

**Information Communication
Technologies
and
Computer Studies**

**Upper Secondary
Teacher Guide**



Papua New Guinea
Department of Education

Issued free to schools by the Department of Education

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Secretary's message

This teacher guide is to be used by teachers when implementing the Upper Secondary Information Communication Technologies and Computer Studies syllabuses (Grades 11 and 12) throughout Papua New Guinea. The Information Communication Technologies and Computer Studies syllabuses identify the learning outcomes and content of the subject as well as assessment requirements. The teacher guide gives practical ideas about ways of implementing the syllabuses: suggestions about what to teach, strategies for facilitating learning and teaching, how to assess and suggested assessment tasks.

A variety of suggested learning and teaching activities provides teachers with ideas to motivate students to learn, and make learning relevant, interesting and enjoyable. Teachers should relate learning in Information Communication Technologies and Computer Studies to real people, issues and the local environment. Teaching using meaningful contexts and making sure students participate in appropriate practical activities assists students to gain knowledge and understanding, and demonstrate skills in Information Communication Technologies and Computer Studies.

Teachers are encouraged to integrate Information Communication Technologies and Computer Studies activities with other subjects, where appropriate, so that students can see the interrelationships between subjects and that the course they are studying provides a holistic education and a pathway for the future.

I commend and approve the Information Communication Technologies and Computer Studies teacher guide for use in all schools with Grades 11 and 12 students throughout Papua New Guinea.



DR JOSEPH PAGELIO

Secretary for Education

Introduction

The purpose of this teacher guide is to help you to implement the Information Communication Technologies (ICT) and Computer Studies (CS) syllabuses. It is designed to stimulate you to create exciting and meaningful teaching programs and lessons by enabling you to choose relevant and purposeful activities and teaching activities. It will encourage you to research and look for new and challenging ways of facilitating students' learning in Information Communication Technologies and Computer Studies.

The teacher guide supports the syllabuses. The syllabuses state the learning outcomes for the subject, outline the content and skills that students will learn, and provide suggested assessment tasks.

The teacher guide provides direction for you in using the outcomes approach in your classroom. The outcomes approach requires you to consider assessment early in your planning. This is reflected in the teacher guide.

This teacher guide provides examples of learning and teaching activities, and assessment activities and tasks. It also provides detailed information on criterion-referenced assessment, and the resources needed to teach Information Communication Technologies and Computer Studies. The section on recording and reporting shows you how to record students' marks and how to report against the learning outcomes.

The outcomes approach

In Papua New Guinea, the Lower Secondary and Upper Secondary syllabuses use an outcomes approach. The major change in the curriculum is the shift to what students know and can do at the end of a learning period, rather than a focus on what the teacher intends to teach.

An outcomes approach identifies the knowledge, skills, attitudes and values that all students should achieve or demonstrate at a particular grade in a particular subject (the learning outcomes). The teacher is responsible for identifying, selecting and using the most appropriate teaching methods and resources to achieve these learning outcomes.

Imagine the student is on a learning journey, heading to a destination. The destination is the learning outcome that is described in the syllabus document. The learning experiences leading to the learning outcome are to be determined by the teacher. The teacher uses curriculum materials, such as syllabus documents and teacher guides, as well as textbooks or electronic media and assessment guidelines, to plan activities that will assist students achieve the learning outcomes.

The outcomes approach has two purposes. They are:

- to equip all students with knowledge, understandings, skills, attitudes and values needed for future success
- to implement programs and opportunities that maximise learning.

Three assumptions of outcomes-based education are:

- all students can learn and succeed (but not on the same day or in the same way)
- success breeds further success
- schools can make a difference.

The four principles of the Papua New Guinean outcomes approach are:

1 *Clarity of focus through learning outcomes*

This means that everything teachers do must be clearly focused on what they want students to be able to do successfully. For this to happen, the learning outcomes should be clearly expressed. If students are expected to learn something, teachers must tell them what it is, and create appropriate opportunities for them to learn it and to demonstrate their learning.

2 *High expectations of all students*

This means that teachers reject comparative forms of assessment and embrace criterion-referenced approaches. The 'principle of high expectations' is about insisting that work be at a very high standard before it is accepted as completed, while giving students the time and support they need to reach this standard. At the same time, students begin to realise that they are capable of far more than before and this challenges them to aim even higher.

3 *Expanded opportunities to learn*

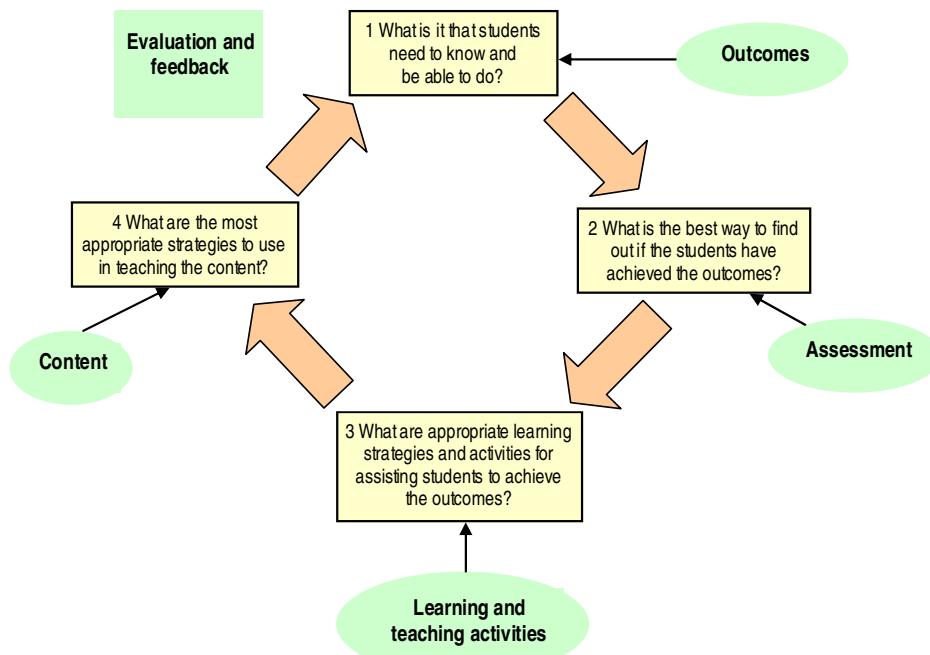
This is based on the idea that not all students can learn the same thing in the same way in the same time. Some achieve the learning outcomes sooner and others later. However, most students can achieve high standards if they are given appropriate opportunities. Traditional ways of

organising schools do not make it easy for teachers to provide expanded opportunities for all students.

