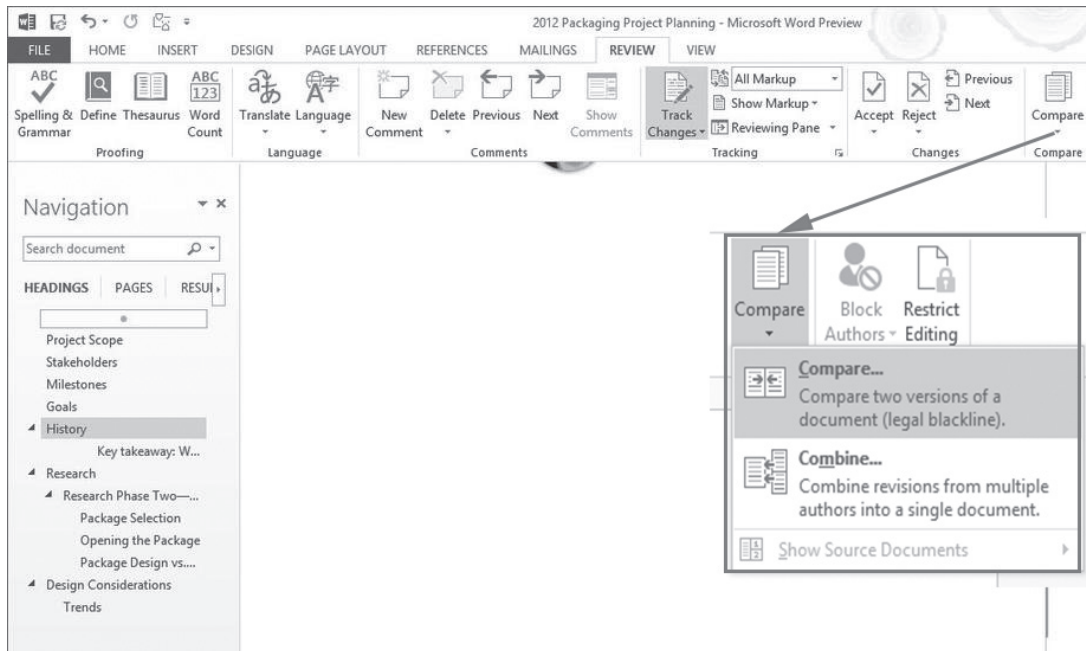


Fig. 6.5: The tool for comparing changes in two documents.

To compare changes from a number of reviewers, click **Combine revisions from multiple authors** instead.

6.9 Suggested Learning Materials

- Computers with Microsoft Office 2013.
- CDs/DVDs of documentaries on the using Microsoft Word 2013.
- Projector or smart board.
- Senior 1 Students' Book.
- Other relevant digital learning materials such as laptops, soft documents and their hardcopies.

6.10 Suggested Low Cost or No Cost Materials

- Press F1 key to access Microsoft Word free tutorial.
- Free tutorials on identified websites.
- Ask learners to bring practical question materials they would want to share.

6.11 Suggested Teaching Methods

- Discussion
- Practical activities
- Question-and-answer method
- Explanation
- Demonstration
- Tutorials

6.12 Suggested Teaching and Learning Activities and Exercises to Support Delivery of Content and Development of Student Competences

- Explain the key concepts in the chapter.
- Demonstrate to the learners on the procedures of applying the various formatting and editing features on a projector.
- Ask the learners to type a document and apply borders, background, watermarks and perform the correct alignment.
- Guide learners to use the track changes feature to indicate modification, use comments, and carry out a word count check.
- Guide learners to type a document and add columns, headers, and create footers.
- Guide learners to create a nested list by use of bullets and numbering feature.
- Guide learners to apply different types of breaks on a document and also vary page numbering on various sections.
- Ask the students oral questions during demonstrations or explanations. Listen keenly as the students provide answers. Encourage them.
- Guide learners to create a document of their choice with the features learnt in this topic. Encourage peer teaching.
- Assess the practical activities being done by the students and provide guidance where necessary.

6.13 Cross-Cutting Issues to be integrated in Teaching and Learning Activities

Find ways of incorporating the following emerging issues during the teaching and learning activities:

- **Dangers of pre-marital sex:** Pre-marital sex means engaging in sexual activities before marriage. These activities include; sodomy, masturbation, pornography and sexual intercourse among others. The following are some of the dangers of pre-marital sex:
 - ➔ **Guilt:** It is a strong sense of having done something morally wrong. It can come immediately or later after the act.
 - ➔ **Ruins friendships:** It always turns a good relationship to bad one since other non-sexual dimensions of the relationship stop developing such as communication.

- ➔ **Worry about HIV:** It is a major emotional stress to many teenagers.
- ➔ Early pregnancy leading to school dropout.
- ➔ Loss of self-respect and self-esteem.
- Create short health breaks during the lesson. The break could be as short as three to five minutes. Use the break to sensitise students on social issues such as environment, HIV/AIDS, dangers associated with premarital sex, and drug and substance abuse. You could download relevant short video clips and spend a few minutes to engage the students on the message.

6.14 Suggestions for Accommodating Special Education Needs (SEN)

Identify learners with special needs and help them to cope during the lesson.

Type of Impairment and Support for the learner

- (i) **Sensory impairment (Visual)**
 - Group these learners with those who have good vision to assist them where necessary.
 - Use large font size and eligible font styles when projecting digital content.
 - Arrange with the administration to provide Braille keyboard, speech input device or speakers for these learners.
- (ii) **Sensory impairment (Hearing)**
 - Project your voice to ensure you are audible to all the learners.
 - Ask the learners oral questions to assess if they understand the concepts.
 - Ensure the learners sit close to the teacher.
- (iii) **Motor impairment**
 - Assign these students the computers near the door so that they do not have to walk long distances before getting to their computers.
 - Pair them with students who are not motor-impaired.
- (iv) **Gifted or talented learners**
 - Assign learners more challenging exercises.
 - Assign learners extra practical questions.
 - Encourage peer teaching.

6.15 Suggestions for Supporting Multi-Ability Learning

Fast learners: Let the fast learners sit next to slow learners so that they can help them. Give them involving activities.

Slow learners

- Use simple English that the student can understand.

- Avoid giving so many procedures to the students at the same time.
- Organise remedial lessons.
- Group these students with the fast learners and encourage peer teaching.
- Closely monitor the practical activities being done by the students.

6.16 Support to Learning Activities

The following are some suggestions on Learning Activities: group work, project work, pair work and individual work.

Project: Let the students:

- (a) Research on dangers of drug and substance abuse in Rwanda and use Microsoft Word to write and format the report.
- (b) Creatively apply the following skills learnt in this unit in the compiled report:
 - Nested list
 - Columns
 - Breaks
 - Styles
 - Page setup (background, watermarks, orientation, setting margins and page borders)
 - Headers, footers, page numbering and drop cap

Group

- (a) Give the students past papers in word processing.
- (b) Give the students selected assignments and learning activities drawn from the ICT Senior 1 Students' Book to discuss.

Pairs: Students should attempt selected learning activities in the ICT Senior 1 Students' Book.

As individual: Give the students selected Learning Activities in the ICT Senior 1 Students' Book.

6.17 Support for the Development of Positive Skills, Values and Attitudes

- (a) The following are some life skills to be developed in this unit: critical and creative thinking, effective communication, and problem solving.
- (b) Values and attitudes to be developed include responsibility, appreciation, cooperation, and curiosity. They are developed in the following ways:
 - Working in groups encourages the attitude of cooperation.

- Curiosity can be developed by letting the learners explore the software. Let them search for an alternative way of performing a procedure.
- Creative and critical thinking is developed by giving them a project.
- Responsibility can be developed by assigning every group a leader and activity to be handled by each student in the group.

6.18 Support to Suggested Formative and Summative Assessment

- Revision Exercise in ICT Senior 1 Students' Book
- Oral questions
- Project documentation
- Practical questions
- Revision questions from past papers

6.19 Links to other Subjects

English: Presentation of extended writing, punctuation and spelling. Correct grammar when writing documents.

6.20 Additional Remedial, Consolidation and Extension Activities

Access the projects done on dangers of drug and substance abuse in Rwanda by the students. Encourage discussion.

6.21 A Sample Lesson Plan: See Appendix 1, pages 151 to 178..

6.22 Answers to the Questions and Activities in the Students' Book

Learning Activity 6.1 (Refer to Students' Book page 137)

Part 1

- This part of the activity could be done as individual work. Treat it as a CAT.
1. Portrait and Landscape
 2. Margin
 3. Watermark
 4. JPEG is short for Joint Photographic Expert Group

Part 2: This part could be done in pairs

- Assess the document created.
- Check if the given watermark is added diagonally, a background colour is added, word art page border included, page margin changed appropriately, and the document saved as **My Page**.

Learning Activity 6.2 (Refer to Students' Book page 141)

Part 1: This part could be done as individual work

1. **How are watermarks used?**
They are distinguishing marks either text or pictures that appear behind text in a document. A water mark is visible when paper is held up to the light They are used as security features to discourage production of counterfeits.
2. **Explain the importance of washout feature used when a picture watermark is to be added.**
It ensures that the picture doesn't interfere with the text in a document.
3. **State the importance of adding breaks in a document.**
Breaks are used to demarcate the end of a part and beginning of another. They enable the user to include different formatting features on a page.
4. **The word count feature** provides the summary details about a document.
5. **A comment is a note that an author or reviewer adds to a document for consideration.** Comments are added in order to include an explanation of a point that is not very clear or suggest correction in a document to be sent to the person who created it.

Part 2: This part could be done in pairs

Assess if the following features are used in the **Anthem** document:

- Track changes feature.
- A comment line added and explanation of each stanza included.
- Spelling and grammar checked.
- Document saved as **Anthem**.

Learning Activity 6.3 (Refer to Students' Book page 151)

Part 1: This part could be done as individual work

1. **A drop cap** is a large capital letter usually at the beginning of a block of text that has the depth of more than one line of regular text.
2. **Explain how a header can be inserted in a document.**
Click **Insert tab** from the menu bar then click on Header command from the ribbon under **Header & Footer** group. Select the type of header and type the content desired and press enter.
3. **List three types of heading styles that can be applied in a document.**
 - Heading 1
 - Heading 2
 - Heading 3
 - Heading 4
 - Heading 5
 - Heading 6

4. **State the importance of using columns in a document.**

- They are used to enhance the look of a document.
- It enables the user to organize a document.

5. **Differentiate between portrait and landscape orientation.**

Portrait orientation is where text and graphics are printed with the longest side placed vertically and the shortest placed horizontally while landscape orientation is where text and graphics are printed with the longest side placed horizontally and the shortest placed vertically.

Revision Exercise 6 (Refer to Students' Book page 151)

Administer this Revision Exercise as a Test. Mark and review it in class.

1. **Differentiate between headers and footers.**

Headers are lines of text or graphics that appears above the top margin of a page or selected pages while footers are lines of text or graphics that appear below the bottom margin of a page or selected pages.

2. **Differentiate between odd page breaks and even page break.**

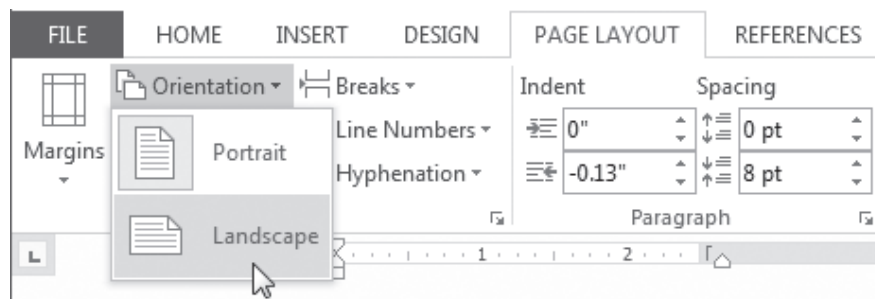
Odd page break begins the new section on the next odd-numbered page while even page break begins the new section on the next even-numbered page.

3. **Explain how column breaks are inserted.**

- Click at the position where the column break is to be inserted.
- Click on the **Page Layout** tab, select **Breaks** in the **Page Setup** group and then click **Column**.

4. **Use diagrams to differentiate between the two types of page orientation.**

Portrait orientation is where text and graphics are printed with the longest side placed vertically and the shortest placed horizontally while landscape orientation is where text and graphics are printed with the longest side placed horizontally and the shortest placed vertically.



Page orientation

5. **Define the term styles.**

They are specially packaged sets that apply many formats at once.

6. **Mention the importance of tracking changes in a document.**

It enables the user to follow up every formatting or editing change made in a document.

7. **Examples of features used for formatting text.**

- Styles
- Nested lists
- Drop caps
- Headers and footers
- Page numbering

8. **The term watermarks refers to text or pictures that appear behind text in a document.**

9. **Types of proofing features include:**

- Word Count
- Track Changes
- Adding comments

10. **List two types of drop caps that can be used in a document.**

- Dropped
- In margin

6.23 Teacher Support on Assessment: Additional Questions and Answers

1. **List three types of changes that can be tracked.**

Insertion, deletion, move, formatting change, or comment.

2. **State the function of Reviewing Pane.**

Reviewing Pane displays all of the changes that appear in the current document, the total number of changes, and the number of changes of each type.

3. **Explain how changes can be tracked one at a time**

Click on **Review** tab in the menu bar, in the **Changes** group, click **Next** or **Previous** command.

4. **State the role of legal backline when proofing a document.**

The legal backline option is used to compare two documents and display a new revised document.

5. **What is the function of the Accept and Reject command found in the Change group?**

- Accept command is used to implement changes made in a document.
- Reject command is used to ignore the changes made in a document.



Geographic Information Systems (GIS) and Maps

Introduction

GIS and Maps equip the learner with skills that enable them to identify and name different elements of the ArcMap interface. The learner should be able to open ArcMap and browse, save and close an existing map. Individually or in groups, learners use navigation tools to explore a map. Also the learners should query a map using identify and find tools.

7.1 Content Map for the Unit

Unit Title	GIS and Maps
Topic Area	Application Software
Subtopic Area	GIS
Number of periods	12 + Homework
Introduction	GIS and Maps
Classroom organization	<ul style="list-style-type: none"> • Whole class orientation then work in groups. • Individual activities.
Equipment required	<ul style="list-style-type: none"> • Computers installed with ArcGIS software, projector, text book and digital materials.
Activities	<ul style="list-style-type: none"> • Practical activities, discussions, demonstration.
Competences practice	<ul style="list-style-type: none"> • Team work, Leadership skills, research and Communication skills.
Language competences practice	<ul style="list-style-type: none"> • Defining • Writing • Communicating • Reporting • Explaining • Group discussions
Vocabulary acquisition	<ul style="list-style-type: none"> • GIS • ArcToolbox • Raster Data • Layers • Pan • Vector data

Vocabulary acquisition (Key terms to be introduced and explained to the student)	<ul style="list-style-type: none"> • Data • Shapefiles • Python • Toolbars • Spatial • TINs • Attribute • Metadata • ArcCatalog • ArcMap • Geocoding • Basemap • Geodatabase • Bookmark • Query • Layers • OpenGL
Numeracy	<ul style="list-style-type: none"> • Geocoding • Navigating a map
Study skills (including language competences)	<ul style="list-style-type: none"> • Note taking • Reporting skills • Organization of ideas • Observation skills
Revision	<ul style="list-style-type: none"> • Learning Activities and Revision Exercise in the ICT Senior 1 Student's Book. • Past papers covering GIS and Maps
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work in teams, carrying out activities, experiment and recording of observation, continuous assessment tests and oral questions.
Learning outcomes	<p>The learner should be able to:</p> <ul style="list-style-type: none"> • Define terms and concepts of GIS. • Explain the interface of ArcMap. • Explain file handling with ArcMap. • Open existing maps, save, close and browse maps. • Use the different navigation tools to explore a map. • Query a map using Identify and Find tools.

7.2 Subtopics/Content to Be Covered

Definition of terms and concepts of GIS

- Java edition (AEJEE), PostGIS and ArcExplorer.
- GIS, ArcGIS Desktop (ArcMap)

The interface of ArcMap

- Table of Contents (TOC), menu bar, status bar, main window and toolbars.

- File handling with ArcMap.
- Open an existing map, save and close a map and browse an existing map.

Navigation tools

- Zoom in/out, fixed zoom in/out, zoom to full extent, zoom to previous/next extent, pan and spatial bookmark.

Query methods

- Find and identify.
- Layers in a map.
- Turn off/on a layer, order layers, add/remove a layer and rename a layer.

7.3 Reference: Senior 1, Students' Book, pages 152 to 178.

7.4 Key Unit Competency

By the end of this unit, the learner should be able to:

- Define and recognise basic features of GIS.
- Differentiate the elements/components of the interface of the GIS application.
- Query a map and organise map layers.

7.5 Learning Objectives

Knowledge and understanding

By the end of the unit, the learner should be able to:

- Understand the basic concepts of GIS.
- Identify different elements of the interface of an ArcMap.
- Know how to work with maps in a GIS environment.
- Know and understand how to use different navigation tools.
- Know how to identify a location using a query on a map.

Skills to be imparted in this unit

By the end of the unit, the learner should be able to:

- Explain GIS-related terms appropriately.
- Explain GIS-related terms appropriately.
- Explore the ArcMap environment.
- Navigate a map and show a certain section of a map in different scales.
- Query a map and organize map layers.