4 *Planning and programming by ‘designing down’*

This means that the starting point for planning, programming and assessing must be the learning outcomes—the desired end results. All decisions on inputs and outputs are then traced back from the learning outcomes. The achievement of the outcome is demonstrated by the skills, knowledge and attitudes gained by the student. The syllabuses and/or teacher guides describe some ways in which students can demonstrate the achievement of learning outcomes.

Outcomes-based approach



Learning outcomes provide teachers with a much clearer focus on what students should learn. They also give teachers greater flexibility to decide what is the most appropriate way of achieving the learning outcomes and meeting the needs of their students by developing programs to suit local content and involve the community.

The outcomes approach promotes greater accountability in terms of student achievement because the learning outcomes for each grade are public knowledge—available to teachers, students, parents and the community. It is not the hours of instruction, buildings, equipment or support services that are the most important aspect of the education process but rather, what students know and can do, as they progress through each grade. The outcomes approach means that learning

- has a clearer purpose
- is more interactive—between teacher and students, between students
- has a greater local context than before
- is more closely monitored and acted upon by the teacher
- uses the teacher as a facilitator of learning as well as an imparter of knowledge.

Learning outcomes

The syllabus learning outcomes describe what students know and can do at the end of Grade 12. The level of achievement of the learning outcome should improve during the two years of Upper Secondary study, and it is at the end of the study that students are given a summative assessment on the level of achievement of the learning outcome.

Information Communication Technologies	Computer Studies
<p>Students can:</p> <ol style="list-style-type: none"> 1 identify and describe computer hardware and software and their functions and capabilities 2 identify and describe a variety of information systems and how these are used within organisations 3 demonstrate knowledge and understanding of the legal and ethical issues of using and producing IT solutions and their effects on the society 4 describe suitable network designs to solve small business or organisational needs 5 demonstrate knowledge of procedures for protecting and keeping data securely on a computer or network 6 describe the hardware and software required for electronic communication between computers and computer systems including methods of connection 7 demonstrate understanding of the internet and e-mail and the issues involved 8 apply advanced skills and concepts in creating solutions to information problems using a range of software 9 develop multimedia presentations using a range of hardware and software devices. 	<p>Students can:</p> <ol style="list-style-type: none"> 1 identify and describe computer hardware and software and their functions and capabilities 2 demonstrate knowledge and understanding of the legal and ethical issues of using information technology 3 apply basic skills in using computer software for research purposes 4 apply basic skills and concepts in creating documents using word processing 5 demonstrate understanding of the internet and e-mail and related issues 6 apply knowledge and skills in creating solutions to information problems using a range of software 7 develop multimedia presentations using a range of hardware and software devices 8 identify and describe a variety of information systems and how these are used within organisations

Learning and teaching

How students learn

What I hear I forget.
What I hear and see I remember a little.
What I hear, see and discuss I begin to understand.
What I hear, see, discuss and do, I acquire knowledge and skills.
What I teach to another, I master.

(‘Active learning credo’ statement, Silberman 1996)

In support of this are these findings: that we remember:

20 per cent of what we hear
40 per cent of what we see
90 per cent of what we see, hear, say and do or what we discover for ourselves.

A student-centred approach to learning and teaching

Different students learn in different ways. Some students learn best by writing, others by talking and discussing, others by reading and others by listening. Most students learn by using a combination of these. All people learn skills through practise and repetition. You need to use a variety of teaching to cater for the different ways your students learn.

You, as a teacher, must teach the knowledge that is included in the syllabus documents. Not only do you have to be able to teach what students should know, you must also be able to interpret that knowledge for students in a way that makes it relevant to them, and enables them to begin to acquire skills of analysis and problem solving, which will support learning and teaching. You also need to give students some opportunities to apply their knowledge, to be creative and to solve problems.

Students who participate in guided instruction learn more than students who are left to construct their own knowledge (Mayer 2004). You need to employ a variety of learning and teaching approaches because all students do not learn in the same way. The ‘auditory learner’ prefers to use listening as the main way of learning new material whereas a ‘visual learner’ prefers to see things written down.

Students should be actively involved in their learning and therefore you need to design appropriate practical activities or experiments, using resources that can be found in your location. In Grades 11 and 12, students will already have had a wide variety of experiences. You need to make use of your students’ experiences when designing and conducting learning in class, so that learning is connected to your students’ world.

The most efficient and long-lasting learning occurs when teachers encourage the development of higher-order thinking and critical analysis skills, which include applying, analysing, evaluation and creating. Attention should also be paid to developing students’ affective and psychomotor skills. To make sure that this takes place, you should encourage deep or rich—rather than shallow—coverage of knowledge and understandings.

There are many learning and teaching strategies described in the Lower Secondary teacher guides.

Learning and teaching strategies

To assist and encourage students to learn, you perform certain tasks. These are referred to as 'teaching strategies'. You need to engage students directly in learning but there are times when you have to take charge of the learning in the class and teach particular concepts or ideas.

Teaching strategies include:

- group work
- skills practice
- research and inquiry
- class discussions or debates
- problem-solving activities
- teacher talk, instructions, explanations, lectures or reading aloud
- directed question and answer sessions
- audiovisual presentations
- textbooks or worksheets
- directed assignments
- demonstration and modelling
- guest speakers
- classroom displays.

Using groups of different sizes as a learning and teaching strategy

Using groups is an important strategy, as students learn from each other and not just from the teacher; it encourages students to participate in achieving a shared goal. Group work encourages cooperative learning.

In deciding whether or not to use groups, you need to consider the following:

- your intended outcomes
- the extent to which the outcomes can be achieved by the group
- the lesson content
- the time allocated for the completion of the task
- the classroom setting
- available materials and resources
- the structure of the group, based on gender, ability, cultural background and student preferences

Groups work well when:

- the group decides upon their goal, timelines and tasks with reference to the design brief
- students realise that success depends on the achievement of the whole group, not individuals
- the task is broken into subtasks which must be completed successfully
- the whole class is involved in the activity and everyone has a role to play; for example, in performances
- membership of small groups is changed regularly to provide a variety of learning experiences for all students.

Strategies for organising and managing groups

- mixed-ability groups: the more able learners in the group can help the others to master the work so that the teacher need not teach some parts
- same-ability groups: the teacher can leave the groups of faster learners to get on with the work on their own. She or he can give extra help to individual learners in the slower groups
- using group leaders: some teachers appoint faster, more able learners as group leaders who can help slower learners

The most efficient and long-lasting learning occurs when teachers encourage the development of higher-order thinking and critical analysis skills, which include applying, analysing, evaluation and creating. Attention should also be paid to developing students' affective and psychomotor skills. To ensure that this occurs, you should encourage deep or rich, rather than shallow, coverage of knowledge and understandings.

Developing ICT and Computer Studies skills

Using computers is an essential part of the study of Information Communication Technologies (ICT) and Computer Studies. It facilitates the understanding of ICT and Computer Studies processes and inquiry.

Using computers can enhance learning opportunities for a wide range of students because it caters for a variety of learning and teaching styles.

Principles and procedures

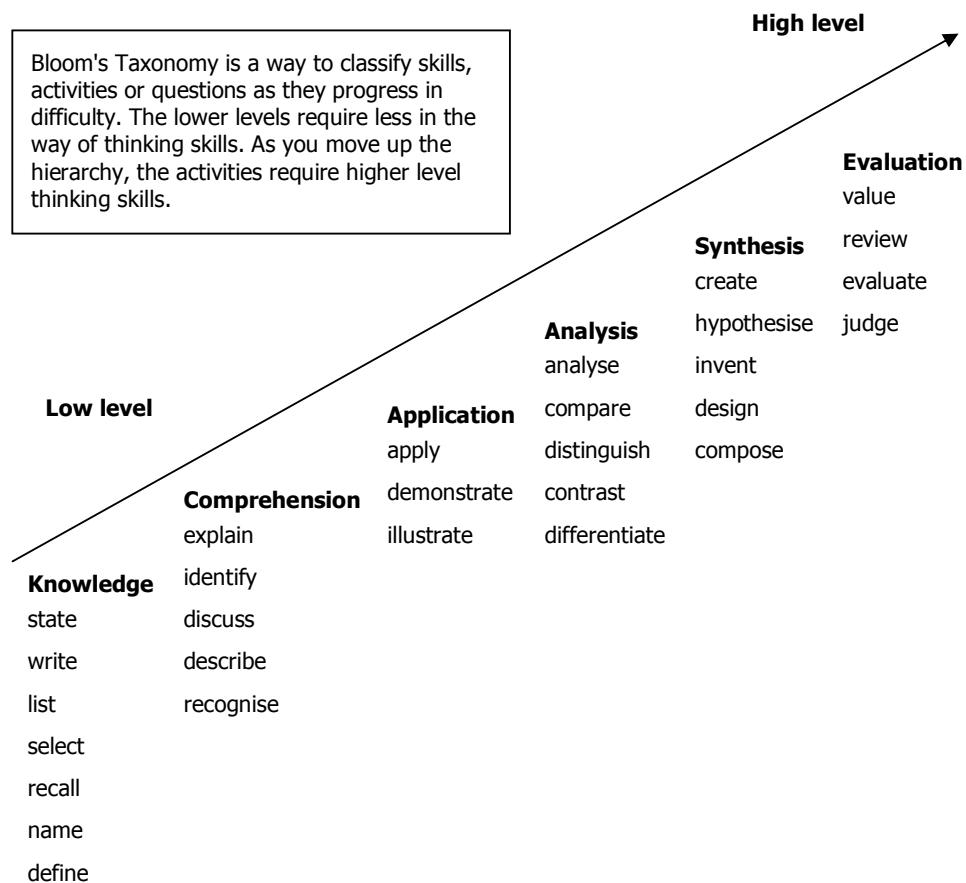
Students need to develop skills to help them learn. Skills development should happen as a part of students' learning experiences and the learning and practising of skills needs to occur in the context of units being taught.

Skills learning tends to be most effective when:

- students go from the known to the unknown
- students understand why it is necessary to gain mastery of specific skills
- skills are developed sequentially at increasing levels of difficulty
- students identify the components of the skill
- the whole skill and the components of the skills are demonstrated
- there are frequent opportunities for practice and immediate feedback
- the skills being taught are varied in terms of amount and type, according to the needs of students
- the skill is used in a range of contexts.

To teach skills effectively, you need to include learning activities that span the range from teacher-directed to student-centred learning, use groups of different sizes ranging from the whole class to small groups and use a range of teaching strategies which use higher-order skills as students progress.

Bloom's taxonomy of skills



Teaching and learning strategies for ICT and Computer Studies

Brainstorming

This is a technique in which a class or group meets in order to record all the information already known on a topic, to develop new ideas or to stimulate creative thinking. Participants 'let the ideas come into their heads', write them down, sort them and decide which require further research. This is an excellent technique used in the introduction of a unit to gain an understanding of student's prior knowledge. This strategy could be used where students could be asked to identify where they have seen different lettering or investigate different types of lettering found on a range of electronic, print or other materials.

Consequence charts

A consequence chart is used to record what students believe to be the likely consequences of a decision or action. Charts can take different forms and enable students to explore cause and effect relationships, alternative consequences or the likely consequences of alternative actions or decisions. For instance, this strategy could be used when teaching about safety:

students could discuss what would happen if they did not follow safety procedures and practices.

Classroom displays

A classroom display provides a way of focusing on the current unit. It stimulates learning and provides a record of learning as well as encouraging students to interact and to respond to learning.

Charts

Helping students to learn to use charts, that is, to organise information in various groupings under different headings, is valuable. It not only helps them to make sense out of a previously unrelated mass of data, but it is a crucial step in the process of developing new ideas and concepts to use in making sense of their experiences. Charts are a powerful organising tool and of considerable help in getting students to think about information and concepts; a chart, for example, could be made to list and classify different food groups or to list the uses of a range of tools.

Flow charts

A flow chart is a diagram showing a series of step-by-step operations, which make up a particular process. The main elements of the process are shown in picture form and are linked by arrows to indicate how one operation leads to the next. A flow chart can also be used to show stages in the development of a product.

Diagrams

Diagrams may be used to illustrate features of an object. They can show how something works, such as the parts of a computer. The best diagrams are clear, with all the necessary details and labels to identify features and explain how it operates.

Evaluation

Evaluation involves weighing up options, consequences and evidence in order to make choices and take action. The evaluation stage in the design process requires students to reflect on the process of designing, planning, making and marketing to see if a product could be improved in the future.

Discussion

Discussions provide opportunities to express ideas and feelings, listen to others and to look at issues from other perspectives. However, it is not practical for more than 20 people in a class. If class discussions are to be used in a large class, the class should be divided into two or more groups.

Guest speaker or visitor

A guest speaker or visitor is a person who is invited to share his or her knowledge and skills with students. This may be a teacher from another class, a parent, a member of the local community or a representative from a group, organisation or institution.

Models

Models provide demonstration of a concept in concrete form. Models can include items made from timber, clay, fabrics and traditional materials.

Photographs and pictures

Photographs and pictures are visual texts. They can be used to develop numerous skills, such as observing, classifying, grouping, comparing and contrasting. Photographs allow for reinvestigation of first-hand experiences at a later date. They also clarify and stimulate further inquiry. Students can take and use photographs as a means of gathering and recording information.

Computer technology enables photographs to be stored and reproduced in various ways. Pictures or photographs of tools, equipment and machines are particularly useful when emphasising safety aspects and issues.

Photographs taken using digital cameras can also be used to produce slide shows or movies.

Presentations

Presentations are used to share information obtained through individual and group research and study. Presentations can be spoken, written or multimedia. They give students experience in organising, planning and presenting information and material to a particular audience and are therefore valuable experiences for both the presenter and the audience.