Attitudes and values to be developed in this unit

By the end of the unit, the learner should be able to appreciate the importance and function of GIS.

7.6 Teacher Preparation

- (i) Practise how to open ArcMap, browse, save and close an existing map.
- (ii) Practise how to use the navigation tools to explore a map.
- (iii) Practise how to query the maps using find and identify tools.
- (iv) Read and master the content to be taught.
- (v) Plan and make notes for the lesson.

7.7 Key Concepts to Be Covered

Terms and concepts of GIS have to be defined so as to understand GIS. Among the many terms, it is important to define terms such as Java edition (AEJEE), PostGIS and ArcExplorer.

- **Java edition (AEJEE)** AEJEE is an abbreviation for **ArcExplorer-Java edition for Education**. It allows viewing and querying local data as well as ArcIMS services from the geodata.gov or other hosted sites.
- **PostGIS** is a free open source extension for PostgreSQL databases for storing, manipulating and retrieving spatial data.
- **ArcExplorer** is a lightweight data viewer from **Esri** for maps and GIS that performs a variety of basic GIS functions including display, query and data retrieval applications.
- **GIS** is a system designed to capture, store, manipulate, analyze, manage and present all types of geographically referenced data, that is, data identified according to their location.
- **ArcGIS Desktop** contains a set of integrated applications, which are accessible from the **Start** menu. These include **ArcMap**, **ArcCatalog**, **ArcToolbox**, **ArcGlobe** and **ArcScene**.

The interface of ArcMap (desktop) has the Table of Contents (TOC), menu bar, status bar, main window and toolbars.

- The **Table of Contents** has tabs that show how the layers are displayed. The layers are displayed either by the drawing order, their source, visibility or by selection.
- The **Menu bar** has options such as the File, Edit, View, Bookmarks, Selection Geoprocessing, Customise, Windows and Help.

- The Status Bar is the horizontal area at the bottom of the ArcMap application window.
- Main Window is the main area on which the spatial data gets displayed.
- The toolbars have tools used to edit and manipulate data on the maps.
- ArcCatalog organizes spatial data contained on the computer and various other locations and allows search, preview and addition of data to ArcMap as well as managing metadata and set up address locator services (geocoding).

Query Methods

- The find and identify tools to query maps.
- Layers in a map from the table of contents.
- Turning the layers **ON** and **OFF** layers, ordering layers, add and remove layers and renaming of layers.

7.8. Additional Content for the Teacher

GIS software architecture

There are sometimes two different GIS architectures, namely:

- Project-oriented: This is oriented towards short duration projects.
- Database oriented: This is oriented towards long-term projects.

Some systems combine the two architectures. Most GIS systems are database-oriented and use a **relational database management system (RDBMS)**. An example is shown in the block diagram in figure 7.1.

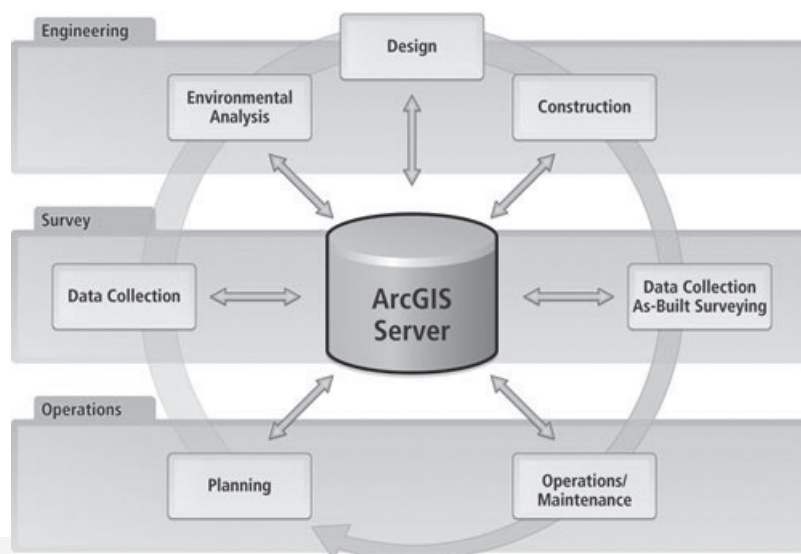


Fig. 7.1: The Database GIS software Architecture

- Data are put into the RDBMS via application programs and retrieved and processed by other application programs before being rendered. It has been suggested that an Object-Oriented Database system (OODBMS) might be better for GIS but this has not yet been implemented.
- A project oriented system can be simpler. Data files may be combined, for example, in an overlaying operation, to produce new data files that can then be processed by other applications. The data files are more susceptible to being corrupted and not as secure as with a DBMS. The project-based system is better for short duration projects.

Maps and Map Types

Maps are among the most captivating forms of information. They represent information in an artistic and scientific manner. They reveal the invisible, and are used to clarify and preserve history. Maps are also used to inform the future. Irrespective of the reason, they capture the imagination of people around the world. Generally, there are three types of maps. These are the;

- Reference maps
- Thematic maps
- Dynamic maps

(i) Reference Maps

- These types of maps have a primary purpose of delivering location information to the user of the map. Reference maps generally represent geographic reality more accurately. Examples of some common types of reference maps include topographic maps and image maps obtained from satellites or aircraft that are available through online mapping services.
- The accuracy of a given map is indeed critical to the users. For instance, governments need accurate reference maps for land use, infrastructure, and planning purposes. Travellers depend on navigation devices such as global positioning system (GPS) units and need accurate and up-to-date reference maps in order to arrive at their desired destinations.

(ii) Thematic Maps

These maps are about a particular topic or theme of interest. They are more concerned with how things are distributed across space. Some abstract concepts represented by thematic maps include life expectancy in Africa, per capita gross domestic product (GDP) across the world, or literacy rates across Europe. These maps make abstract and invisible concepts visible and comparable on a map.

(iii) Dynamic Maps

Dynamic mapping refers more to how maps are used and delivered to the user, for example, through mobile phones, than to the content of the map itself. Dynamic maps are interactive and changeable representations of the earth and its resident phenomena. Both reference and thematic maps are dynamic in nature, and the maps are an integral component of the GIS.

7.9 Suggested Learning Materials

- Computers with appropriate software
- CDs/DVDs of world maps
- A video player, projector
- The ICT Students' Book for Senior 1
- An interactive board
- ArcGIS desktop
- Other relevant digital learning materials such as radio, television, laptops, phones, tablets, billing machines, projector.

7.10 Suggested Low Cost Or No Cost Materials:

- Free downloads from the Internet. (Always establish the authenticity of the website to avoid downloading infected files.)
- Free tutorials on identified websites.
- Ask learners to bring any learning materials they would want to share.
- Visit neighbouring schools and request access to their resources.

7.11 Suggested Teaching Methods

Some of the teaching methods that can be applied in this chapter include

- Question-and-answer method
- Explanation
- Practical activities
- Discussions

7.12 Suggested Teaching and Learning Activities and Exercises to Support Delivery Of Content And Development Of Student Competences

- Class discussions on defining terms and concepts of GIS.
- Group discussions on the interface of ArcMap.

- Question and answers on varied concepts
- Students to share any knowledge they may have
- Video clips on GIS and maps

7.13 Cross-Cutting Issues to Be Integrated In Teaching and Learning Activities

Facts about Planet Mars

- Mars is the fourth planet from the Sun and it was named after the Roman god of war. It is also known as the **Red Planet** due to its reddish appearance. Mars is a terrestrial Planet with a thin atmosphere composed primarily of carbon dioxide.



Fig. 7.2: Image of Planet Mars

- Mass: 641,693,000,000,000 billion kg (0.107 x Earth), its equatorial circumference is about 21,297 km.
- Mars has two known moons, the **Phobos** and the **Deimos**. The temperatures on its surface range between -87°C to -5°C . Mars is home to the tallest mountain in the solar system. **Olympus Mons**, a shield volcano, is 21km high and 600km in diameter. Evidence from volcanic lava flow show that the mountain is still active.
- There have been eighteen successful missions to Mars. Up to September 2014 there had been 40 missions to Mars, including orbiteers landers, and several flybys.
- The most recent visits to Mars include the Mars Curiosity mission in 2012; the MAVEN mission, which landed on September 22, 2014; followed by the Indian Space Research Organization's (ISRO) MOM Mangalyaan orbiter, which arrived on September 24, 2014.
- Other missions include the European Space Agency's ExoMars mission, comprising an orbiter, lander, and a rover, followed by NASA's InSight robotic lander mission, slated for launch in March 2016 and a planned arrival in September 2016.

7.14 Suggestions for Accommodating Special Education Needs

The teacher should identify learners with special needs and help them to cope during the teaching learning activities.

Type of impairment	Support for the learner
Sensory impairment (visual)	<ul style="list-style-type: none">• Learners could sit next to learners with good vision to get help where necessary.• Teacher to write large letters on the board.
Sensory impairment (hearing)	<ul style="list-style-type: none">• Teacher should make an effort to speak loudly to be audible to the affected learners.• Allow learners to sit close to the teacher.
Motor impairment	<ul style="list-style-type: none">• Do the activities in one place avoid situation requiring learner to move from place to place.
Gifted or talented learners	<ul style="list-style-type: none">• Assign learners extra work.• Assign the learners more challenging work.

7.15 Suggestions For Supporting Multi-Ability Learning

Fast learners	<ul style="list-style-type: none">• Request learners to sit next to slow learners to help them.• Give them extra tasks to perform.
Slow learners	<ul style="list-style-type: none">• Teacher take time to go over the procedure and use the language the learners will understand.• Remedial teaching.• Use other learners to assist them to do the task.

7.16 Support to Learning Activities

Group work, pair work, project work, individual work and whole class work.

Group:

- In groups, open the **ArcMap**, browse, save, and close an existing map.
- Use the navigation tools to explore maps.

As individual:

- Query a map using the map of Africa using the identify tool.
- Create a Legend on a Map and save the Map.

7.17 Support for the Development of Positive Skills, Values and Attitudes

- Some life skills to develop include critical thinking, effective communication, problem solving and creative thinking. Some values to be developed include responsibility, appreciation, cooperation, and curiosity.
- Working in groups encourages development attitude of cooperation.
- Develop curiosity by letting the learners discover the various tools in ArcMap.
- Have desire to explore the environment and find out more on what they have learnt.
- Creativity can be encouraged by letting the students open different types of maps.

7.18 Support to Suggested Formative And Summative Assessment

- Learning Activities and Revision Exercise in the ICT Students' Book for Senior 1
- Oral questions
- Continuous Assessment Tests (CATs)
- Random Assessment Test (RATs)

7.19 Links to Other Subjects

- Geography in location of places.
- Physical Geography

7.20 Additional Remedial, Consolidation and Extension Activities

Let the students try and create several layers on a certain basemap. They should be as creative as possible in the design. Reward the winning design.

7.21: Additional Assignment

Arrange an educational visit to an institution that uses ArcMap. Have a resource person to take the learner through the software. Encourage them to ask questions.

7.22 A Sample Lesson Plan: See Appendix 1, pages 151 to 178.

7.23 Answers to the Questions and Activities in the Students' Book

Learning Activity 7.1 (Refer to the Students' Book, page 156)

Part 1: This part could be done as individual work

1. GIS is the abbreviation for Geographic Information Systems
2. Raster and vector

3. Points and Attributes
4. ArcCatalog; ArcMap; and ArcToolbox
5. ArcCatalog
6. Arc Explorer Java Edition Education
7. Images composed of pixels
8. Layers
9. **Give five different areas where GIS can be applied.**
 - **Natural Resources:** This includes forestry management, habitat identification and evaluation.
 - **Community services:** Fire, ambulance, police, crime investigations, utility management.
 - **Health:** Mapping the spread of infectious agents.
 - **Water resources:** Planning water needs, mapping aquifers among others.
 - **Minerals:** Mapping oil, coal, natural gas deposits, and copper among others.

Part 2: This part could be done in groups of five

Guide the learners to do research on the Internet. They should find out the type of institutions likely to be using GIS and maps. Give guidance. This could be given as a group assignment. Let the group representatives give a class presentation on their findings.

Learning Activity 7.2 (Refer to the Students' Book, page 165)

Part 1: This part could be done as individual work

Give this as a test. Mark and review it in class.

1. The parts of the Interface window of the ArcMap include the following: Table of Contents; Menu bar; Status bar; Main window; and Toolbars..
2. The **Add Data** command is used to add new data to the maps in active data frame.
3. ArcMap provides two ways of viewing a map, namely **data view** and **layout view**.
4. **Zoom In** is a tool used to enlarge the maps for a better view.
5. The **Identify tool** is used to view attribute values for a certain feature.
6. **Data View** provides a geographic window for exploring, displaying, and querying data on the map.
7. A **Bookmark** is a toolkit that can be used to save a feature to a map.

Part 2: This part could be done as individual work

Give this as a CAT. Mark and review it in class.

1. **Explain different ways of launching ArcMap.**
 - It can be opened from the **Start** menu or by use of an icon on the desktop.
 - To launch ArcMap, Click on the ArcMap icon.
2. **Explain the function of three command buttons in the table of contents for ArcMap.**
 - **List By drawing Order**- where the layers are listed by drawing order. Drag and drop to change the drawing order.
 - **List by Visibility**: The Layers are listed according to whether they are turned **ON** or **OFF**. A layer can be turned **ON** or **OFF** by checking the checkbox next to it.
 - **List by Selection**: Layers are listed by whether their features are selectable by the interactive selection and editing tools.
3. **What is the function of the “Add Data” button?**

The command is used to add new data to the map’s active data frame.
4. **Explain how one can switch between Data View and Layout view in ArcMaps.**

ArcMap provides two ways of viewing a map; data view and layout view. Each view allows one to view and interact with the map in different ways.
5. **Explain the procedure for creating a bookmark.**

To create a bookmark, Pan and zoom the data frame to the area of interest then click **Bookmarks**, and then select **Create**.
6. **How can a legend be inserted in a Map?** From the menu bar, click **Insert** and then from the drop-down menu, click **Legend**. The **Legend Wizard** dialogue box appears. From the box, choose the Legend title, title fonts properties, size, and type, justification. Click **Next** to move to the next wizard window from where the frame can be customised. Click **Finish**. The legend appears at the bottom of the map as designed.

Learning Activity 7.3 (Refer to the Students’ Book, page 168)

Part 1: This part could be done in pairs.

Give this in class. Let the students discuss the answers in pairs.

1. ArcCatalog
2. Catalog tree
3. Coordinates

4. An attribute provides information about a location or data for example, population.

Part 2: This part could be done as individual work.

Let the students do it as a take home assignment. Give them about two days to complete the assignment and hand in the work.

1. **What is an ArcCatalog? Explain how it is different from an ArcMap?**

ArcCatalog is an administration application within ESRI's ArcGIS suite and its primary role is to maintain geospatial data and the resulting metadata. ArcCatalog deals with the investigation, inspection, and finding of geographic data sets while ArcMap uses those data sets to form layers that display maps and allows exploration of the underlying spatial data.

2. **Give and explain the different types of GIS files.**

- (i) **.pmf** - A read only map file created using ArcGIS publisher extension.
- (ii) **.shp** - Shapefiles are simple file formats for storing the vector-based geometric location and attribute information.
- (iii) **.prj** - These are files containing coordinate system information to provide spatial referencing of data.
- (iv) **.xml** - Metadata documents for individual file-based datasets and are managed in ArcGIS workspace folders.
- (v) **.mxd** - are files containing a map, its layers, display information, and other elements used in ArcMap.

3. **Explain different properties of GIS.**

- (i) Location - Coordinates used to give the exact location of an object.
- (ii) Attributes - Provide information about the location, for example, the population and the number of homes in a locality.
- (iii) Spatial Relationships - Properties associating an object with other objects.

Learning Activity 7.4 (Refer to the Students' Book, page 177)

Part 1: This part could be done as individual work.

Give this as a CAT. Mark and review it in class.

1. The **Fixed Zoom In** tool enlarges the image from the centre of the page.
2. The **Zoom to full extent** enlarges the image of the map to its full limit.
3. The **Pan tool** is used move an image horizontally or vertically from a stationary point in order to view it from different angles.
4. The **Find tool** is used to search a location.

5. **Linear referencing** is the method of assigning geographic locations relative positions along measured linear features.

Part 2: This part could be done as an individual take away test.

Give the students three days to complete the assignment. Discuss the answers in class.

1. **Explain the function of the following tools as used in GIS:**
 - (i) **Fixed Zoom In:** Enlarges the size of the image from the center of the page.
 - (ii) **Pan:** This is a tool used to move the image horizontally or vertically from a fixed position in order to view it from different angles.
2. **Explain how the Map of Rwanda can be located using the Find tool.**
 - To find Rwanda on a map, type **Rwanda** in the **Find tool**, and a list of the features from layers in the map that contain that search string in any of their attributes appears.
 - Once the results of Find are displayed, navigate through each feature. Click an entry in the results list to flash it on the map (if it is within the map extent); double-click to pan to it (center the map on its location).
3. **What is linear referencing?** Linear referencing is the method of storing geographic locations by using relative positions along measured linear features.
4. **Explain how the attribute values for Lake Victoria can be determined in GIS.** To view the attribute values for Lake Victoria, use the Identify Tool found in the toolbar. Click the identify tool on the tool bar, and then click on a location in the data frame to identify the features at the selected location.
5. This questions could be done in pairs. Let them label ArcMap Window.