Problem solving

A particularly relevant teaching and learning strategy for ICT and Computer Studies briefs is problem solving. Students are involved in identifying and working towards solutions to design problems. The classroom, school grounds, community and home all contain problems that are appropriate starting points for investigation by students.

The purpose of learning through the application of problem-solving skills is to link conceptual understandings with practical experiences. It is important that students be given opportunities to apply problem-solving techniques to a range of issues.

The teacher's role is to:

- assist students identify problems that are relevant and solvable
- organise learning that develops skills in problem solving
- choose learning activities that encourage responsible actions.

Reflective learning

Reflection is the act of thinking about what has been learnt. It often involves putting learning into a new context, looking at the experiences in a new light, interpreting what has been said or done for different applications or a new situation. Teachers need to provide time both during and at the end of any learning experience for students to contemplate the content and processes in which they have been involved. This time needs to allow for individual, small group and whole class reflection. As a result of reflective learning students may develop flexibility and creativity.

Research

One of the best ways to learn about ICT and Computer Studies is to think of the questions you want answered or what you want to know and inquire about the things which interest you. This means doing your own research to find the answers. The same applies to your students. There are a number of steps involved in doing research and the best results are achieved if students do things in the right order and ask the following questions.

Defining

- What do I want to find out?
- What is my purpose?
- What are key words or ideas of this task?
- What do I need to do?

Locating

- Where can I find the information I need?
- What do I already know?
- What do I still need to find out?

Selecting

- What information do I really need?
- What can I leave out?
- How relevant is the information I have found?
- How reliable is the information I have found?
- How will I record all the information?

Organising

- How can I best use this information?
- Do I need to use all the information?
- How can I best combine information from different sources?

Presenting

- How can I present this information?
- With whom will I share this information?
- How does the audience affect my presentation?

Assessing

- What did I learn from all this?
- Did I achieve what I set out to achieve?
- How did I go with each step of the information process?
- How did I go with presenting my information?
- Where do I go from here?

Tables and graphs

Graphs are used to show how an item or items of information change over a given time.

Line graphs may take the form of a smooth curve or may consist of line segments that join places plotted on the graph.

Bar graphs are used to show totals of information. This information can be shown for one item over a number of time periods, or for a number of items over one time period. The height of the base indicates clearly the total of the information being shown. Bar graphs can also be used to compare totals of one or more items.

A *circle or pie graph* is an accurate way of showing how each item of data contributes to complete a picture. The ‘slices’ of the ‘pie’ are drawn proportionally in a clear, colourful way to show the percentages they represent.

A *table* is also useful for organising information. Information in tables is usually presented in columns enclosed by a frame and including headings within a frame.

Using the internet for investigations

The internet encompasses a number of facilities including the World Wide Web and electronic mail (e-mail). It is both a useful source of information on many topics and a means of communicating with people in other places. Specific skills are required to access information on the internet and, more importantly, to critically evaluate and validate such information.

Values education

No educational activity is value-free. You have a responsibility to impart to your students Papua New Guinean values, and moral, ethical, democratic, and educational values.

What do students do in ICT and Computer Studies?

Using computers enables students to acquire skills in:

- designing solutions to a computer problem (problem-solving skills)
 - investigation
 - design
 - production
 - evaluation
- operating a computer (operational skills)
 - starting up and shutting down a computer
 - using a keyboard to enter words and data
 - using a printer and other devices attached to the computer
 - organising and managing documents and files using a storage device
 - accessing documents on a network
 - storing and retrieving documents
 - backing up files
- using different types of software (software skills)
 - choosing appropriate software to carry out a particular task
 - using a word processor to create assignments, essays, reports and stories

- using a spreadsheet to solve problems that use numbers
- making pictures using graphics programs
- making changes to information in a database
- using a browser to access information on the internet
- recording and creating your own video
- recording and creating your own sounds
- creating and managing a website that includes text, graphics, colour, sound, animation and video
- using a network such as a LAN and internet (network skills)
 - using electronic mail to send and receive messages
 - using a computer to communicate with people
 - accessing and storing data on a local area network
 - using a computer to access the World Wide Web
- finding relevant and useful information quickly (information literacy skills)
 - using computer software help files located on disk and online
 - using electronic encyclopaedias and dictionaries
 - using search engines on the Web to find information
 - critically evaluating the usefulness of information found
- producing effective and well-presented documents (document skills)
 - arranging information in an interesting manner
 - making a document easy to read
 - being able to produce documents to be accessed online
- communicating information effectively (communication skills)
 - producing a document that is well laid out and easy to read
 - creating a spreadsheet that clearly shows important information
 - creating a presentation that shows important points clearly and concisely
 - creating a webpage that is easy to read and navigate.

Developing a program

A teaching program outlines the nature and sequence of learning and teaching necessary for students to demonstrate the achievement of the learning outcomes. The content of the syllabus describes the learning context and the knowledge required for the demonstration of each outcome. The relevant learning outcomes for each unit or topic are stated at the beginning of the unit and the requirements of the outcomes are elaborated.

Teachers must develop programs that include appropriate learning activities to enable students to develop the knowledge and skills identified in the outcome statements.

The content prescribed in the units indicates the breadth and depth with which topics should be treated. The sequence of teaching is prescribed by the sequence of content. The learning outcomes and assessment, however, must be central to the planning of the teaching program.

Planning and programming units

The main purpose of planning and programming is to help you to arrange the presentation of the unit in an organised manner. This will help you to know what to teach and when to teach it. It is strongly recommended that you make plans with the other teachers who teach the same subject. By planning together, you will *all* have better lessons and make better use of your limited resources.

Points to consider when programming

- Which outcomes are students working towards?
- What is the purpose of this unit or topic or learning experience?
- Which learning experiences will assist students to develop their knowledge and understandings, skills, and values and attitudes, in ICT and Computer Studies?
- What are the indicators of student learning that you would expect to observe?
- How can the learning experiences be sequenced?
- How do the learning experiences in the unit relate to students' existing knowledge and skills?
- How are individual learning needs to be catered for?
- What are the literacy demands of this unit or learning experience?
- What authentic links can be made with the content of other subjects?
- How can school events and practices be incorporated into the program?
- Do the assessment methods address the outcomes and enhance the learning?
- How can the assessment be part of the learning and teaching program?

The planning process

In this teacher guide, ideas for programming and organising have been provided. These have been arranged in steps to help you teach the unit. The steps follow the thinking processes involved in the outcomes approach.

Step 1: Interpreting the learning outcomes

The first step is to read the description in the syllabus. Then study the learning outcomes and what students do to achieve the learning outcomes, in order to determine what students will know and be able to do by the end of the unit. You need to look at the action verb, concept and context of each learning outcome. This will help you to see what skills and knowledge are embedded in the outcome.

Step 2: Planning for assessment

It is necessary to plan for assessment early to ensure that you teach the content and skills students need to achieve the learning outcomes. You will have to decide when to schedule assessment tasks to allow yourself time to teach the required content and time for students to develop the necessary skills. You will also need time to mark the task and provide feedback.

Practical tasks may, for example, be broken into a series of stages that are marked over several weeks as students progress with making their product. It is not appropriate to leave all assessment until the end of the unit.

This teacher guide provides performance standards and examples of a marking guide. You should develop marking guides when you are marking tasks to ensure consistency in your assessment. You must also develop clear and detailed instructions for completing the task and make sure all students know exactly what they have to do.

Step 3: Programming a learning sequence

This step requires you to develop a program outlining a sequence of topics and the amount of time spent on each topic. If the unit involves a project, for example, you may plan to teach some theory at appropriate stages during the project, rather than teaching all the theory before the students start the project. To develop your program you need to study the topics listed in the syllabus and to think about which learning activities will best provide students with the opportunity to learn the content and practise the appropriate skills, and how long the activities will take. You will have to think about some major activities that last several weeks and smaller activities that may be completed in a single lesson.

Step 4: Elaboration of activities and content

Once you have mapped out your program for the term, you must then develop more detailed plans for each topic in the unit. All units require students to be actively engaged in learning, not just copying from the board. Make sure you develop a range of activities that suit all learning needs—some reading and writing, some speaking and listening, some observing and doing.

Browse through the textbooks and teaching resources you have access to and list the chapters, pages or items that you will use for each topic in your program. The textbooks should also provide you with ideas for activities related to the topic. You may have to collect or develop some resources for yourself. Once you have sorted out your ideas and information, you can then develop your more detailed weekly program and daily lesson plans.

This teacher guide gives some suggested learning and teaching activities for each unit and some suggested assessment tasks that you might like to use to ensure active learning.

ICT and Computer Studies requirements

ICT requirements

All units must be completed by students. Some units are theory topics and will be taught concurrently with the practical topic in each term.

Grade	Weeks	Term	Unit	Essential resources for activities and assessment
11.1	10	1	Computer Fundamentals	Used computers (stripped for demonstration), peripheral devices, posters, timeline, slides
11.2	10	1	Advanced Word Processing	Computers, word-processing software, raw data for processing
11.3	10	2	Computers and Society	Computers, word-processing software, raw data for processing, internet connection, ICT policy document, ergonomic chart, secondary storage devices, anti-virus software, HIV and AIDS posters or brochures
11.4	10	2	Advanced Spreadsheets	Computers, spreadsheet software, raw data for processing, storage devices
11.5	10	3	Database 1	Computers, database software, raw data for processing, storage devices
11.6	10	4	Internet 1	Computers, internet browser, storage devices, modem, telephone line, ISP
11.7	10	4	Desktop Publishing	Computers, publishing software, raw data for processing, storage devices, digital or video cameras, scanners, colour printer
12.1	30	1–3	Information and Communication Systems	Computers, file or network server, network software, switches (hub), RJ 45 cables, raw data for processing, storage devices
12.2	10	1	Database 2	Computers, database software, raw data for processing, storage devices
12.3	10	2	Internet 2	Computers, internet browser, storage devices, modem, telephone line, ISP, raw data for processing, digital or video cameras, scanners, colour printer, LCD projector, OHS, audio speakers
12.4	10	3	Multimedia	Computers, internet browser, storage devices, modem, telephone line, ISP, raw data for processing, digital or video cameras, scanners, colour printer, LCD projector, OHS, audio speakers
12.5	3	4	Computers and Employment	Computers, word-processing software, raw data for processing

Computer Studies requirements

All units must be completed by students. Some units are theory topics and will be taught concurrently with the practical topic in each term.

Grade	Weeks	Term	Unit	Essential resources for activities and assessment
11.1	10	1	Computer Fundamentals	Used computers (stripped for demonstration), peripheral devices, posters, timeline, slides
11.2	10	2	File and Information Management	Computers, word-processing software, raw data for processing, electronic encyclopaedia, storage devices
11.3	10	2	Word Processing	Computers, word-processing software, raw data for processing
11.4	10	3	Computers and Society	Computers, word-processing software, raw data for processing, internet connection, ICT policy document, ergonomic chart, secondary storage devices, anti-virus software, HIV and AIDS posters or brochures
11.5	10	3	Desktop Publishing	Computers, publishing software, raw data for processing, storage devices, digital or video cameras, scanners, colour printer
11.6	10	4	The Internet	Computers, internet browser, storage devices, modem, telephone line, ISP, raw data for processing, digital or video cameras, scanners, colour printer, LCD projector, OHS, audio speakers
12.1	30	1–3	Information and Communication Systems	Computers, file or network server, network software, switches (hub), RJ 45 cables, raw data for processing, storage devices
12.2	10	1	Multimedia	Computers, internet browser, storage devices, modem, telephone line, ISP, raw data for processing, digital or video cameras, scanners, colour printer, LCD projector, OHS, audio speakers
12.3	10	2	Spreadsheets	Computers, spreadsheet software, raw data for processing, storage devices
12.4	10	3	Databases	Computers, database software, raw data for processing, storage devices
12.5	3	4	Computers and Employment	Computers, word-processing software, raw data for processing

Assessing ICT and Computer Studies

Assessment is an important part of learning and teaching. It is used to:

- evaluate and improve learning and teaching
- report achievement
- provide feedback to students on their progress
- provide feedback to stakeholders.

Criterion-referenced assessment

Assessment in ICT and Computer Studies is criterion-referenced and measures students' achievement of the learning outcomes described in the syllabus. In criterion-referenced assessment, particular knowledge, skills or abilities are specified as criteria that must be achieved. The extent to which they are achieved is assessed and facilitated by the teacher.

Criterion-referenced assessment often takes on a problem-centred orientation, rather than a knowledge-based orientation. To achieve an outcome means having to demonstrate the attainment of skills and attitudes, not just write about them. Assessment then becomes more than just a means of judging knowledge and performance—it becomes an integral part of the learning process itself. Criterion-referenced assessment is:

- standards or criterion-referenced; that is, outcomes are judged against pre-defined standards (see table below)
- direct and authentic, related directly to the learning situation. This has the potential for motivating learning, since students can see a direct relevance between what is learnt and what is assessed.

Norm-referenced assessment

'Norm-referenced assessment' makes judgements on how well the student did in relation to others who took the test. It is often used in conjunction with a curve of 'normal distribution', which assumes that a few will do exceptionally well and a few will do badly and the majority will peak in the middle, normally judged as average.

Example of a criterion-referenced test

The driving test is the classic example of a criterion-referenced test. The examiner has a list of criteria, each of which must be satisfactorily demonstrated in order to pass; for example, completing a three-point turn without hitting either kerb.