Revision Exercise 7 (Refer to the Students' Book, page 178)

Administer this Revision Exercise as a Test. Mark and review it in class.

1. To view attribute values for a certain feature, use the **Identify Tool** that can be accessed from the **Tools** toolbar.
 - (i) Click the **Identify** tool on the **Tools** toolbar.
 - (ii) Click on a location in the data frame to identify the features at the location. The attributes are presented in the identify window.
2. **ArcMap** is the main mapping application that allows the creation of maps and query attributes and analyzes spatial relationships and layout of the final projects. **ArcCatalog** is used for managing spatial data contained in the computer and other locations, managing database designs, recording and viewing metadata.

3. **ArcExplorer** is a lightweight data viewer. It performs a variety of basic GIS functions including display, query, and data retrieval applications.
4. **ArcMap** can be opened from the **Start** menu or by clicking the **ArcMap** button in the **ArcCatalog** tool bar.
5. The tool lists the layers by drawing order. Drag and drop to change the drawing order. When the layers tab is right-clicked, the commands are displayed.
6. A **Spatial Bookmark** is an electronic marker in a map that identifies the geography of the map for future reference or retrieval.
7. The map is panned by dragging on the screen.
 - (i) The **Pan** tool can be clicked to re-centre the image or double-clicked to re-centre and zoom in.
 - (ii) Holding down the C - key changes the cursor to the pan tool, then use the mouse to move the map.
 - (iii) The map can also be moved by holding down the scrolling wheel of the mouse.
 - (iv) To roam around the map, hold down the Q key or hold down the scrolling wheel of the mouse until the shape of the cursor changes, then roam as desired.

7.23 Teacher Support on Assessment: Additional Questions and Answers (All Questions: Let the students work in pairs.)

1. **What is GIS?** A geographic information system (GIS) is a system designed to capture, store, manipulate, analyze, manage, and present all types of spatial data, which is data identified according to their geographical location.
2. **Name some areas covered by GIS:** Areas covered by GIS include; Natural resources, community services, health, water resources, minerals, education, and mapping of natural phenomena among other areas.
3. **The Components of ArcGIS** include ArcMap, ArcCatalog, and ArcToolbox; however, the other platforms that are included in ArcGIS for Desktop are ArcScene and ArcGlobe which both enable 3D data viewing and manipulation.
4. **Differentiate between ArcMap and ArcGlobe**
ArcMap is the main mapping application that allows the creation of maps and query attributes. It also analyses spatial relationships and layout of the final projects. ArcGlobe is part of the ArcGIS 3D analyst extension and is generally designed to be used with very large datasets.



Networking and Internet Fundamentals

Introduction

The term network is generally described as a system or group of interconnected objects or people. A computer network is therefore a set of interconnected computing nodes which communicate with one another through a transmission medium using a set of rules. A computer network must have sharable resources, a transmission medium, and a set of rules (protocols).

Internet stands for International Network. It is a worldwide network of computers connecting millions of computer networks through a combination of public and private communication lines such as telephone lines, wireless connection and fibre optic. Several devices and protocols are required in networking and Internet connectivity.

8.1 Content Map for the Unit

Unit 8	Network and Internet fundamentals
Topic Area	Computer Network and Data Communication
Number of periods	8 + Homework
Classroom organization	<ul style="list-style-type: none"> • Whole class orientation then work in groups. • Individual work activities.
Equipment required	<ul style="list-style-type: none"> • Computers, Servers, radio waves, Internet connectivity, routers, switches, transmission data cables, projector and the Students course book.
Activities	<ul style="list-style-type: none"> • Practical activities • Field trips • Discussions • Watching educative video
Competences practice	<ul style="list-style-type: none"> • Team work • Leadership skills • Communication skills • Practical skills • Manipulation skills

Language competences practice	<ul style="list-style-type: none"> • Defining • Explaining • Group discussions • Reporting • Communicating • Practical • Writing • Presenting
Vocabulary acquisition (Key terms to be introduced and explained to the student)	<ul style="list-style-type: none"> • Computer network • WWW • ISP • E-mail • Internet • URL • Web pages • Username
Numeracy	<ul style="list-style-type: none"> • Graphic representations of types of networks. • Deciphering search results which are given in numerics. • Including numerics in a password.
Study skills (including language competences)	Note taking/ writing, practical exercise , organization of ideas, presentation/reporting skills, observation skills.
Revision	<ul style="list-style-type: none"> • The available Learning Activities and the Revision Exercise in the ICT Senior 1 Students' Book.
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work in teams, carrying out activities, assessing whether the objectives are met, continuous assessment tests and oral questions. • A summative evaluation at the end of the unit to examine the extent to which the intended learning objectives have been accomplished.
Learning outcomes	<p>The learner should be able to:</p> <ul style="list-style-type: none"> • Identify, explain, and classify computer networks. • Outline the advantages and disadvantages of computer networks. • Observe and apply the various features of networks and the Internet. • Outline the history and evolution of the Internet. • Appreciate the importance of the Internet. • Appropriately make use of Internet and different Internet equipment.

8.2 Subtopics/Content to be covered

Computer Network concepts: Network and computer network definitions, characteristics, advantages and disadvantages, the role, and classification of computer network.

Internet concepts: Definition of the Internet, the World Wide Web (WWW), web page, web browser, URL, and ISP.

History of the Internet: Use of Internet in daily life, methods or ways to connect to the Internet and getting online connections.

Search engines: Definition, advantages and disadvantages, list of examples of search and deciphering search engines.

Electronic mail (email): Definition, e-mail address, advantages and disadvantages, creation of an e-mail account and uploading and down loading a file from an e-mail.

8.3 Reference: Refer to the ICT for Senior 1, Students' Book, pages 177 to 203.

8.4 Key Unit Competency

By the end of this unit, the learner should be able to understand the rationale of a computer network and use the Internet efficiently and effectively.

8.5 Learning Objectives

Knowledge and understanding

By the end of the unit, the learner should be able to:

- (i) Explain network and computer network terms.
- (ii) Explain the role, and advantages and disadvantages of a computer network.
- (iii) Identify the common types of computer networks according to geographical areas.
- (iv) Define the Internet and world wide web (WWW).
- (v) Identify a webpage, web site, web browser, URL, and ISP.
- (vi) Explain the importance of using the Internet in daily life.
- (vii) Identify different methods used to connect to the Internet.
- (viii) Explain the different types of search engines.
- (ix) Identify and decipher search results on information from the Internet.
- (x) Define and identify the advantage and disadvantages of using email.

Skills to be imparted in this unit:

By the end of the unit, the learner should be able to:

- (i) Describe a computer network, the characteristics of a network, the role, and the advantages and disadvantages of a computer network.
- (ii) Classify a computer network according to geographical areas.
- (iii) Research on the following Internet terms: Internet, World Wide Web (WWW), webpage, website, web browser, URL, and ISP.
- (iv) Apply different methods to connect to the Internet.
- (v) Explore different search engines to perform searches on the Internet.
- (vi) Apply and decipher search results using techniques to filter information from the Internet.
- (vii) Create and manage an email account.

Attitudes and values to be imparted in this unit

By the end of the unit, the learner should be able to:

- (i) Appreciate the importance and power of a computer network and the Internet on daily life.
- (ii) Enjoy improved communication and research by using the Internet efficiently.

8.6 Teacher Preparation

- (i) Create a lesson plan based on the schemes of work.
- (ii) Make notes and demonstration materials before each lesson.
- (iii) Attempt the Learning Activities in Senior 1 Students' book before giving them to the students.
- (iv) Provide different resource materials to cater for the varied abilities of learners.

8.7 Key Concepts to be covered

- **Computer Network concepts:** Network, is generally described as a system or group of interconnected objects or people. A computer network is a set of interconnected computing nodes which communicate with one another through a transmission medium using a set of rules.
- **Internet concepts: Internet stands for International Network:** It is a worldwide network of computers connecting millions of computer networks through a combination of public and private communication lines such as telephone lines, wireless connection and fibre optic.

- **History of the computers:** It refers to the development of the Internet. The root of today's Internet comes from the Advanced Research Projects Agency (ARPANET) which was a branch of the department of defence.
- **Search Engine:** Search Engines are programs that help the user to look for and identify items on the Internet that correspond to keywords or phrases specified from the World Wide Web.
- **Electronic mail (E-mail):** This refers to a system of exchanging messages electronically over a computer network. The user must have an e-mail address in order to use e-mailing services.

8.8 Additional Content for the Teacher

In Networking, two or more computers are electronically linked together for direct communication. Through the network data exchange and information are exchanged.

A simple network can consist of only two computers or electronic devices. A complex network may consist of hundreds or thousands of computers or other electronic devices.

Some sources classify networks into eight types; others classify them into ten types as follows:

- **LAN** - Local Area Network
- **WAN** - Wide Area Network
- **PAN** - Personal Area Network
- **GAN** - Global Area Network
- **CAN** - Campus Area Network
- **WLAN** - Wireless Local Area Network
- **MAN** - Metropolitan Area Network
- **SAN** - Storage Area Network
- **DAN** - Desk Area Network
- **VPN** - Virtual Private Network

1. A **Local Area Network (LAN)** connects computers or the networking devices within a small physical area such small offices, home, cafés and restaurants. In LAN, the devices are connected using wires.
2. A **Wireless Local Area Network (WLAN)** is local area network in which the networked computers or devices are connected using wireless network technology, which is mostly referred as Wireless Fidelity (WiFi). This type of connectivity uses radio signals for communication.
3. A **Wide Area Network (WAN)** connects computers or the networking devices over a wide area. The Internet is an example of a WAN.
4. A **Metropolitan Area Network (MAN)** is similar to but larger than a local area network (LAN). However, it covers an entire city or town. A MAN is formed by connecting several LANs.

5. A **Personal Area Network** covers a small area of about 10 to 15 metres. A PAN supports one person instead of a group. Computers or devices in a Personal Area Networks can be connected with cables, Bluetooth technology, infrared connectivity or Wi-Fi (wireless technology). Bluetooth PANs are also sometimes called piconets.
6. **SAN** can sometimes refer to **System Area Network** or the **Storage Area Network**.
 - A **System Area Network** consists of high performance computers that are used for distributing computer applications that require fast local network performance.
 - A **Storage Area Network** is used for data management.
7. A **Global area network (GAN)** refers to a network that is composed of different interconnected Wide Area networks (WANs). A GAN covers an unlimited geographical area. It uses the global satellite Internet network for connectivity.
8. A **Desk Area Network (DAN)** consists of interconnected computer devices. A DAN allows the exchange of information between various computer peripherals and the CPU. DAN enables the network to share resources over the network.
9. A **Campus Area Network (CAN)** consists of computers and devices in a geographical locality such as a university campus, a school or a military base. It could be taken as the Metropolitan Area Network that has the specific settings covering a small area just such as a computer lab in the university or senior school.
10. A **Virtual Private Network (VPN)** uses a public telecommunication system to allow connectivity. An employee working in a remote site could, for example, get connected to his or organization's network through VPN. The VPN provides the organization and the remote user with connectivity at a low cost. The only challenge is ensuring the security of data exchange.

8.9 Suggested Learning Materials

Computers, Servers, radio waves, Internet connectivity, routers, switches, transmission data cables, projector and text books.

8.10 Suggested Low Cost or No Cost Materials

- Free tutorials on identified websites but always establish the authenticity of the website to avoid downloading infected files.
- Ask learners to bring any learning materials they would want to share, for example, routers, switches, and data transmission cables among others.
- Visit neighbouring schools and request access to their resources.
- Demonstrate types of network using the available equipment in the school.

8.11 Suggested Teaching Methods

- Discussion
- Practical work
- Question-and-answer method
- Educational visit (Field visit)
- Demonstration
- Explanation

8.12 Suggested Teaching and Learning Activities and Exercises to Support Delivery of Content and Development of Student Competences

- Class discussion on networks and the Internet.
- Group discussion on networks and the Internet.
- Students to share their experiences about networks and the Internet.
- Listening to audio lessons and watching relevant video clips on networks and the Internet.
- Invite resource persons from Internet Service Providers and computer engineering organisations to give talks.
- Question-and-answer method during discussion on the networks and the Internet.
- An essay writing competition on the networks and the Internet.

8.13 Cross-Cutting Issues to be integrated in Teaching and Learning Activities

- Sensitise the students on the use of social media platforms. Let them appreciate both the positives and the negatives of these networks.
- Remind them the importance of vetting their own posts before sharing them on networks. Potential employers are now evaluating people's social media history as part of the interview.
- Sensitise them not to share personal details or even pictures with strangers that they meet online. Some could be perpetrators of sexual abuse.

8.14 Suggestions for accommodating Special Education Needs (SEN)

The teacher should identify learners with special needs and help them to cope during the teaching learning activities.

Type of impairment	Support for the learner
Sensory impairment (visual)	<ul style="list-style-type: none">• Teacher to allow learners to sit close to the board.• Learners with impairment should sit next to learners with good vision to get assistance where necessary.

Sensory impairment (hearing)	<ul style="list-style-type: none"> • Teacher should speak loudly to be audible to the affected learners. • Allow the learners to sit close to the teacher.
Motor impairment (Movement)	<ul style="list-style-type: none"> • Carry out activities in one place without involving unnecessary movements.
Gifted or talented learners	<ul style="list-style-type: none"> • Assign learners extra and more challenging work. • Encourage fast learners to assist the slow learners.

8.15 Suggestions for Supporting Multi-Ability Learning

Fast learners	<ul style="list-style-type: none"> • Request them to sit next to slow learners to get assistance. • Give them extra tasks to perform.
Slow learners	<ul style="list-style-type: none"> • Remedial teaching. • Take time to go over the procedure and use the language the learners will understand. • Use other learners to assist them to do the task.

8.16 Support to Learning Activities

Individual work, pair work, group work and whole class work.

- In groups, learners to practise on network connectivity.
- The learners to assist each other to create e-mail accounts, and send/receive e-mail messages.
- As individuals, let the learners attempt the questions under Learning Activities, as well as the Revision Exercise in the ICT Students' Book for Senior 1.

8.17 Support for the Development of Positive Skills, Values and Attitudes

Some life skills to develop include problem solving, decision making, effective communication and creative thinking. Some values to be developed include responsibility, appreciation, respect, cooperation, and curiosity.

- Attitude of cooperation is developed through working in groups.
- Develop curiosity by letting the learners discover how to access and make use of new library information from the Internet.
- Have desire to explore other uses of the Internet other than communication, especially in banking and other business sectors.
- Develop responsibility and respect, especially where ethical issues are concerned about abuse of the Internet. Sensitise learners on using the Internet appropriately.

8.18 Support to Suggested Formative and Summative assessment

- Assignments, Learning Activities, and Questions under the Revision Exercise in ICT Students' Book for Senior 1.
- Oral questions.
- Continuous Assessment Tests (CATs)
- Random Assessment Tests (RATs)
- End of term examination.

8.19 Links to other subjects

- Physics, Business, Geography, Biology and Chemistry among others in the applications of networks and the Internet.
- Development of life skills through Internet research.
- The Internet has been labelled the Virtual University. Through online search and watching educative video clips, one could get answers to any arising questions.

8.20 Additional Remedial, Consolidation and Extension Activities

1. Identify **three** ways of classifying computer networks.
2. Differentiate between intranet and extranet.
3. Highlight **four** problems of using the Internet.
4. Joseph's computer was working properly at the beginning. He then started experiencing some problems. The computer became slow. He also started losing some documents after using the Internet. Explain what might have happened to his computer.
5. The following is a list of equipment that is necessary in networking. Explain what they are and how they are used.

(a) Bridges	(b) Modem
(c) Routers	(d) Hub

8.21 A Sample Lesson Plan: See Appendix 1, pages 151 to 178.

8.22 Answers to the Questions and Learning Activities in the Students' Book

Learning Activity 8.1 (Refer to the Students' Book, page 184)

Part 1: This part could be done as individual work.

Give this as a CAT. Mark and review it in class.

1. A **Network** is described as a system or group of interconnected objects or people.
2. A **Computer Network** is a set of interconnected computers which communicate with one another through a transmission medium using a set of rules. The nodes share resources and services.
3. A set of rules that allow communication between two or network devices is referred to as **protocol**.
4. A computer connected to a network is referred to as **workstation** while the one that is not connected is a **standalone**.
5. **LAN** is a network covering a small geographical area while **MAN** covers a town or a city.
6. The advantages of a computer network are:
 - (a) Resource sharing
 - (b) Speed/ fast means of transferring files
 - (c) Communication/ exchange of information
 - (d) Work group computing
 - (e) Increased memory storage
 - (f) Security measures
8. Apart from LAN and MAN, other examples of computer networks as classified according to geographical area are: (i) PAN; (ii) WAN; (iii) HAN; (iv) CAN; and (v) SAN

Part 2: This part could be done in pairs.

Students could then compare their answers in class.

1. **Distinguish between a LAN and a WAN**

LAN	WAN
• Covers a small geographical area	• Covers a very large geographical area
• Transmits data at high speed	• Transmits data at lower speed
• Less transmission costs	• High transmission costs

2. **Give three resources that are shared in a computer network.**

Hardware; Software; and Data.