The important thing is that failure in one criterion cannot be compensated for by above-average performance in others; nor can a student fail in spite of meeting every criterion (as they can in norm-referenced assessment) simply because everybody else that day surpassed the criteria and was better than him or her. Criterion-referenced assessment has the following characteristics:

- a syllabus that describes what students are expected to learn in terms of aims, outcomes and content

- a syllabus that provides a clear sense of the syllabus standards through its aims, outcomes and content
- tasks designed to produce an image of what students have achieved at that point in the learning and teaching process relative to the outcomes
- standards of performance at different levels: the 'performance standards'
- a report that gives marks referenced to predetermined standards
- assessment tasks that refer to syllabus outcomes, content, assessment components and component weightings
- external exams that are based on syllabus outcomes and content. External markers use standards-referenced marking guidelines developed by the ICT examination committee.
- assessment that is better-integrated with learning and teaching.

Criterion or standards-referenced assessment in ICT

Learning outcomes performance standards					
Learning outcomes	Very high achievement	High achievement	Satisfactory achievement	Low achievement	Below minimum standard
1. Identify and describe computer hardware and software and their functions and capabilities	Independently identifies and describes in detail a wide range of hardware and software and their functions and capabilities	Identifies and describes in detail a range of computer hardware and software and their functions and capabilities	Identifies and describes some computer hardware and software and their functions and capabilities	Identifies some computer hardware and software and their functions and capabilities	Has failed to meet the minimum standard required
2. Identify and describe a variety of information systems and how these are used within organisations	Independently identifies and describes in detail a wide range of information systems and demonstrates understanding of how these are used within organisations	Identifies and describes in detail a range of information systems and demonstrates knowledge of how these are used within organisations	Identifies and describes some information systems and how these are used within organisations	Identifies and describes at least one information system and how these are used within organisations	Has failed to meet the minimum standard required
3. Demonstrate knowledge and understanding of the legal and ethical issues of using and producing IT solutions and their effects on the society	Demonstrates extensive knowledge and understanding of a wide range of complex legal and ethical issues of using information technology	Demonstrates thorough knowledge and understanding of a range of legal and ethical issues of using information technology	Demonstrates some knowledge and understanding of legal and ethical issues of using information technology	Demonstrates some knowledge of legal and ethical issues of using information technology	Has failed to meet the minimum standard required
4. Describe suitable network designs to solve small business or organisational needs	Researches, identifies and describes in detail suitable network designs to solve complex small business or organisational needs	Identifies and describes in detail suitable network designs to solve small business or organisational needs	Describes some network designs to solve small business or organisational needs	Describes at least one network designs to solve small business or organisational needs	Has failed to meet the minimum standard required

Learning outcomes performance standards					
Learning outcomes	Very high achievement	High achievement	Satisfactory achievement	Low achievement	Below minimum standard
5. Demonstrate knowledge of procedures for protecting and keeping data securely on a computer or network	Demonstrates extensive knowledge and understanding advanced procedures for protecting and keeping data securely on a computer and network	Demonstrates broad knowledge and understanding of procedures for protecting and keeping data securely on a computer and network	Demonstrates some knowledge and understanding of procedures for protecting and keeping data securely on a computer or network	Demonstrates limited knowledge and understanding of procedures for protecting and keeping data securely on a computer or network	Has failed to meet the minimum standard required
6. Describe the hardware and software required for electronic communication between computers and computer systems including methods of connection	Researches, identifies and describes in detail a range of hardware and software required for electronic communication between computers and computer systems including alternative methods of connection	Identifies and describes in detail a number of hardware and software required for electronic communication between computers and computer systems including methods of connection	Describes some hardware and software required for electronic communication between computers and computer systems including methods of connection	Describes some hardware and software required for electronic communication between computers	Has failed to meet the minimum standard required
7. Demonstrate understanding of the internet and e-mail and the issues involved	Demonstrates extensive knowledge and understanding of the internet and e-mail and a wide range of complex issues involved	Demonstrates thorough knowledge and understanding of the internet and e-mail and a wide range of issues involved	Demonstrates knowledge and understanding of the internet and e-mail and some issues involved	Demonstrates some knowledge of the internet and e-mail and some issues involved	Has failed to meet the minimum standard required
8. Apply advanced skills and concepts in creating solutions to information problems using a range of software	Independently selects and proficiently applies a wide range of relevant, advanced skills and concepts in creating original solutions to information problems using a range of software	Independently selects and applies a range of relevant, advanced skills and concepts in creating original solutions to information problems using a range of software	Uses advanced skills and concepts in creating solutions to information problems using a range of software	Uses skills and concepts in creating solutions to information problems using a limited range of software	Has failed to meet the minimum standard required
9. Develop multimedia presentations using a range of hardware and software devices	Independently develops advanced multimedia presentations using advanced features and a range of hardware and software devices	Independently develops multimedia presentations using advanced features and a range of hardware and software devices	Develops multimedia presentations using a range of hardware and software devices	Develops multimedia presentations using one hardware and software device	Has failed to meet the minimum standard required

Criterion or standards-referenced assessment in Computer Studies

Learning outcomes performance standards					
Learning outcomes	Very high achievement	High achievement	Satisfactory achievement	Low achievement	Below minimum standard
1. Identify and describe computer hardware and software and their functions and capabilities	Identifies and describes in detail a wide range of hardware and software and their functions and capabilities	Identifies and describes a range of computer hardware and software and their functions and capabilities	Identifies and describes some computer hardware and software and their functions and capabilities	Identifies some computer hardware and software and their functions and capabilities	Has failed to meet the minimum standard required
2. Demonstrate knowledge and understanding of the legal and ethical issues of using information technology	Demonstrates extensive knowledge and understanding of a wide range of complex legal and ethical issues of using information technology	Demonstrates thorough knowledge and understanding of a range of legal and ethical issues of using information technology	Demonstrates some knowledge and understanding of legal and ethical issues of using information technology	Demonstrates some knowledge of legal and ethical issues of using information technology	Has failed to meet the minimum standard required
3. Apply basic skills in using computer software for research purposes	Proficiently applies a range of advanced skills in using computer software for a variety of research purposes	Applies a range of advanced skills in using computer software for a variety of research purposes	Applies basic skills in using computer software for research purposes	Applies limited skills in using computer software for research purposes	Has failed to meet the minimum standard required
4. Apply basic skills and concepts in creating documents using word processing	Proficiently applies a range of advanced skills in creating documents using word processing	Applies a range of advanced skills in creating documents using word processing	Applies basic skills in creating documents using word processing	Applies limited skills in creating documents using word processing	Has failed to meet the minimum standard required
5. Demonstrate understanding of the internet and e-mail and related issues	Demonstrates thorough knowledge and understanding of the internet and e-mail and a wide range of issues involved	Demonstrates knowledge and understanding of the internet and e-mail and some issues involved	Demonstrates knowledge of the internet and e-mail and some issues involved	Demonstrates limited knowledge and understanding of the internet and e-mail	Has failed to meet the minimum standard required
6. Apply knowledge and skills in creating solutions to information problems using a range of software	Selects and applies a range of relevant, advanced skills and concepts in creating original solutions to information problems using a range of software	Uses advanced skills and concepts in creating solutions to information problems using a range of software	Uses skills and concepts in creating solutions to information problems using a limited range of software	Uses limited skills and concepts in creating solutions to information problems using a limited range of software	Has failed to meet the minimum standard required
7. Develop multimedia presentations using a range of hardware and software devices	Develops advanced multimedia presentations using advanced features and a range of hardware and software devices	Develops multimedia presentations using advanced features and a range of hardware and software devices	Develops multimedia presentations using a range of hardware and software devices	Develops a multimedia presentation using a hardware and software device	Has failed to meet the minimum standard required

Learning outcomes performance standards					
Learning outcomes	Very high achievement	High achievement	Satisfactory achievement	Low achievement	Below minimum standard
8. Identify and describe a variety of information systems and how these are used within organisations	Identifies and describes in detail a range of information systems and demonstrates knowledge of how these are used within organisations	Identifies and describes a range of information systems and how these are used within organisations	Identifies and describes some information systems and how these are used within organisations	Identifies at least one information system and how these are used within organisations	Has failed to meet the minimum standard required

Assessment *for* learning

Assessment *for* learning is often called ‘formative assessment’. It is assessment that gathers data and evidence about student learning during the learning process. It enables you to see where students are having problems and to give immediate feedback, which will help your students learn better.

It also helps you plan your program to make student learning, and your teaching, more effective. Often it is informal—students can mark their own work or their friend’s. An example is a quick class quiz to see if students remember the important points of the previous lesson.

Assessment *of* learning

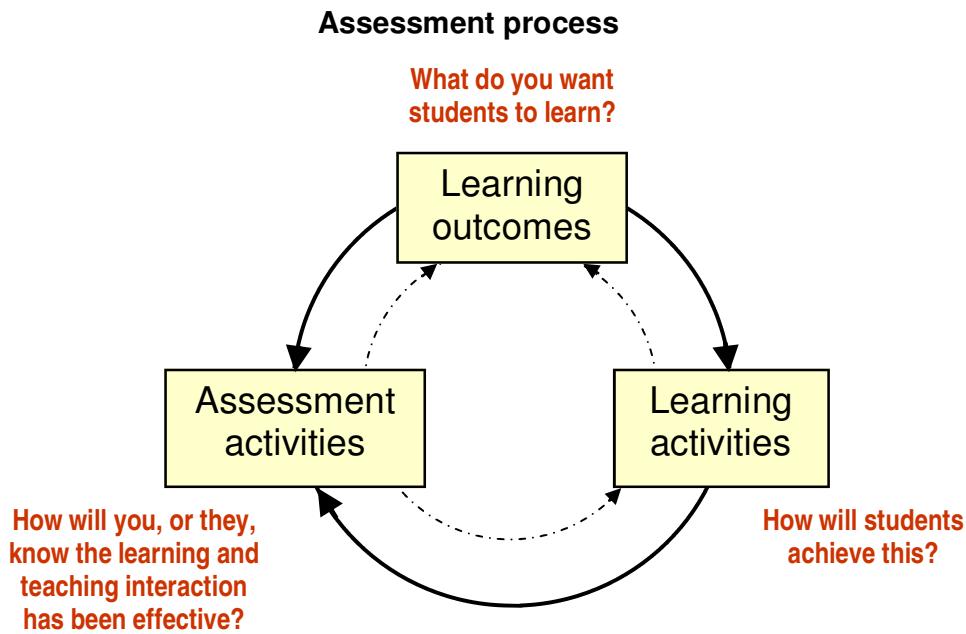
Assessment *of* learning is often called ‘summative assessment’. Summative assessment is used to obtain evidence and data that shows how much learning has occurred, usually at the end of the term or unit. End-of-year examinations are examples of summative assessment. It is usually done for formal recording and reporting purposes.

Assessing ICT and Computer Studies units

In ICT and Computer Studies the learning outcomes are assessed using the range of assessment methods specified in the syllabus (in the table of components, weightings and tasks).

In deciding what to assess, the starting point is: ‘what do you want students to do and/or learn?’ and following from this: ‘how will the students engage with the material?’ which in turn leads to the design and development of learning tasks and activities. It is crucial that at this point the assessment tasks clearly link back to the learning outcomes and are appropriate for the learning activities.

The assessment can be used for formative and summative purposes. Assessment can be represented as:



Once it is clear what needs to be assessed and why, then the form the assessment will take needs to be determined.

There are many types of assessment tasks that can be implemented; the factors that will determine choices include:

- the students—how many are there, what is expected of them, how long will the assessment task take?
- the learning outcomes of the subject and how they might be best achieved.

During the year you must set assessment tasks that ensure that all the learning outcomes of the subject have been assessed internally.

Each task you set must include assessment criteria that provide clear guidelines to students as to how, and to what extent, the achievement of the learning outcomes may be demonstrated.

Marking guides and assessment criteria help you with the marking process and ensure that your assessment is consistent across classes. It is important that marking guides and assessment criteria are collectively developed.

Students must complete the assessment tasks set. Each task must provide clear guidelines to students for how the task will be completed and how the criteria will be applied.

When you set a task, make sure that:

- the requirements of the task are made as clear as possible to the student
- the assessment criteria and performance standards or marking guides are provided to students so that they know what it is that they have to do
- sources or stimulus material used are clear and appropriate to the task
- instructions are clear and concise
- the language level is appropriate for the grade
- it does not contain gender, cultural or any other bias
- materials and equipment needed are available to students
- adequate time is allowed for completion of the task.

Assessment methods

Although assessment components and weightings are stipulated in the syllabus, you decide which assessment method to use when assessing the learning outcomes.

You should use a variety of assessment methods to suit the purpose of the assessment.

Assessment can be classified into four categories:

- tests
- product or project assessments
- performance assessments
- process skills assessments

Because each has limitations, maintaining a balance of assessment methods is very important.

Tests

A 'test' is a formal and structured assessment of student achievement and progress, which the teacher administers to the class.

Tests are an important aspect of the learning and teaching process if they are integrated into the regular class routine and not treated merely as a summative strategy.

Tests allow students to monitor their progress and provide valuable information for you in planning further learning and teaching activities.

Tests will assist student learning if they are clearly linked to the outcomes. Evidence has shown that several short tests are more effective for student progress than one long test. It is extremely important that tests are marked and that students are given feedback on their performance.