3. **What are disadvantages of a computer network?**

- Expensive to install and maintain
- Failure of the server and hardware

- Spread of computer viruses
- Insecurity of information

Part 3: This part could be done as class work or in groups:

- To find out the type of network in their school and the neighbouring institutions, the teacher could organize class visits in the school and to neighbouring institutions.
- Let the learners work also in groups. They should find out the type of network in their school and the neighbouring institutions. Let them research and then prepare a presentation to share with the class. Give guidance where necessary.

Learning Activity 8.2 (Refer to the Students' Book, page 185)

Part 1: This part could be done as individual work.

Give this as a CAT. Mark and review it in class.

1. **Define the term Internet as used in computer.**

Internet stands for International Network. It is a worldwide network of computers connecting millions of computer networks communication media such as telephone lines, wireless connection and fibre optic.

2. **ISP:** It is an abbreviation for **Internet Service Provider**. ISP is a licensed organization or company that provides access to the Internet usually at a fee.
3. **WWW:** It is commonly referred to as the Web is the abbreviation for **World Wide Web**.

WWW refers to a large virtual space of the Internet where information pages called web pages are installed. The web pages can be accessed using a web browser.

4. **URL:** It is an abbreviation for Uniform [or Universal] Resource Locator. A website address is commonly known as **URL**.

It is a unique address of each web page in a websites, which identifies the location of a specific web page on the Internet.

5. **Differentiate between a web page and website as used in the Internet.**

A webpage is a hypertext and hypermedia documents containing information about an individual or organization while a website is a collection of related web pages stored as a single file in a web server.

6. Briefly explain the term “web browser”. A **Web browser** is commonly referred to as a browser. This is a program used for displaying and viewing web pages on the World Wide Web (WWW).

Part 2: This part could be done in groups of five.

Learners could work in groups. They are expected to explore the Internet. Find out the URLs of:

- (i) Their school
- (ii) The Rwanda Education Board
- (iii) Other institutions of their choice

Let them prepare a presentation and share it in class.

Learning Activity 8.3 (Refer to the Students' Book, page 192)

Part 1

This part could be done as individual work. Give it as a take home CAT. Let the students hand in their completed papers in a week for marking.

1. **Give a brief description of the Internet history. (Points to assess include the following:)**
 - The root of today's Internet came from visionary people in 1960s for the purpose of information and research sharing.
 - In 1962 packet switching was developed and it formed the basis of the Internet connection.
 - The **Advanced Research Projects Agency (ARPANET)**, which was a branch of the department of defence was the first known fully operational packet-switching network.
 - In 1990, Lee started working on a hypertext graphical user interface browser and editor.
 - By 1991 the first World Wide Web (WWW) was set up. Later in 1998 Google search engine was born changing how users engaged with the Internet.
 - Today Internet is everywhere, enabling people to communicate and share interests using social media sites such as Facebook, Twitter, LinkedIn, YouTube, blogs, wikis, and many more.
2. **Explain the application of the Internet in the following areas:**
 - (a) **Communication:** Through electronic mails (e-mails), social sites, chat rooms and newsgroups, people can easily exchange information all over the world.
 - (b) **Research:** People use the Internet to get information on various topics.

- (c) **Education:** Internet is used in various ways, including distant education or online education, Internet- or Web-based training. It can also be used to take up short-term courses with the course materials available online, attend virtual classes, learn and take examinations.

2. **Explain two ways in which one can get connected to the Internet.**

Connecting to the Internet can be done using the following ways:

- **Dial up:** It involves connecting a computer to an Internet Service Provider (ISP) by use of a modem and telephone line such as a Subscriber Identity/ Identification Module (SIM) card, only when accessing the Internet.

The connection is terminated once the user logs out from the Internet. Dial-up Internet connection is mostly used in rural or remote areas where broadband Internet access is not available.

However, dial up Internet is potentially approaching extinction because of the advancements in wireless technology.

- **Broadband:** This is a high capacity transmission technique that uses a wide range of frequencies to enable a large number of messages to be communicated simultaneously.

Some examples of broadband are Wi-Fi , 4G and satellite among others.

- **Wi-Fi:** It stands for Wireless Fidelity. It is a wireless networking technology that uses radio waves to provide high-speed Internet and networking connections.

Examples of WiFi enabled devices includes laptops, cell phones, tablets, iPads, and peripheral devices such as printers and keyboards among others. They communicate with a single computer which is fitted with a Wi-Fi adapter.

3. **Explain three basic parts of a web browser.**

The following are basic parts of a browser window:

- (a) **Menu bar:** It consists a list of menus to choose from, for example, File, Edit, View, Tools and Help.
- (b) **Control buttons:** These buttons are found on right side of the title bar of the search engine and include minimise, restore, maximise and close.
- **Minimize:** It removes a search engine from a view to an icon on the task bar.
 - **Restore:** It reduces the size of a search engine window.
 - **Maximize:** It enlarges the search engine window and fills the screen.
 - **Close:** It exits the active window.

- (c) **Address bar:** This is where the web site address (or name) is typed so as to go to the website page. An example of a web site address is **www.techrwanda.com**. (Learners may give other examples.)
- (d) **Search Text box:** This is where keywords or search query are typed to describe the information that one wants to find.

4. **State the three main parts of a website address.**

- Protocol
- Server name and
- Resource ID

Part 2

Let the learners work in groups. They are expected to explore the Internet connection in their school. They should:

- (i) Identify the method of connection.
- (i) Find out the web address of the school
- (ii) Write the domain of the school.

Let them prepare a presentation and share it in class.

Learning Activity 8.4 (Refer to the Students' Book, page 195)

Part 1

This part could be done as individual work. Give it as a take home CAT. Let the students hand in their completed papers in a week for marking.

1. The interconnectivity of networks is known as the **Internet**.
2. A host computer is also known as the **server**.
3. A **website** is a collection of web pages stored as a single file in a web server.
4. Hypertext and hypermedia documents containing information about an individual or an organization is called a **web page**.
5. A computer that stores hypertext and hypermedia documents is known as a **web Server**.
6. The **World Wide Web** is a large virtual space of the internet where information pages called web pages are installed.
7. A website address is commonly known as the **Uniform Resource Locator (URL)**.

Part 2: Students could work in pairs

1. **Distinguish between network and internet.**

Network is a group of interconnected objects or people while internet is an interconnectivity of networks.

2. **What are the uses of internet?**

- Allows sharing of resource
- Used in communication
- Provide increased storage capacity
- Entertainment
- Provision of security

3. The URL is an abbreviation for **Uniform Resource Locator**. A website address is commonly known as **URL**. It is a unique address of each web page in a websites which identifies the location of a specific web page on the Internet.

- The URL consists of three parts namely; **protocol, server name** and **resource ID**.

4. An example of URL is **http://www.techrwanda.com**

5. **Define the term search engine.**

Search Engines are programs that help a user to look for and identify items that corresponds to keywords or phrases specified from the World Wide Web.

The following are some examples of search engines:

- | | | |
|------------------|--------------------|---------------|
| (a) Google | (b) Google scholar | (c) Yahoo! |
| (d) Bing | (e) Ask.com | (f) Wikipedia |
| (g) WiseGeek.com | | |

6. A web browser is a program that is used for displaying and viewing web pages on the World Wide Web (WWW).

7. Examples of web browsers are Mosaic, Netscape Navigator, Internet Explorer, Mozilla Firefox, Opera Mini, and Google Chrome among others.

8. Wi-fi stands for Wireless Fidelity. This is a wireless networking technology that uses radio waves to provide high-speed Internet and networking connections. Examples of Wi-Fi enabled devices includes laptops, cell phones, tablets, iPads, and peripheral devices such as the mouse, printers and keyboards among others.

9. **State two advantages of using a search engine.**

- They provide precise results.
- They have indexes representing important parts of the Internet which offer a wide range of information resources.
- They enable users to describe the information being searched.
- They enable users to locate and access information in different websites.
- They reduce the time taken to locate desired information.

- They provide a wealth of information for professional and personal use.

10. **State two disadvantages of search engines**

- Tiresome and complex to search if the keyword typed is ambiguous. The user may get discouraged and frustrated because of the many links he or she has to search before getting the correct information.
- A lot of irrelevant information gets displayed after typing a keyword.
- A lot of distractions from advertisements that keep popping up.
- A link to sites containing viruses could be displayed as a search result.

Part 3: Students could work in groups of five

Let the learners work in groups of five. They are expected to search for information on the topic of social media platform. You could then have a lively debate as a class on the issues raised at the group level.

Part 4: Students could work in groups of five

Let the learners work in groups. They are expected to search for information on the following topics and do brief write-ups.

- (i) The harmful effects of drugs and substance abuse
- (ii) The importance of conserving the environment
- (iii) The dangers of engaging in premarital sex
- (iv) The importance of maintaining peace in a country

Let them prepare write-ups and hand them in for your assessment. Plan for a session when the topics could be reviewed in class. Open the discussion and encourage the learners to contribute. Take the opportunity to counsel them on the importance of making responsible decisions in life.

Learning Activity 8.5 (Refer to the Students' Book, page 205)

Part 1

This part could be done as individual work. Give it as a CAT. Let the students hand in their completed papers for marking.

1. **Define the following terms:**

- (a) **E-mail:** refers to a system of exchanging messages electronically over a computer network.
- (b) **Hyperlink:** It is a form of hypertext that provides a link to other webpages in a website.

(c) **Password:** It is a string of characters entered to log in or sign in so as to allow one get authentication.

2. **State three advantages of using an e-mail.**

- It allows sending of one mail to many recipients at the same time.
- It is cheaper compared to traditional mails.
- It is convenient since it allows sending and receiving mails from anywhere in the world.
- E-mails can be saved for future retrieval.
- It is easier to reply and forward mails.
- E-mails provide more security of messages since to access an e-mail the account owner must provide the password.
- Allows sending and receiving of any form of information including images, and video and audio clips.

2. **Define the term downloading.**

Downloading is the process of getting information from the Internet to a local storage media such as the computer.

3. **What is the role of an address book in an e-mail.**

It is an online contact manager used to store all contact information and it makes it easy to keep track of names, e-mail addresses, phone numbers, fax numbers and a lot more.

4. **State three characteristics of a strong password.**

- A strong password should have a minimum of 8 characters.
- It should be a mixture of both letters, numbers, and if possible symbols.
- Passwords are case sensitive. A secure password should contain a combination of lower and upper cases, numbers and characters.

Part 2: Students could work in groups of five

Let the learners work in groups. They are expected to:

1. Create email accounts.
2. Exchange emails amongst themselves.
3. Search the Internet for information on the effects of Internet on Rwanda's economy.

Do a brief write-up.

Give guidance. Encourage them to ask questions. Visit them in their groups and assess the progress they are making.

Revision Exercise 8 (Refer to the Students' Book, page 205)

Administer this Revision Exercise as a test. Mark and review it in class.

1. **Email** is a system of exchanging messages electronically over a computer networks.
2. The format of an e-mail address has the following items:
 - **Username:** It identifies the owner of the e-mail address
 - **@ (at sign):** Separates the user name from the rest of the address parts
 - **Host computer:** The name of the remote server on which the e-mail account is hosted. For example Yahoo, Hotmail among others
 - **. (dot):** Separates the domain from the other part of the e-mail address
 - **Domain name:** It identifies the type of institution offering the services.
3. **Composing** is the process of creating a new mail.
4. Cc is short for **Carbon Copy** while Bcc is short for **Blind Carbon Copy**.
5. Examples of programs that enable a user to compose, send, achieve, receive, format and forward emails are Yahoo! Google Chrome, and Outlook.
6. **State some challenges of using an email.**
 - Requires some computer literacy to use.
 - Security of messages may not be guaranteed due to hacking or cracking.
 - E-mails are not accessible to everyone due to Internet connectivity problems.
 - Expensive to set up.
 - Allows spread of viruses such as hoax.
7. **Explain the different parts of an email address.**
 - **Username:** It identifies the owner of the e-mail address.
 - **@ (at sign):** Separates the username from the rest of the address parts.
 - **hostcomputer:** The name of the remote server on which the e-mail account is hosted. For example gmail, yahoo and hotmail among others.
 - **. (dot):** Separates the domain from the other part of the e-mail address.
 - **Domain name:** It identifies the type of institution offering the services.
8. **Differentiate between BCC and CC.**

To send the same message to a number of people one can use Cc or Bcc. When one uses Cc (Carbon copy), the list of all the recipients appears in each recipient's mail. He or she is able to tell who else received the email. When one uses Bcc (Blind Carbon Copy), the list of all the recipients is hidden from the other recipients' of the mail. The recipient is not able to tell who else received the email.

9. Advantages of email over traditional mail: Fast (instant). The message is received seconds after being sent. One can attach video clips, music clips and heavy images. One can also easily attach a long document such as an ebook. Emails are affordable as one only requires Internet connection.

8.23 Teacher Support on Assessment: Additional Questions and Answers

1. State three characteristics of a computer network. (Pair work.)
 - **Resource sharing:** A network must allow exchange of files, hardware and software from one computer to another.
 - **Security:** A network must provide protection for data from unauthorised access, manipulation and implement policies and procedures for recovery from data losses.
 - **Reliability:** A computer network should work consistently to perform according to its requirement.
2. Explain two advantages of a computer network. (Pair work.)
 - **Resource sharing:** A computer network allows sharing of resources such as printers among the users in a network thus eliminating the need to have individual printers for each computer. This reduces the cost of purchasing and maintaining these resources.
 - **Speed:** A computer network provides a very fast means of sharing and transferring files thus saving time while maintaining file integrity.
 - **Communication:** A computer network provides the hardware necessary for exchanging information between the users in the network. For example, the use of e-mails.
 - **Work group computing:** Many users in different geographical locations can work on a document or a project at the same time using workgroup software and hardware thus saving time and travelling expenses.
 - **Security:** A computer network allows administrators to manage critical data by regularly backing up and implementing security measures to control access to critical information.
 - **Increased storage capacity:** Many computers in a network provide a lot of memory that can be shared among the computers to increase the overall storage capacity.
 - **Entertainment:** A computer network supports multi-player computer games and entertainment.

3. State two disadvantages of a computer network. (Pair work.)

- **Expensive to install and maintain:** High costs are involved in installing and maintaining the network, for example, the cost of cables, file servers, software and technical support services among others.
- **Failure of the server and hardware:** Malfunctioning of a node or a broken cable may terminate the functioning of the entire network.
- **Insecurity of information:** Shared information in a network is exposed to hacking, cracking and eavesdropping among others.
- **Spread of computer viruses:** Viruses can easily spread to other computers throughout a computer network.

4. Classify computer networks according to geographical area. (Individual work.)

- Personal Area Network (PAN)
- Local Area Network (LAN)
- Metropolitan Area Network (MAN)
- Wide Area Network (WAN)

5. Differentiate between LAN and WAN. (Pair work.)

Local Area Network	Wide area Network
<ul style="list-style-type: none"> • Covers a small geographical area. 	<ul style="list-style-type: none"> • Covers a very large geographical area usually worldwide.
<ul style="list-style-type: none"> • Transmits data at high speeds (higher bandwidth) because of the small distance covered. 	<ul style="list-style-type: none"> • Transmits data at lower speeds (lower bandwidth) because of the very large distance covered.
<ul style="list-style-type: none"> • Less transmission costs because it is managed within an organization. 	<ul style="list-style-type: none"> • High transmission costs because it is managed by other organizations such as satellite and telephone companies.

6. Explain Wi-Fi as an Internet connectivity method. (Pair work.)

Wi-Fi stands for **Wireless Fidelity**. It is a wireless networking technology that uses radio waves to provide high-speed Internet and networking connections. Examples of Wi-Fi enabled devices includes laptops, cell phones, tablets, iPads, and peripheral devices such as printers and keyboards among others. They communicate with a single computer which is fitted with a Wi-Fi adapter.



Music Sprite Programming

Introduction

Scratch is a free desktop and online programming language that allows creation of interactive projects such as games, animations, music and stories that can be shared around the world. It allows the use of event-driven programming with multiple active objects called sprites.

Sprites can be created by the user in the paint editor that is part of the Scratch program or can be imported from external sources. Scratch program was developed and is maintained by the *Lifelong Kindergarten group* at the Massachusetts Institute of Technology is used in this topic to create projects.

9.1 Content Map for the Unit

Unit 9:	Music Sprite programming
Topic Area	Programming (Scratch)
Number of periods	10 + Home Work
Introduction	Music Sprite programming
Classroom organization	<ul style="list-style-type: none"> • Whole class orientation then work in groups. • Individual activities.
Equipment required	<ul style="list-style-type: none"> • Computer Laboratory, Scratch editor, Audacity software, Internet connection, digital material, projector.
Activities	<ul style="list-style-type: none"> • Practical activities and discussions.
Competences practised	<ul style="list-style-type: none"> • Team work, research, communication and practical skills.
Language competences practice	<ul style="list-style-type: none"> • Defining • Explaining • Writing • Communicating • Group discussions • Reporting
Numeracy	<ul style="list-style-type: none"> • Programming/logic

Vocabulary acquisition (Key terms to be introduced and explained to the student)	<ul style="list-style-type: none"> • Sprite • Project • List • Menu • Stop button • Script • Animation • Online • Thumbnail • Block • Costume • Offline • Script area
Study skills (including language competences)	<ul style="list-style-type: none"> • Note taking/ writing notes. • Organization of ideas. • Watching video lessons. • Presentation/ Reporting skills • Observation skills
Revision	<ul style="list-style-type: none"> • The following are the available: Learning Activities and revision questions in the ICT Senior 1 Students' Book.
Assessment	<ul style="list-style-type: none"> • A formative assessment of the ability to work individually and in groups, carrying out projects or practical activities, answer oral questions and continuous assessment tests. • A summative evaluation at the end of the unit to examine the understanding of all the concepts.
Learning outcomes	<p>The learner should be able to:</p> <ul style="list-style-type: none"> • Create a music Sprite. • Describe, associate, and apply different components of the scratch editor to create a sound clip and song. • Explain how ICT has contributed to real life especially in the field of music and entertainment.

9.2 Subtopics/Content to be Covered

Create/import sprite

- Create a new sprite or import the existing image.
- Use combo blocks to play sounds.
- Choose the Sprite especially from those from the **Things** folder.
- Manipulation of variables to program switch on and switch off.
- Manipulation of: change switch by, set switch to, forever, forever ... if.

Create a tune using the Sound Tool Kit

- To add a music script to a sprite: using play sound/play sound... until, play drum, rest for, set instrument, play note, set volume to, change volume by, etc.
- Create a Sound Clip using Audacity.
- Creating a song using Sound Tool Kit.

9.3 Reference: Refer to the ICT Senior 1 Students' Book, pages 206 to 237.

9.4 Key Unit Competency

By the end of this unit, the learner should be able to create a music sprite and add music with Scratch and Audacity.

9.5 Learning Objectives

Knowledge and understanding

By the end of the unit, the learner should be able to:

- (i) Associate different commands to develop music.
- (ii) Identify different tools in scratch that enable us to produce a melody.
- (iii) Apply scratch instructions to switch on/off music.
- (iv) Describe and apply different components of a scratch window to create a sound clip using Audacity.

Skills to be imparted in this unit

By the end of the unit, the learner should be able to:

- (i) Create a music sprite.
- (ii) Move the music loop to the music sprite.
- (iii) Turning music on and off.
- (iv) Create a tune/melody using the sound tool kit.
- (v) Create a sound clip using Audacity.

Attitudes and values to be developed in this unit

By the end of the unit, the learner should be able to:

- (i) Conceptualise the ICT contribution to real life, especially in the field of music.
- (ii) Express the desire to produce more melodies using scratch commands.
- (iii) Pay attention on how to use commands and to produce music.
- (iv) Be proud to arrange commands and produce a melody/music.

9.6 Teacher Preparation

- (i) Create a lesson plan based on the schemes of work.
- (ii) Make notes and prepare practical tasks before each lesson.
- (iii) Attempt the assignments, the learning activity, and the Revision Exercise in ICT Students' Book for Senior 1 before giving them to the students.

9.7 Key Concepts to be covered

- Scratch is a free desktop and online programming language that allows creation of interactive games, animations, music and stories that can be shared around the world.
- Scratch allows the use of event-driven programming with multiple active objects called sprites.
- The four main areas in Scratch 2.0 user interface are stage area, sprite list area, scripts tab and scripts area.
- A combination of single sprite blocks forms combo sprite blocks.
- The three types of variables in Scratch 2.0 are local (private), global (public) and cloud.
- Audacity is a free, open source software that can be used to create Scratch sound clips or songs.

9.8 Additional Content for the Teacher

Stage backdrop

- A backdrop is created using the same procedure as creating a new sprite, that is, backdrop from the library, paint new backdrop, upload backdrop from file and add new backdrop from camera.
- Adding a backdrop creates **Backdrops** tab that contains built-in events.

Example

- (i) Create a project named **cars** on the desktop.
- (ii) Open the Backdrop Library and select **berkeley mural** backdrop.
- (iii) Under **City** in the **Sprite library** select **Convertible1**, **Convertible2** and **Convertible3**.
- (iv) Open the Sound Library and select **Car passing**.
- (v) For each sprite, create a script that will **move 2 steps, if on edge, bounce, set rotation style left-right, and play sound car passing**.

Solution



9.9 Suggested Teaching and Learning Materials

- Computers installed with Scratch and Audacity software.
- Internet connection.
- Digital material.
- Projector.
- ICT Senior 1 Students' Book and other relevant Textbooks.
- Illustration charts.

9.10 Suggested Low Cost or No Cost Materials

- Free software (Scratch and Audacity) downloads from authentic websites.
- Free Scratch tutorials on identified websites.

9.11 Suggested Teaching Methods

- Discussions
- Demonstrations
- Question-and-answer method
- Use of resource person/ICT expert

- Research/project/practical
- Audio and Video recordings

9.12 Suggested Teaching and Learning Activities and Exercises to Support Delivery of Content and Development of Student Competences

- Class discussion on Scratch user interface.
- Question-and-answer method on different sprite programming concepts.
- Group discussion on creating music sprites.
- Watching online presentations on Scratch projects.
- Inviting resource persons to provide talks on application of Sprite programming concepts.

9.13 Cross-Cutting Issues to be integrated in Teaching and Learning Activities

Drug and substance abuse

- Drug and substance abuse refers to the use of chemical substances that lead to inability to control the use of the substance.
- Examples of drugs and substances abused include alcohol, nicotine, heroine, cocaine and cannabis among other harmful substances.
- These substances cause the user to suffer negative physical or health effects. It may lead to one engaging in other harmful habits such as pre-marital sex.
- Drug abuse in secondary schools and other learning institutions has become a concern, especially among the youth.
- Learners who engage in drug and substance abuse may become addicted. It is advisable to avoid drugs because it is much easier and safer than managing and dealing with the effects.

The following are some of the measures one can take to avoid this harmful habit:

- (i) **Engage in positive leisure activities:** Engage in hobbies and other interest areas that do not involve use of alcohol and other harmful substances.
- (ii) **Understand how to manage stress:** Do not use drugs and other harmful substances as a way of dealing with emotional distress. These substances give the user a false impression that their problem is solved and this may lead to addiction.
- (iii) **Choose friends wisely and overcome peer pressure:** Hang out with friends who do not engage in drug abuse. Avoid situations where those attending are likely to engage in harmful activities such as smoking and drinking among others.

- Create short health breaks during the lesson. The break could be as short as three to five minutes. Use the break to sensitise students on social issues such as environment, HIV/AIDS, dangers associated with premarital sex, and drug and substance abuse. You could download relevant short video clips and spend a few minutes to engage the students on the message.

9.14 Suggestions for accommodating Special Education Needs (SEN)

The teacher should identify learners with special needs and help them to cope during the teaching/ learning activities.

Type of impairment	Support for the learner
Sensory impairment (visual)	<ul style="list-style-type: none"> • Computers to be set to ensure that students with visual impairment are able to clearly identify the various features in Scratch editor, for example, maximize window, zoom among others. • Grouping students to ensure that those with good vision are paired with the affected learners. In this way they are able to help where necessary.
Sensory impairment (hearing)	<ul style="list-style-type: none"> • Teacher to speak loudly to be audible to the learner. • Allow learners to sit close to the teacher.
Motor impairment	<ul style="list-style-type: none"> • Setting up the computer equipment in a manner that does not require the learner to move unnecessarily.
Gifted or talented learners	<ul style="list-style-type: none"> • Assign learners extra and more challenging tasks. • Encourage peer teaching where the fast learners assist the slow learners.

9.15 Suggestions for Supporting Multi-Ability Learning

Fast learners	<ul style="list-style-type: none"> • Fast learners to assist slow learners. • Assign learners extra and more challenging tasks.
Slow learners	<ul style="list-style-type: none"> • Teacher to take time to go over procedures and use simple language. • Remedial teaching. • Use fast learners to assist them to carry out tasks.

9.16 Support to Learning Activities

Individual work, pair work, group work and whole class work.

9.17 Support for the Development of Positive Skills, Values and Attitudes

Some life skills to develop include critical thinking, creative thinking, effective communication, problem solving and self-esteem. Some values to be developed include responsibility, patience, appreciation, cooperation and curiosity.

- Using the paint editor in Scratch to create sprites and manipulate the sprites with various scripts encourages creativity and critical thinking.
- Creating projects or carrying out practical assignments in groups encourages development of cooperation.
- Carrying out more challenging tasks encourages development of patience, self-esteem, curiosity and allows critical thinking.
- Expressing the desire to carry out tasks develops problem solving skills.

9.18 Support to Suggested Formative and Summative Assessment

- Revision Exercise in ICT Senior 1 Students' Book.
- Oral questions
- Assignments
- Written and practical examinations
- Group and individual presentation
- Project development

9.19 Links to other Subjects: Music: entertainment.

9.20 Additional Remedial, Consolidation and Extension Activities

Group the learners and let them explore the 10 groups of block palettes under Scripts tab and identify the blocks under each group.

The learners should be creative and attempt to create scripts that manipulate different sprites.

9.21 A Sample Lesson Plan:

See Appendix 1, pages 151 to 178.

9.22 Answers to the Questions and Activities in the Students' Book

Learning Activity 9.1 (Refer to Students' Book, page 209) (Pair work)

1. Open Scratch program and click the **Giga** button to choose **Bear1** sprite from library. This sprite has two costumes that can be accessed by clicking the **Costumes** tab. Ensure that bear1-a is selected as shown in figure 9.1(a) below:



Figure 9.1.(a): Part of Costume tab displaying bear1-a costume

2. Delete bear1-a costume, click on Paintbrush button and draw different shapes as desired. Fill the shapes with preferred colours and then zoom to 200%.

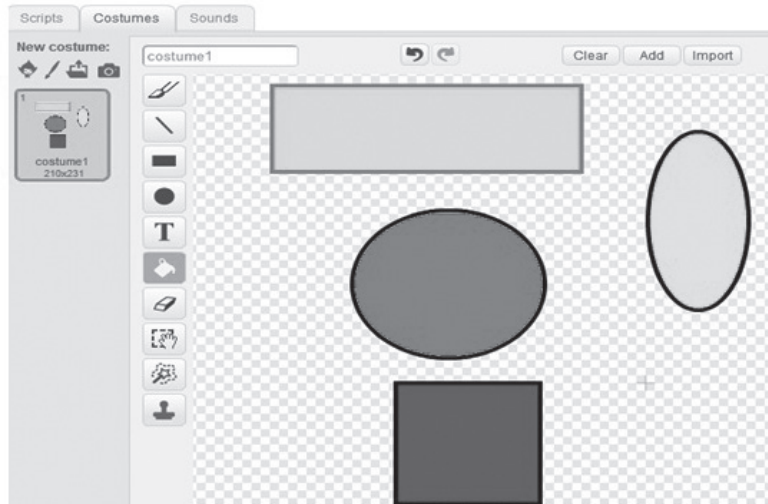


Figure 9.1(b): Part of Costume tab: Shapes filled with different colours and zoomed to 200%

Learning Activity 9.2 (Refer to Students' Book, page 212) (Pair work)

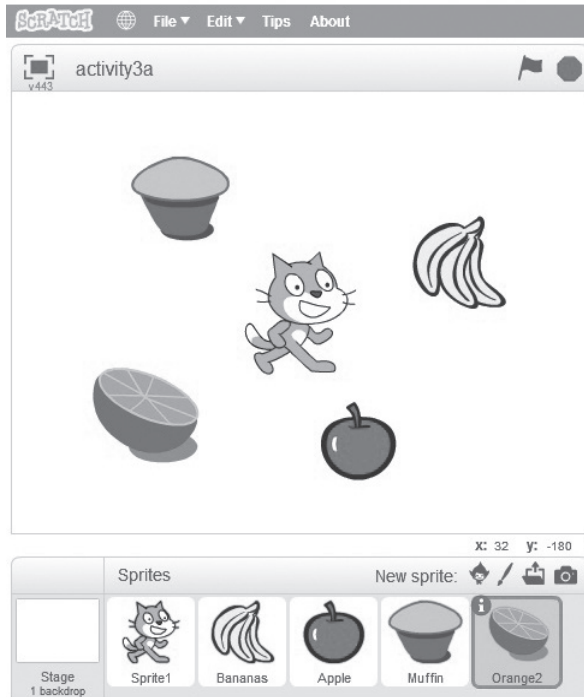


Fig. 9.2(a): Activity 3a

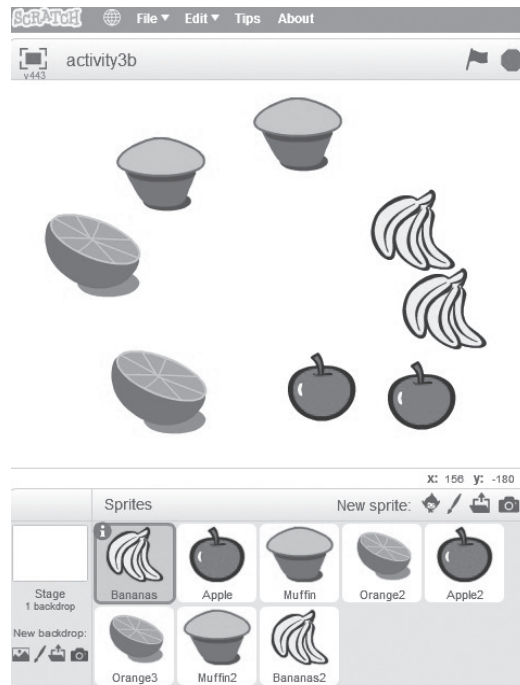


Fig. 9.2(b): Activity 3b

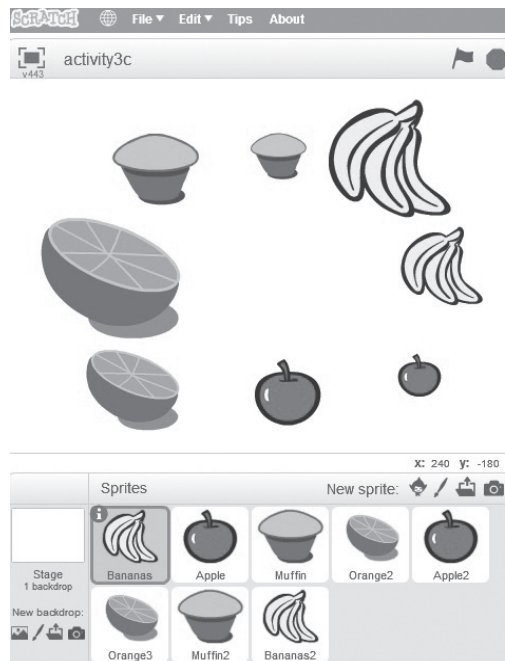




Fig. 9.2(c): Activity 3c

In Activity3c, the duplicates have been manipulated as follows; Orange2 and Bananas have been increased in size using the **Grow** button and Muffin and Apple2 have been reduced in size using **Shrink** button.

Learning Activity 9.3 (Refer to Students' Book, page 220) (Pair work)

- (i) Open **Scratch** program.
- (ii) Paint a new sprite.
- (iii) From the **Drawing** tools, click **Ellipse** tool. Clicking this tool displays hollow mode  and solid mode  ellipses next to the colour palette. Click on **Hollow** mode and draw three circles as shown in figure 9.3(a).

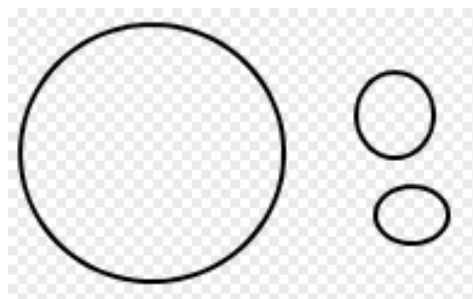



Fig. 9.3(a): Using the Hollow mode

- (iv) Click **Solid** mode and draw a little dark solid circle inside the medium circle to form the eye. Use the **Eraser** tool  from the drawing tools to trim the smallest circle to form the ear the ear as shown in figure 9.3(b).

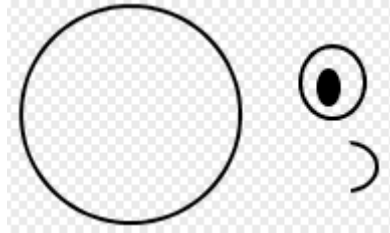



Fig. 9.3(b): Using the Solid mode and Eraser tool

- (v) Use the **Fill** tool  then choose the preferred colour from the colour palette and click on the largest circle to form the face.
- (vi) Click the **Duplicate** tool button, select the eyeball to copy and drag the eyeball copy to make two eyes. Repeat the procedure for the ear to make two ears as shown in figure 9.3(c).

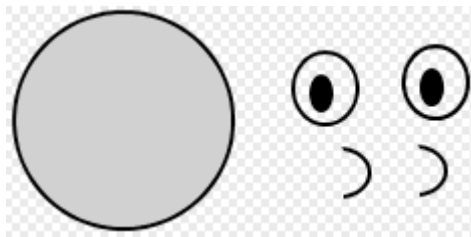


Fig. 9.3(c): Using the Fill and Duplicate tools

- (vii) Use **Select** tool  button to do the following as shown in figure 9.3(d).

- Select and move the eyes to the face. Fill both eyes with white colour by clicking the **Fill** tool; choose the colour from the colour palette and click on the eyeball.

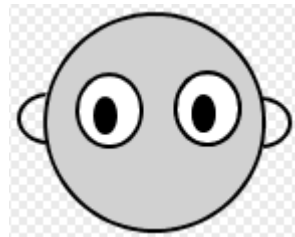





Fig. 9.3(d): Using the Select tool

- Select right ear and drag it to its position.
- Select the left ear and click **Flip** left-right  button to flip it. Drag the right ear to its position.

- (viii) Draw the mouth using the Erase tool , other body parts and the dress using the Line tool . Fill the dress colour using the Fill tool as shown in Figure 9.3(e) shown below.

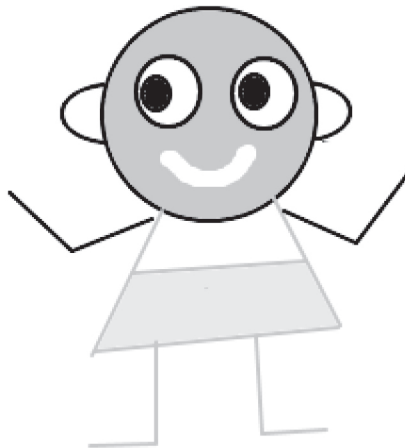
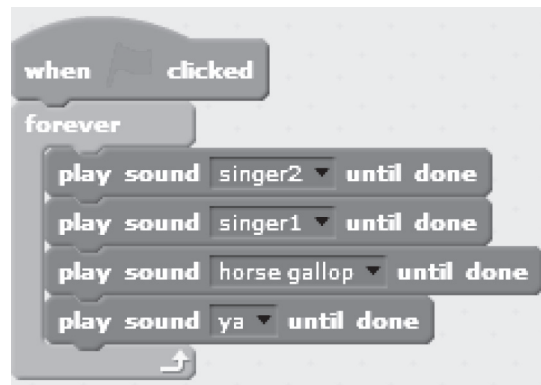


Fig. 9.3(e): Sprite created using Paint Editor

Learning Activity 9.4 (Refer to Students' Book, page 224)

The expected result in this activity is shown below:



Learning Activity 9.5 (Refer to Students' Book, page 233) (Pair work)

- (i) Turn on Rwanda National Anthem using any of the players on the computer. If connected to the internet, play online streaming National Anthem.



Fig. 9.5(a): Online streaming of Rwandan National Anthem

- (ii) Select (Stereo) Recording and Click the Record button to start recording.

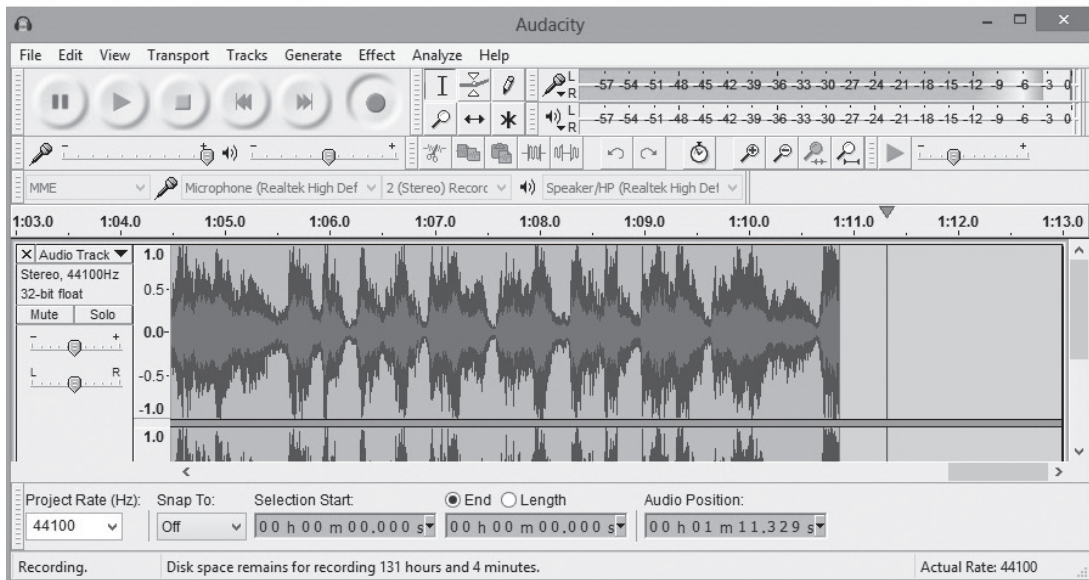


Fig. 9.5(b): Recording using Audacity

(iii) Click Stop button  when through.

(iv) Save the recorded song as Anthem on the desktop.



Fig. 9.5(c): Recorded anthem saved as .wav in Windows Media Player

(v) Click Sounds tab and click Import button to upload sound from file.

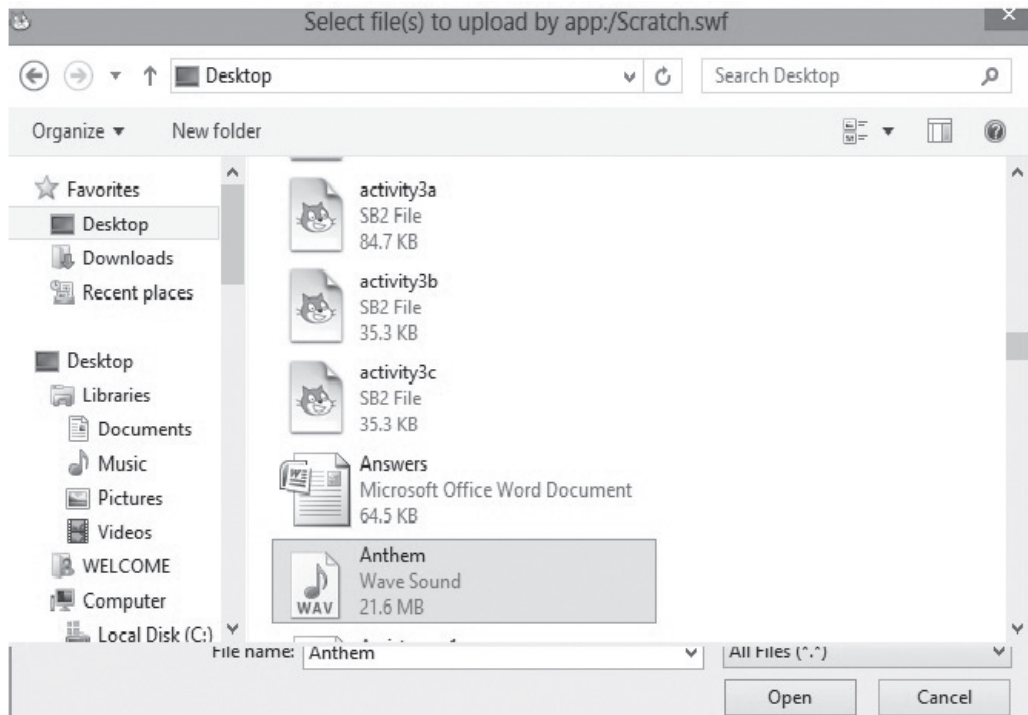


Fig. 9.5(d): Uploading Anthem from Desktop

(vi) Clicking on Open uploads the anthem as shown in Figure 9.5(e) below:



Fig. 9.5(e): Recorded Anthem uploaded under Sounds tab

To import the recorded anthem to a sprite so that it plays until done:

- Click the Scripts tab and then select the Sound toolkit.
- Click on the **play sound Anthem until done** and drag it to the Scripts area.
- Click the block to play until done.

Revision Exercise 9 (Refer to Students' Book, page 237)

Administer this Revision Exercise as a test. Mark and review it in class.

1. Explain the four main areas in Scratch 2.0 user interface.
 - (a) **The Stage area:** This term refers to the area located at the upper left part of the Scratch window and displays the sprite (s) and the results. It contains the View full screen button, project title and two script control buttons, that is, Green Flag and Stop buttons.
 - (b) **Sprite list area:** This is the area located at the bottom left part of the Scratch window and displays sprites as thumbnails.
 - (c) **Scripts tab:** This tab contains the block palettes that are activated by clicking. It is located in the middle of the Scratch window and contains blocks that can be dragged onto the scripts area to make a project.

(d) **Scripts area:** It is located at the right side of the Scratch window and it is where blocks are combined to form scripts which in turn form a project.

2. **Define the following terms as used in Scratch programming.**

(a) **Blocks:** These are shapes that connect to each other and are used to create codes. They determine how sprites interact with each other.

(b) **Script:** This is a collection of connected blocks that perform a task.

(c) **Thumbnails:** These are images of a large documents or graphics that are reduced in size to allow multiple documents or images to be viewed on the screen at the same time.

(d) **Animations:** These are motionless images that appear in a rapid sequence to create the appearance of movement.

(e) **Backdrop :** It is a frame or background of the stage.

3. **Difference between the following terms:**

(a) **Sprites and costumes:** Sprites are objects that can be manipulated through scripts to perform actions in a project while costumes are frames or other appearances of the sprites. Sprites can change their appearance to any of their costumes.

(b) **Variables and lists:** Variable can only store one value at a time whereas lists store multiple pieces of information at once.

(c) **Local Variables and Global Variables.**

- Local variables can only be changed by the sprite that own them but can be read by other sprites, whereas global variables can be read and changed by any sprite in the project.
- Local variables are created by selecting **For this sprite only** option button whereas global variables are created by selecting **For all sprites** option button.

4. **State any four block palettes under the Scripts tab.**

(i) Motion (ii) Looks (iii) Sound

(iv) Pen (v) Data

5. **Identify any four blocks that are found in Sound tool kit.**

(i) Play sound. (ii) Pay sound...until done.

(iii) Stop all sounds (iv) Rest for ...Beats

(v) Change volume by ...

6. Describe how you would change the amount of time Scratch waits between switching costumes.

- (i) Create a new sprite.
- (ii) Select the preferred block from the **Control** blocks, for example,



- (iii) Select **next costume** from the **Looks** blocks.

- (iv) Apply the desired control from the **Control** blocks, for example, **forever** as shown in the Figure below:



Scratch waits for 2 seconds before switching to the next costume

7. Outline the procedure of creating a variable in Scratch 2.0

- (i) Under the **Script Tab** Select **Data** blocks.
- (ii) Click on **Make Variable** button.
- (iii) Under the **New Variable** dialog box, give the desired variable name and specify its scope.

Appendix 1: Sample lesson plan 1

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD /MM/ YY	ICT	Senior 1	1	1 of 7	40 mins	40
Type of Special Educational Needs and number of learners							
Assess your class to establish the number of learners with special needs and make the arrangements to cater for them as necessary.							
Topic area:							
Introduction to ICT							
Sub-topic area:							
ICT Fundamentals							
Unit title							
ICT Foundation.							
Key Unit Competence:							
Explain the foundation of Information and Communication Technology (ICT).							
Title of the lesson							
Data, information, communication.							
Instructional Objectives: By the end of this lesson the learner should be able to:							
<ul style="list-style-type: none"> Knowledge and understanding: Define the term data. Define the term communication. Skills: Explain the different elements of communication. Attitude and values: Appreciate the different devices that use digital and analog data. 							
Plan for this Class (location: in / outside)							
Inside.							
Learning Materials (for all learners)							
<ul style="list-style-type: none"> Computers, ICT Equipment, CDs and DVDs, video player, projector Internet. The ICT for Senior 2 Students' Book pages 1 to 21. 							
Reference							

Steps and Timing	Description of teaching and learning activity		Competences and Cross-Cutting Issues to be addressed
	Teacher's Activities	Learners' Activities	
Introduction: <i>Review of the previous Lesson (if relevant)</i>	<ul style="list-style-type: none"> Ask questions on the previous lesson. 	<ul style="list-style-type: none"> Respond to questions 	<ul style="list-style-type: none"> Discussion on mobile phone Advantages and disadvantages
Do Activity 1 (5 minutes)	<ul style="list-style-type: none"> Introduce the lesson through oral questions data and information, communication. Guide learners to do group discussion. 	<ul style="list-style-type: none"> Answer the oral questions. For example, data are raw facts. Group discussion on factors affecting information. 	
Feedback from Activity 1 (10 minutes)	<ul style="list-style-type: none"> Ask group leaders to report on the discussion done. Through question and answer method help learners to state the factors affecting information. 	<ul style="list-style-type: none"> Group leaders report findings of the group: Possible answers: <ul style="list-style-type: none"> Accuracy Relevance Timeliness Completeness 	
Do Activity 2 (10 minutes)	<ul style="list-style-type: none"> Introduce the cross cutting issue on Advantages and disadvantages of using a mobile phone. 	<ul style="list-style-type: none"> Learners to watch a video clip. 	

<p>Feedback on Activity 2 (10 minutes)</p>	<p>Ask group leaders to report on discussion</p>	<p>Group leaders report: Possible answers:</p> <p>Advantages</p> <ul style="list-style-type: none"> (i) Research (ii) Teaching and learning aid (iii) Convenience (iv) Share information <p>Disadvantages</p> <ul style="list-style-type: none"> (i) Interruptions (ii) Theft (iii) Cheating 	<p>Advantages and disadvantages of using a mobile phone</p>
<p>Summarise lesson and lead into next lesson (5 minutes)</p>	<p>Conclusion:</p> <ul style="list-style-type: none"> • Draw the summary of the findings from the group discussions. • Ask oral questions on the main points. <ul style="list-style-type: none"> (i) Data (ii) Information (iii) communication 	<ul style="list-style-type: none"> • Copy the summary in their note books. • Answer the oral questions. • Think about question for next lesson. 	
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Self-Assessment

A good teacher will always assess him/herself. As you assess each learner's progress, assess your teaching performance.

Ask yourself the following questions:

- Were the learners interested in the topic I presented?
- Was the topic applicable in their day-to-day life? Did they identify with the teaching and learning experience?
- For how long did I talk during the lesson?
- For how long did I allow the learners to talk?
- Did I ask the learners relevant questions?
- Did I listen keenly to their responses?
- Did I use appropriate teaching aids?
- Did the teaching aids arouse curiosity and stir interest in the learners?
- What teaching and learning activities did I present to the learners?
- Did the teaching and learning activities support multi-ability learning?
- Were the activities varied?
- What teaching and learning resources did I use? Were they relevant, affordable and familiar to the learners?
- Did I take care of learners with special learning difficulties or special educational needs (SENs)?
- Did I evaluate the learners appropriately and adequately?
- How can I do better in the next lesson?

Being critical of your performance will help you improve your teaching in the subsequent lessons.

Sample lesson plan 2

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD /MM/YY	ICT	Senior 1	3	of	40 mins	40
Type of Special Educational Needs and number of learners							
Topic area: Introduction to ICT							
Sub-topic area: ICT Fundamentals							
Unit title Computer Navigation							
Key Unit Competence: Navigate the Windows environment and work with Windows explorer to introduce the techniques of folder and file management.							
Title of the lesson Desktop							
Learning Objectives: By the end of this lesson the learner should be able to:							
<ul style="list-style-type: none"> Knowledge and understanding : Define various terminologies in relation to computer navigations. State parts of a task bar. Skills : Add items to the start menu, desktop and quick launcher. Attitude and values: Appreciate the importance of desktop in a computer. 							
Plan for this Class (location: in / outside) Inside.							
Learning Materials (for all learners) <ul style="list-style-type: none"> Computers, ICT Equipment,, video player, projector , and other relevant digital learning materials Internet. The ICT for Senior 2 Students' Book pages 70 to 93. 							
Reference							

Steps and Timing	Description of teaching and learning activity		Competences and Cross-Cutting Issues to be addressed
	Teacher's Activities	Learners' Activities	
Introduction: <i>Review of the previous Lesson (if relevant) (5 minutes)</i>	<ul style="list-style-type: none"> Ask questions on previous lesson 	<ul style="list-style-type: none"> Respond to questions 	
Do Activity 1 (10 minutes)	<ul style="list-style-type: none"> Introduce the lesson through oral questions on desktop Guide learners to do group discussion. 	<ul style="list-style-type: none"> Answer the oral questions. For example, icons on the desktop. Group discussion customizing the desktop. 	
Feedback from Activity 1 (5 minutes)	<ul style="list-style-type: none"> Ask group leaders to report on the discussion done. Through question and answer method help learners to state items that can be customized. 	<ul style="list-style-type: none"> Group leaders report findings of the group: Possible answers: <ul style="list-style-type: none"> Customize the start menu Customize the desktop, Customize the taskbar. 	
Do Activity 2 (10 minutes)	<ul style="list-style-type: none"> Introduce the cross cutting issue on sexually transmitted infections 	<ul style="list-style-type: none"> Discussion in groups 	<ul style="list-style-type: none"> Discussion on sexually transmitted infections

<p>Feedback on Activity 2 (5 minutes)</p>	<p>Ask group leaders to report on discussion</p>	<p>Group leaders report: Possible answers on prevention of STIs:</p> <ul style="list-style-type: none"> (i) Sex and HIV Education. (ii) Abstinence. (iii) Being faithful. (iv) Use of protection. (v) Avoid alcohol and drugs. 	<p>Tips On How to prevent STIs</p>
<p>Summarise lesson and lead into next lesson (5 minutes)</p>	<p>Conclusion:</p> <ul style="list-style-type: none"> • Draw the summary of the findings from the group discussions. • Ask oral questions on the main points. <ul style="list-style-type: none"> (i) Desktop (ii) Start menu (iii) Taskbar 	<ul style="list-style-type: none"> • Copy the summary in their note books. • Answer the oral questions. • Think about question for next lesson 	
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Sample lesson plan 3

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD /MM/ YY	ICT	Senior 1	4	1 of	40 mins	40
Type of Special Educational Needs and number of learners							
Topic area: Introduction to ICT							
Sub-topic area: Safety and security							
Unit title Safe, secure and ethical use of computers.							
Key Unit Competence: Maintain a computer in good working condition and use it safely, securely and ethically.							
Title of the lesson Computer safety							
Learning Objectives: By the end of this lesson the learner should be able to:							
<ul style="list-style-type: none"> • Knowledge and understanding: Describe general safety in computer lab. • Skills: Apply safety and security measures on a computer lab. • Attitude and values: Appreciate the computer safety precautions taken in a computer lab. 							
Plan for this Class (location: in / outside) Inside.							
Learning Materials (for all learners) <ul style="list-style-type: none"> • Computers, ICT Equipment,, video player, projector , and other relevant digital learning materials • Internet. 							
Reference The ICT for Senior 2 Students' Book page 94 to 101.							

Steps and Timing	Description of teaching and learning activity		Competencies and cross cutting issues to be addressed
	Teacher's Activities	Learners' Activities	
Introduction: <i>Review of the previous Lesson (If relevant)</i> (5 minutes)	<ul style="list-style-type: none"> Ask questions on previous lesson 	<ul style="list-style-type: none"> Respond to questions 	
Do Activity 1 (10 minutes)	<ul style="list-style-type: none"> Introduce the lesson through oral questions on Safe, secure and ethical use of computers. Guide learners to do group discussion. 	<ul style="list-style-type: none"> Answer the oral questions. Group discussion Safe, secure and ethical use of computers. 	<ul style="list-style-type: none">
Feedback from Activity 1 (5 minutes)	<ul style="list-style-type: none"> Ask group leaders to report on the discussion done. Through question and answer method help learners to state safety, secure and ethical ways of using computers. 	<ul style="list-style-type: none"> Group leaders report findings of the group: Possible answers: <ul style="list-style-type: none"> Safe use of computers Secure use of computers. Ethical use of computers. 	
Do activity 2 (10 minutes)	<ul style="list-style-type: none"> Introduce the cross cutting issue on how to handle emerging issues on health safety. 	<ul style="list-style-type: none"> Discussion in groups 	<ul style="list-style-type: none"> Discussion on emerging issues on health safety.

<p>Feedback on Activity 2 (5 minutes)</p>	<ul style="list-style-type: none"> • Ask group leaders to report on discussion 	<p>Group leaders report: Possible answers:</p> <ul style="list-style-type: none"> (i) Prohibition of food and beverages in the computer lab. (ii) Precaution on the use of computers for long hours. (iii) Use of a UPS. (iv) Short health breaks during lessons. 	<p>Tips on health safety .</p>
<p>Summarise lesson and lead into next lesson (5 minutes)</p>	<ul style="list-style-type: none"> • Conclusion: • Draw the summary of the findings from the group discussions. • Ask oral questions on the main points. • Safe, secure and ethical use of computers. • • 	<ul style="list-style-type: none"> • Copy the summary in their note books. • Answer the oral questions. • Think about question for next lesson 	
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Sample lesson plan 4

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD /MM/ YY	ICT	Senior 1	2	1 of 6	40 mins	40
Type of Special Educational Needs and number of learners							
Topic area: INTRODUCTION TO ICT							
Sub-topic area: ICT FUNDAMENTALS							
Unit title Computer systems.							
Key Unit Competence: Explain the evolution, categories, parts and role of computers.							
Title of the lesson Definition of a computer, functions of computers (input, processing, storage and output), and characteristics of a computer.							
Learning Objectives: By the end of this lesson the learner should be able to:							
<ul style="list-style-type: none"> • Knowledge and understanding : Explain computer related terms. • Skills : Use computer related terms appropriately. • Attitude and values: Appreciate the role played by computers in the evolution of society and their impact on daily life. 							
Plan for this Class (location: in / outside) Inside.							
Learning Materials (for all learners) <ul style="list-style-type: none"> • Computers, ICT Equipment,, computer laboratory, Projector, Cleaning tools, detergents • Internet Hardcopies. 							
Reference The ICT for Senior 1 Students' Book page 1 to 21.							

Description of teaching and learning activity		Competences and Cross-Cutting Issues to be addressed
Steps and Timing	Teacher's Activities	Learners' Activities
Introduction: <i>Review of the previous Lesson (if relevant)</i> (5 minutes)	Ask questions on previous lesson	Respond to questions
Do Activity 1 (10 minutes)	Introduce the lesson through oral questions on Definition of a computer, functions of computers and characteristics of a computer. Pair the learners to discuss on characteristics of a computer.	Answer the oral questions. For example, Define a computer In pairs discuss the characteristics of a computer.
Feedback from Activity 1 (5 minutes)	<ul style="list-style-type: none"> Assess the activity done by the learners. Correct the learners if any mistake is realized. 	Show their work to the teacher. Take in the corrections.
Do Activity 2 (10 minutes)	Introduce the cross cutting issue Peer pressure. <ul style="list-style-type: none"> Group the learners to discuss the cross cutting issue. 	<ul style="list-style-type: none"> Discussion in groups
		Ability to define a computer, outline the functions of a computer and explain the characteristics of a computer Discussion on Peer pressure.

<p>Feedback on activity 2 (5 minutes)</p>	<p>Ask group leaders to report on the discussion</p>	<p>Group leaders report: Possible answers: Effects of peer pressure on.</p> <ul style="list-style-type: none"> • Academic performance • Fashion choices • Alcohol and drug use • Decision to have a boyfriend or girlfriend • Choice of who your friends are 	<p>Effects of peer pressure.</p>
<p>Summarise lesson and lead into next lesson (5 minutes)</p>	<p>Conclusion:</p> <ul style="list-style-type: none"> • Draw the summary of the findings from the group discussions and pair activity. <p>Ask oral questions on the main points.</p> <p>(i) Definition of a computer is an electronic device that accepts data processes it through stored programs and then outputs it.</p> <p>(ii) Functions of a computer is: input, process, output and storage.</p> <p>(iii) Characteristics of a computer are: Versatility, Speed Accuracy Versatility Reliability Power of Remembering No IQ Diligence Storage</p>	<p>Copy the summary in their note books.</p> <p>Answer the oral questions.</p> <p>Think about question for next lesson</p>	
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Sample lesson plan 5

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD /MM/ YY	ICT	Senior 1	5	1 of 10	40 mins	45
Type of Special Educational Needs and number of learners							
Topic area: Application Software							
Sub-topic area: Word Processing							
Unit title Word Processing Basics I							
Key Unit Competence: Create and manipulate a document using basic word processing features.							
Title of the lesson Word Processing							
Learning Objectives: By the end of this lesson the learner should be able to:							
Knowledge and understanding:		Define the term word processing Identify the basic features of a word processing environment. Explain the role of word processing applications.					
Skills:		Explore the environment of word processing applications.					
Attitude and values:		Appreciate the basic features of word processing applications.					
Plan for this Class (location: in / outside) Inside.							
Learning Materials (for all learners) Computers installed with Microsoft Word 2013, Internet, soft copies, Hard copies, projector or smart board							
Reference The ICT for Senior 1 Students' Book page 102 to 130.							

Steps and Timing	Description of teaching and learning activity		Competences and Cross-Cutting Issues to be addressed
	Teacher's Activities	Learners' Activities	
Introduction: <i>Review of the previous Lesson (if relevant)</i> (5 minutes)	<ul style="list-style-type: none"> Ask questions on previous lesson 	<ul style="list-style-type: none"> Respond to questions 	
Do Activity 1 (10 minutes)	<ul style="list-style-type: none"> Introduce the lesson through oral questions on role of word processing applications. Guide learners to define word processor and give its role. Pair the learners to carry out practical activities 	<ul style="list-style-type: none"> Answer the oral questions. For example, In pairs carry out the practical activities on 	
Feedback from Activity 1 (5 minutes)	<ul style="list-style-type: none"> Assess the practical activity done by the learners. Correct the learners if any mistake is realized. 	<ul style="list-style-type: none"> Show their work to the teacher. Take in the corrections. 	<ul style="list-style-type: none"> Ability to define the term word processor, Word processing environment. Name the role of word processor.
Do Activity 2 (10 minutes)	<ul style="list-style-type: none"> Introduce the cross cutting issue on symptom of depression. Group the learners to discuss the cross cutting issue. 	<ul style="list-style-type: none"> Discussion in groups 	<ul style="list-style-type: none"> Discussion on Symptom of depression.

<p>Feedback on Activity 2 (5 minutes)</p>	<p>Ask group leaders to report on the discussion</p>	<p>Group leaders report: Possible answers:</p> <ul style="list-style-type: none"> • Loss of appetite. • Insomnia. • State of intense sadness. 	<p>Symptom of depression.</p>
<p>Summarise lesson and lead into next lesson (5 minutes)</p>	<p>Conclusion:</p> <ul style="list-style-type: none"> • Draw the summary of the findings from the group discussions and pair activity. • Ask oral questions on the main points. <ul style="list-style-type: none"> (i) Word processors enable users to create, save, edit, format and print text documents. (ii) Role of word processors include create and manipulate text-based documents. (iii) Word processing environment include title bar menu bar, ribbon and quick access toolbar among others. 	<ul style="list-style-type: none"> • Copy the summary in their note books. • Answer the oral questions. • Think about question for next lesson 	
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Sample lesson plan 6

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD /MM/ YY	ICT	Senior 1	6	1 of 10	40 mins	45
Type of Special Educational Needs and number of learners							
Topic area: Application Software							
Sub-topic area: Word Processing							
Unit title Word Processing Basics II							
Key Unit Competence: Manipulate text and use advanced formatting methods and add simple objects in a document.							
Title of the lesson Page Setup (Setting Margins, Orientation and Page borders)							
Learning Objectives: By the end of this lesson the learner should be able to:							
<ul style="list-style-type: none"> • Knowledge and understanding : Explain the technique for manipulating a document. • Skills : Manipulate a document by managing the layout of the page and the entire document. • Attitude and values: Show interest in formatting and manipulating a document. 							
Plan for this Class (location: in / outside) Inside.							
Learning Materials (for all learners) Computers installed with Microsoft Word 2013, Internet, soft copies, Hard copies, projector or smart board							
Reference The ICT for Senior 1 Students' Book page 131 to 151.							

		Description of teaching and learning activity		
Steps and Timing	Teacher's Activities	Learners' Activities	Competences and Cross-Cutting Issues to be addressed	
Introduction: <i>Review of the previous Lesson (if relevant)</i> (5 minutes)	<ul style="list-style-type: none"> Ask questions on previous lesson 	<ul style="list-style-type: none"> Respond to questions 		
Do Activity 1 (10 minutes)	<ul style="list-style-type: none"> Introduce the lesson through oral questions on setting margin, orientation and page borders. Guide learners to add page borders, set margins and page orientation. Pair the learners to carry out practical activities 	<ul style="list-style-type: none"> Answer the oral questions. For example, the default page orientation is portrait. In pairs carry out the practical activities on setting margin, orientation and page borders of a document. 		
Feedback from Activity 1 (5 minutes)	<ul style="list-style-type: none"> Assess the practical activity done by the learners. Correct the learners if any mistake is realized. 	<ul style="list-style-type: none"> Show their work to the teacher. Take in the corrections. 	<ul style="list-style-type: none"> Ability to add page border, set margin and change page orientation. 	
Do Activity 2 (10 minutes)	<ul style="list-style-type: none"> Introduce the cross cutting issue on dangers of pre-marital sex. Group the learners to discuss the cross cutting issue. 	<ul style="list-style-type: none"> Discussion in groups 	<ul style="list-style-type: none"> Discussion on Premarital sex. 	

<p>Feedback on Activity 2 (5 minutes)</p>	<ul style="list-style-type: none"> • Ask group leaders to report on the discussion 	<ul style="list-style-type: none"> • Group leaders report: • Possible answers: • Guilt. • Worry about HIV. • Ruined Relationship. 	<ul style="list-style-type: none"> • Dangers of premarital sex.
<p>Summarise lesson and lead into next lesson (5 minutes)</p>	<p>Conclusion:</p> <ul style="list-style-type: none"> • Draw the summary of the findings from the group discussions and pair activity. • Ask oral questions on the main points. <ul style="list-style-type: none"> (i) There are two orientations namely Portrait and landscape. (ii) Portrait orientation is the default one. (iii) There are four margins around a page namely top, bottom, left and right. (iv) Page border covers an entire page around the margins. 	<ul style="list-style-type: none"> • Copy the summary in their note books. • Answer the oral questions. • Think about question for next lesson 	
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Sample lesson plan 7

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD/MM/YY	ICT.....	Senior 1	7	1 of 1	40 mins	45
Type of Special Educational Needs and number of learners							
Topic area: Application Software							
Sub-topic area: GIS							
Unit title GIS and Maps							
Key Unit Competence: (i) Define and recognise basic features of GIS. (ii) Differentiate the elements or components of the interface of the GIS application. (iii) Query a map and organise map layers.							
Title of the lesson Define terms and concepts of GIS							
Learning Objectives (inclusive to reflect needs of whole class)							
<ul style="list-style-type: none"> • Knowledge and understanding : Understand the basic concepts of GIS. • Skills : Explain GIS related terms appropriately. • Attitude and values: Appreciate the importance and function of GIS. 							
Plan for this Class (location: in / outside) Inside							
Learning Materials (for all learners) Computers intalled with ArcGis Software, projector, text books, interactive board							
Reference ICT for senior 1 pages 152 to 178							

Steps and Timing	Description of teaching and learning activity		Competences and Cross-Cutting Issues to be addressed
	Teacher's Activities	Learners' Activities	
INTRODUCTION: <i>Review of the previous Lesson (If relevant)</i> (5 minutes)	<ul style="list-style-type: none"> Ask questions on previous lesson 	<ul style="list-style-type: none"> Respond to questions 	
Do Activity 1 (10 minutes)	<ul style="list-style-type: none"> Introduce the lesson by asking questions on geography. Define terms and concepts of GIS like PostGIS and ArcExplorer. Pair the learners for the demonstration activities. Introduce and explain the different elements of the ArcGIS interface. Demonstrate how to Open ArcMap and browse, save, and close an existing map. 	<ul style="list-style-type: none"> Respond to teachers questions. Identify and name different elements of the ArcGIS interface. Open ArcMap and browse, save, and close an existing map. Ask the Teacher relevant questions. Form working and discussion groups 	
Feedback from Activity 1 (5 minutes)	<ul style="list-style-type: none"> Allow the learner to practice opening ArcMap and browsing, saving, and closing an existing map. Respond to queries from the learners based on their difficulties. Identify learners with difficulties and help them. Ask group leaders to report on discussion. 	<ul style="list-style-type: none"> Practice opening ArcMap and browsing, saving, and closing an existing map. Ask the teacher questions based on the difficult areas. Group leaders report on the challenges faced during the discussion. 	<ul style="list-style-type: none"> Define and recognise basic features of GIS. Differentiate the elements/ components of the interface of the GIS application.

<p>Do Activity 2 (10 minutes)</p>	<ul style="list-style-type: none"> • Introduce the cross cutting issue on Facts about Planet Mars. • Divide the learners in larger groups for the discussion. 	<ul style="list-style-type: none"> • Discussion in groups the Facts about Planet Mars. • Choose a group leader. • Gather as much information possible on the cross cutting issue. • Note down the agreed points within the group. 	<ul style="list-style-type: none"> • Discuss Facts about Planet Mars
<p>Feedback on Activity 2 (5 minutes)</p>	<p>Ask group leaders to report on discussion</p>	<p>Group leaders report: Possible Points to note:</p> <ol style="list-style-type: none"> 1. The position of planet Mars in the solar system. 2. The mass of planet Mars and the physical size compared to Earth. 3. Temperature and atmospheric pressure in Mars. 4. Human missions to Mars. 5. Is it possible to draw maps for Planet Mars? 	
<p>Summarise lesson and lead into next lesson. (5 minutes)</p>	<p>Conclusion:</p> <ul style="list-style-type: none"> • Assess the reports from the groups and award points based on the submitted material. • Ensure even the weak learners can perform the demonstrated activities. • If possible briefly introduce the following topic and make a link with the current topic. 	<ul style="list-style-type: none"> • Submit the group report to the teacher for assessment. • Ask the teacher to clarify challenging areas in the topic of discussion. • Think about question for next lesson. 	
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Sample lesson plan 8

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD /MM/ YY	ICT	Senior 1	8	1 of 8	40 mins	45
Type of Special Educational Needs and number of learners							
Topic area: Computer Network and Data communication							
Sub-topic area:							
Unit title Network and Internet fundamentals.							
Key Unit Competence: Understand the rationale of a computer network and use the Internet efficiently and effectively.							
Title of the lesson Network and computer network, characteristics, the role, advantages and disadvantages of a computer network.							
Learning Objectives: By the end of this lesson the learner should be able to:							
• Knowledge and understanding:	Explain network and computer network. Explain the role, and advantages and disadvantages of a computer network.						
• Skills:	Describe a computer network, the characteristics, the role, the advantages and disadvantages of a computer network.						
• Attitude and values:	Appreciate the importance and power of a computer network and the Internet on daily life.						
Plan for this Class (location: in / outside) Inside.							
Learning Materials (for all learners) Computers, servers, radio waves, Internet connectivity, routers, switches, transmission data cables, projector							
Reference The ICT for Senior 1 Students' Book page 179 to 205.							

Steps and Timing	Description of teaching and learning activity		Competences and Cross-Cutting Issues to be addressed
	Teacher's Activities	Learners' Activities	
Introduction (5 minutes)	<ul style="list-style-type: none"> Introduce the lesson through oral questions about computer network. 	<ul style="list-style-type: none"> Respond to questions 	
Do Activity 1 (10 minutes)	<ul style="list-style-type: none"> Introduce through oral questions on the characteristic, the role advantages and disadvantages of a computer network. Guide learners to through group discussion. 	<ul style="list-style-type: none"> Answer the oral questions. For example, the characteristics of a computer network. Group discussion on the role, the advantages and disadvantages of a computer network 	
Feedback from Activity 1 (5 minutes)	<ul style="list-style-type: none"> Ask group leaders to report on the discussion done. Through question and answer method help learners to state the characteristics of computer network. 	<ul style="list-style-type: none"> Group leaders report findings of the group: Possible answers: (i) Resource sharing. (ii) Security. (iii) Reliability. 	<ul style="list-style-type: none"> Ability to answer questions.
Do Activity 2 (10 minutes)	<ul style="list-style-type: none"> Introduce the cross cutting issue on use of social media platforms in high school. 	<ul style="list-style-type: none"> Discussion in groups 	<ul style="list-style-type: none"> Discussion on Social media platforms

<p>Feedback on Activity 2 (5 minutes)</p>	<ul style="list-style-type: none"> • Ask group leaders to report on discussion 	<ul style="list-style-type: none"> • Group leaders report: <p>Possible answers:</p> <ul style="list-style-type: none"> • Positives and negatives of social media • Vetting their own posts before sharing them on networks • Sensitisation on sharing personal details and pictures with strangers 	<ul style="list-style-type: none"> • Tips on how to use social media platforms in High School.
<p>Summarise lesson and lead into next lesson (5 minutes)</p>	<p>Conclusion:</p> <ul style="list-style-type: none"> • Draw the summary of the findings from the group discussions. <p>Ask oral questions on the main points.</p> <ul style="list-style-type: none"> (i) Network and computer network. (ii) Characteristics of computer networks. (iii) Role of computer network. (iv) Advantages and disadvantages of computer networks. 	<p>Copy the summary in their note books.</p> <p>Answer the oral questions.</p> <p>Think about question for next lesson</p>	
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Sample lesson plan 9

Term	Date	Subject	Class	Unit N°	Lesson N°	Duration	Class size
[Term]	DD /MM/ YY	ICT	Senior 1	9	1 of 10	40 Minutes	45
Type of Special Educational Needs and number of learners							
Topic area: Programming (Scratch)							
Sub-topic area: Music Sprite programming							
Unit title Music Sprite programming							
Key Unit Competence: <ul style="list-style-type: none"> The learner should be able to create a music sprite and add music with scratch and audacity. 							
Title of the lesson Create/import sprite							
Learning Objectives: By the end of this lesson the learner should be able to: <ul style="list-style-type: none"> Create a music sprite Add music to a sprite. 							
<ul style="list-style-type: none"> Knowledge and understanding : Associate different commands to develop music. 							
<ul style="list-style-type: none"> Skills : Create a music sprite Move the music loop to the music sprite 							
<ul style="list-style-type: none"> Attitude and values: Express the desire to produce more melodies using scratch commands. 							
Plan for this Class Inside							
Learning Materials (for all learners) <ul style="list-style-type: none"> Computers installed with Scratch editor and Audacity, Internet connection 							
Reference <ul style="list-style-type: none"> ICT Senior 1 Students' book 206 to 237. 							

Description of teaching and learning activity		Competences and Cross-Cutting Issues to be addressed
Steps and Timing	Teacher's Activities	Learners' Activities
Introduction: <i>Review of the previous Lesson (If relevant)</i> <i>(5 minutes)</i>	<ul style="list-style-type: none"> Review the previous lesson by asking questions. 	<ul style="list-style-type: none"> Answer the questions.
Do Activity 1 (10 minutes)	<ul style="list-style-type: none"> Orally introduce the lesson and guide the learners in understanding Sprite programming. 	<ul style="list-style-type: none"> Learners attempt to answer the oral questions, for example, by linking sprite programming to music and entertainment.
Feedback from Activity 1 (5 minutes)	<ul style="list-style-type: none"> Through question and answer method the teacher helps the learner to explain key concepts in Scratch user interface. Practically show learners how to work in Scratch user interface. 	<ul style="list-style-type: none"> Define the terms: blocks palettes, blocks, scripts, thumbnails, costumes, sprite list and script area among others. Write down notes in their note books.
Do Activity 2 (10 minutes)	<ul style="list-style-type: none"> Introduce the cross cutting issue on how Drugs and substance abuse 	<ul style="list-style-type: none"> Define key words in Scratch. Identify various features in Scratch.

<p>Feedback on Activity 2 (5 minutes)</p>	<ul style="list-style-type: none"> • Ask group leaders to report on discussion. • As other learners to contribute and share experiences if any. 	<p>Group leaders report: Possible answers:</p> <p>(i) Drug and substance abuse is harmful.</p> <p>(ii) Examples include alcohol, tobacco among other harmful substances.</p> <p>(iii) Drug and substance abuse can be prevented.</p>	<ul style="list-style-type: none"> • Discuss drugs and substance abuse, effects and measures to avoid drug and substance abuse.
<p>Summarise lesson and lead into next lesson (5 minutes)</p>	<p>Conclusion:</p> <ul style="list-style-type: none"> • Create sprite (s) and add music. • Assign learners practical tasks to enable them understand Scratch and prepare for the next lesson. 	<ul style="list-style-type: none"> • Write down the steps. • Practice the steps provided. • Ask teacher for guidance on challenging tasks. • Come up with questions for next lesson. 	<ul style="list-style-type: none"> • Create simple scripts to manipulate sprites and add music.
<p>Teacher Self Evaluation</p>	<ul style="list-style-type: none"> • See notes on Self evaluation (self assessment on page 154) 		

Appendix 2: Glossary of ICT Terms

Animations: Animation is the process of displaying motionless images in a rapid sequence to create the appearance of movement. Examples of animations are cartoons on Televisions.

Applications: These are programs that are designed to perform specific task for the user.

Application software: They are programs that are designed to enable the user accomplish a given task.

ArcCatalog: This component organizes spatial data contained on the computer and various other locations and allows search, preview and addition of data to ArcMap as well as managing metadata and set up address locator services (geocoding).

ArcGIS: This is a geographic system designed to capture, store, manipulate, analyze, manage and present all types of geographically referenced data, that is, data identified according to their location.

ArcMap: This is the main mapping application that allows the creation of maps and query attributes. It also analyzes spatial relationships and layout of the final projects.

ArcToolbox: This is a Geographic Information System (GIS) component. It contains tools for Geoprocessing, data conversion, coordinate systems and projections among other functions.

Artificial Intelligence: It is the science of developing machines that mimic human behaviour such as reasoning, learning, hearing, seeing and communicating.

Attribute: This is a defined characteristic of a theme.

Autocomplete: It is a feature that enables phrases to be automatically completed on pressing the enter key, after they have been written midway.

AutoFormat: Refers to a range of predefined formatting templates.

Basemap: This is a map portraying background orientated information such as landforms, landmarks, roads and political boundaries, onto which other thematic information is placed.

Bitmap: A graphic image made up of many tiny dots.

Blocks: These are shapes that connect to each other and are used to create code. They determine how sprites interact with each other.

Broadband: This is a high capacity transmission technique that uses a wide range of frequencies to enable a large number of messages to be communicated simultaneously.

Bullets: They are small solid shapes used just before a line of text such as an item in a list. They are used to mark the beginning of a point.

Cc (Carbon Copy): This is used to send the same message to a number of people. When Cc is used, the list of all the recipients appears in each recipient's mail.

Central Processing Unit: It is also known as a processor. It is commonly referred to as the "brain" of a computer system. The processor is a programmable device that controls the retrieval, interpretation and execution of instructions in a computer.

Clipboard: It is a temporary location for storing copied or cut data waiting to be pasted.

Command: It is an instruction given for action to be taken. It represents an authorizing rule, power, or reason for some actions to be performed.

Computer Buses: These are a group of electronic wires that provide a path way through which bits of data are transmitted between the various computer components.

Computer laboratory: It is a special room set aside for safe installation and use of computer equipment.

Connector: It is a part of a cable that plugs into a port or interface to connect two devices.

Costume: An image or visual representation that affects the appearance of a sprite. A sprite can be programmed to switch to a different costume to change its appearance.

CPU: Abbreviation for the **Central Processing Unit**. Also called the processor, and makes up the brain of a computer.

Customised software: They are tailor-made to solve a specific problem at hand or to meet a specific need of the user.

Data gathering: It is the systematic collection of data for a specific purpose from various sources.

Dialog box: This is a graphic interface which displays a section of the screen to be viewed. It gives the user several options to be choose from.

Distance Learning: It is also known as distance education. It is a mode of study where students do not physically attend learning centres.

Drop cap: It is a large capital letter usually at the beginning of a block of text that has the depth of more than one line of regular text.

E-Mail: This refers to a system of exchanging messages electronically over a computer network.

Fire extinguisher: It is a metallic cylinder usually red in colour containing a substance or agent that put out a small fire.

Firmware: These are software programs that are stored in computers Read Only Memory (ROM) where they are available for immediate use.

Footers: They are lines of text or graphics that appear below the bottom margin of a page or selected pages.

Formatting: It is the process of improving the appearance of a document to make it attractive and appealing to look at.

Geocoding: This is a GIS procedure for converting street addresses into spatial data that can be displayed as features on a map, usually by referencing address information from a street segment data layer.

Geodatabase: This is a collection of geographic datasets of various types held in a common file or folder such as Microsoft Access database, or a multiuser relational DBMS (such as Oracle, Microsoft SQL Server, PostgreSQL, Informix, or IBM DB2).

GIS: This is a system designed to capture, store, manipulate, analyze, manage and present all types of geographically referenced data, that is, data identified according to their location.

Hard disk: It consists of one or several inflexible circular disks called platters which are coated with a magnetic material normally Iron II Oxide.

Hardware: It is defined as any physical and tangible component of a computer which could either be mechanical, electrical or electronic.

Headers: They are lines of text or graphics that appear above the top margin of a page or selected pages.

Indent: It is pushing text away from the margin.

Input: This is data entered in a computer for processing.

Input Devices: These are hardware components that are used to enter data and instructions into a computer.

Integrated software: These are software that combines several standard software into a package

Internet: It stands for International Network. It is a worldwide network of computers connecting millions of computer networks through a combination of public and private communication lines such as telephone lines, wireless connection and fiber optic.

ISP: This is the abbreviation for Internet Service Provider. It is a licensed organization or company that provides access to the Internet usually at a fee.

Label: It is a heading which describes the content of a row or column.

LAN: This stands for Local Area Network. It covers a small geographical area for example, an office, a building, an institution, or an organization.

Landscape: This is where text and graphics are printed with the longest side placed horizontally and the shortest placed vertically.

Layer: This is a method used to display geographic data sets in ArcMap with each layer pointing to a data set and specifying how the data set is represented using symbols and text labels.

Layout: This is a presentation or an outline which designates a design, or arrangement of data or information.

Lists: It is also known as an array in other programming languages. It refers to a variable that stores multiple pieces of information at once.

MAN: This stands for Metropolitan Area Network covers a city or town. It can be made up of many LANs and can provide Internet connectivity in a Metropolitan region.

Metadata: This is part of an ArcGIS item. Whenever an item is copied in ArcGIS, its metadata also gets copied and when the item is imported into a geodatabase, its metadata is also imported. Metadata is stored in the same location as the item's data in a manner that is appropriate for its data type.

Microcomputers: They are popularly known as Personal Computers (PCs) since they are designed to be used by one person at a time.

Network: is a set of interconnected computing nodes which communicate with one another through a transmission medium using a set of rules.

Networking software: It is system software that is used for configuration and enhancement of interactions in a computer network.

Numbering: This is the use of numbers to list different points. They may be set in Arabic or Roman.

Offline: Does not require Internet connection.

Off-the-Shelf software: They are software written by a software engineer or programmer, packaged and then made available through a vendor, distributor or the developer

Online: Requires Internet connection.

Operating System: This is a group of programs that provide a platform for loading other programs known as application programs and act as an interface between the hardware and the application programs.

Orientation: This refers to the positioning of the page in relation to the text or graphics. There are two types of page orientation, namely landscape and portrait.

Output: It is the information produced after processing is complete.

Output devices: These are devices used for displaying data and information.

Page margins: They are the blank spaces around the edges of a page.

Page numbering: This is a formatting feature that organises a large document for ease of reference and makes it easy to track by inserting numbers beginning with the first page.

Palmtop computers: They are designed to fit in the palm of the user and easily fit in pockets.

PAN: It is also known as Wireless Personal Area Network (WPAN). It is the smallest network used for data transmission among devices within the environment of an individual user.

Password: is a string of characters entered to log-in or sign-in so as to allow one get authentication.

Peripheral devices: They are computer components that are connected to the ports in the system unit through cables or wireless media.

Port: It is an interface on a computer on which a device can be connected.

Portrait: This is where text and graphics are printed with the longest side placed vertically and the shortest placed horizontally.

Processing: This is the conversion of data into information.

Programs: Also known as software. It is a collection of instructions that enable the computer to perform specific tasks or help the user to interact with a computer.

Project: This is a creation made in the Scratch Program. A project can be about anything, from music to animations, art, games, and simulations among others.

Query: This is a request that examines features or tabular attributes based on user-selected criteria and displays only those features or records that satisfy the given criteria.

Raster Data: These are items, usually images that are composed of pixels.

Register: They are temporary storage location found inside the processor that is used to hold data, instructions or information awaiting processing or output.

Screen: It is also known as the monitor or Visual Display Unit. It is an output device that displays information from the computer.

Script: A collection of connected blocks that perform a task.

Scrolling: It is the processes of moving around a document without changing the position of the cursor.

Search Engines: These are programs that help a user to look for and identify items that corresponds to keywords or phrases specified from the World Wide Web. Examples include; Yahoo, Google, WiseGeek, and Inforceek.

Server: Is a computer or device on a network that manages network resources.

Shapefiles: This is an Esri vector data storage format for storing the location, shape, and attributes of geographic features and it stores a set of related files.

Software: It is a collection of instructions (programs) that enable the computer to perform specific tasks or help the user to interact with a computer.

Sorting: Arranging data alphabetically or numerically in a descending or ascending order.

Spatial: These are features related to or existing within space.

Sprite: A sprite is an object that can be manipulated through a script to perform actions in a project. A project can contain multiple sprites that interact with one another. The default Sprite is a cat but it can be changed to a different sprite.

Storage: A computer can store a large amount of data within it. It has primary and secondary storage devices that are used for this purpose.

Styles: They are specially packaged sets that apply many formats at once. They are available to the user for formatting the document.

Suite: A collection of programs with related functionality sold together as a package.

Surf/Browse: To surf or to browse is to view or access data from the Internet.

Telecommuting: Telecommuting is working from a remote location, usually one's home by electronically linking to the workplace.

Thesaurus: This feature displays synonyms and antonyms of a selected word.

Thumbnail: An image of a large document or graphic that is reduced in size to allow multiple documents or images to be viewed on the screen at the same time.

Toolbars: This is a graphical user interface (GUI) with buttons that allow users to execute software commands.

URL: is an abbreviation for Uniform Resource Locator. It is a unique address of each web page in a websites which identifies the location of a specific web page on the Internet.

Username: : It is a name that identifies the owner of the e-mail address. It also refers to the identity one uses to log in to a computer network.

Utility software: They are system software that is used to perform routine functions aimed at optimizing, analysing and maintaining the operations of a computer.

Vector Data: These are drawings that represent features such as streets, rivers, railway lines, lakes, city blocks and any other feature that can be drawn on a map

Virtual memory: It is the use of part of the hard disk as main memory for storing tasks from or to the processor.

WAN: This stands for a Wide Area Network. It interconnects LANs and MANs within a very large geographical area and may span across regions, country, continents or even the whole world.

Watermarks: They are text or pictures that appear behind text in a document.

Web browse: These are programs used for displaying and viewing web pages on the World Wide Web (WWW), for example, Mosaic, Netscape Navigator, Internet Explorer, Mozilla Firefox, Opera and Google Chrome amongst others. The web pages can be accessed using a web browser.

Webpage: It is Hypertext and hypermedia documents containing information about an individual or organisation.

Wi-Fi: is a wireless networking technology that uses radio waves to provide high-speed Internet and networking connections.

Windows Accessories: These are built-in programs found in Windows operating system, for example, calculator, notepad and pain among others.