There are many different types of tests. Tests should be designed to find out what students know, and also to find out about the development of their thinking processes and skills. Open questions provide more detailed information about achievement than a question to which there is only one answer.

Principles of designing classroom tests

Tests allow a wide variety of ways for students to demonstrate what they know and can do. Therefore:

- students need to understand the purpose and value of the test
- the test must assess intended outcomes
- clear directions must be given for each section of the test
- the questions should vary from simple to complex
- marks should be awarded for each section
- the question types (true or false, fill-in-the-blank, multiple-choice, extended response, short answer, matching) should be varied.

Tests should:

- be easy to read (with space between questions to make reading and writing easier)

- reflect an appropriate reading level
- involve a variety of tasks
- make allowance for students with special needs
- give students some choice in the questions they select
- vary the levels of questions to include gathering, processing and applying information
- provide enough time for all students to finish.

Product or project assessments

A project can be an assessment task, given to an individual student or a group of students, on a topic related to the subject. The project results in a product that is assessed. The project may involve both in-class and out-of-class research and development.

The project should be primarily a learning experience and not solely an assessment task. As a great deal of time and effort goes into producing a quality product from a project assignment task, you should allow class time to work on the project.

A product or project:

- allows the students to formulate their own questions and then try to find answers to them
- provides students with opportunities to use their multiple intelligences to create a product
- allows teachers to assign projects at different levels of difficulty to account for individual learning styles and ability levels
- can be motivating to students
- provides an opportunity for positive interaction and collaboration among peers
- provides an alternative for students who have problems reading and writing
- increases the self-esteem of students who would not get recognition on tests or traditional writing assignments
- allows for students to share their learning and accomplishments with other students, classes, parents, or community members
- can achieve essential learning outcomes through application and transfer.

Assignments

‘Assignments’ are unsupervised pieces of work that often combine formative and summative assessment tasks. They form a major component of continuous assessment in which more than one assessment item is completed within the term.

Any of the methods of assessment can be set as assignments, although restrictions in format, such as word limits and due dates, are often put on the assessment task to make them more practical.

Investigations

An ‘investigation’ involves students in a study of an issue or a problem. Teachers may guide students through their study of the issue; or individual

students, or groups of students, may choose and develop an issue in consultation with the teacher.

This assessment component emphasises the student's investigation of the issue in its context, by collecting, analysing, and commenting on secondary data and information.

Students should be encouraged to consider and explore a variety of perspectives as they develop and state their position on the issue. Students may present the investigation for assessment in a variety of forms, including one or a combination of the following: a written report, an oral presentation, a website, linked documents, multimedia, a video or audio recording.

Criteria for judging performance

The student's performance in the investigation will be judged by the extent to which the student:

- identifies and describes the issue or problem
- describes and explains the causes and effects
- critically analyses information and outlines possible steps leading to a solution or recommendation.

Portfolios

Portfolios provide evidence for judgements of student achievement in a range of contexts. Portfolios contain a specific collection of student work or evidence. This collection of work should provide a fair, valid and informative picture of the student's accomplishments.

Computer-based tasks

Using computers to administer student assessment can provide flexibility in the time, location or even the questions being asked of students. The most common type of computer-based assessment is based on multiple-choice questions, which can assist teachers to manage large volumes of marking and feedback.

Performance or presentation assessments

A 'presentation' provides opportunities for students to develop skills and confidence when presenting to an audience. When presentations are used for assessment purposes, *how* students present is as important as *what* they present.

Performances and presentations can be formal or informal. Class or group performances must be timed and the purpose clearly defined.

All participants have a task to perform. However, as part of learning and teaching or formative assessment, all members should have an opportunity to perform different roles throughout the year. Group presentations can be shared among members to allow all members a turn at talking or performing.

Group and individual oral presentations and performances can be very time-consuming, both in their use of valuable lesson time and in marking. The best approach is to allocate topics or allow students to choose from a variety of topics, to develop clear criteria for presentations, and to require the rest of the class (audience) to take notes, identify key points or write an evaluation to enhance their learning.

‘Spotlighting’ uses individual student checklists. This method can be used to focus on a few selected aspects of student performance or outcomes; for example, when assessing student performances in drama or music. It is best to focus on five to six students at a time, systematically working through the class over time.

‘Focused questioning’ is a technique often used in conjunction with spotlighting. With focused questioning, teachers can gain a deeper awareness as to whether or not students understand the concepts or skills being taught.

Process skills assessments

This method of the assessment component, the ‘process skills assessment’, involves assessing students’ understanding of concepts based on the practical skills that can be used, the evaluation of work done, and/or the reporting of information.

These skills include, for example:

- interpretation skills
- evaluation skills
- reflection skills
- communication skills (such as writing, speaking and listening).

Types of assessment tasks

Using different assessment tasks is the way to make sure that students are able to demonstrate the range of their abilities in different contexts. Each category has advantages in assessing different learning outcomes.

For example, a selected response assessment task, such as a series of multiple-choice questions, is able to assess all areas of mastery of knowledge, but only some kinds of reasoning.

Assessment ideas for individual students or groups

Tests	Products or projects	Performances	Process skills
Extended response	Advertisements	Activities	Analysing
Multiple-choice	Audiocassettes	Announcements	Anecdotal records
Matching	Assignment	Character sketches	Classifying data
Short answer	Banners	Class presentation	Collecting data
Practical tests	Brainstorming	Commercials	Communicating
	Brochures	Conferences	Concept mapping
	Cartoons	Cooperative learning	Conferences: teacher and peer
	Case studies	Demonstrations	Critiquing
	CD or DVD burning	Debates	Debriefing
	Certificates	Discussions	Designing
	Computer creations	Experiments	Evaluation
	Computer games	Explanations	Explanation
	Creating documents	Field trips	Exploration
	Creating tables	Group activities	Interpreting
	Crossword puzzles	Interviews	Interviews

Tests	Products or projects	Performances	Process skills
	Databases Directories Displays Editing videos, music E-mails Evaluating webpages Graphic design Graphs Group presentation Invitation cards Job applications Letters to the Editor Models Movie reviews Multimedia Newsletters Presentation Peer editing critiques Photographs Portfolios Posters Presentation Product descriptions Projects Proposals Publications Questionnaires Recording Research papers Results of surveys Résumés Reviews of TV- programs Scanning Simulation games Spreadsheets Tests TV station Video conferencing Web browsing Web design	Jingles News reports Presentations Reports Role-plays Simulations Surveys TV talk shows Verbal comparisons	Investigation Interaction Interviews Manipulation of data Observations Processing data

Feedback

When you assess the task, remember that feedback will help the student understand why he or she received the result and how to do better next time.

Feedback should be:

- *constructive*, so students feel encouraged and motivated to improve
- *timely*, so students can use it for subsequent learning
- *prompt*, so students can remember what they did and thought at the time
- *focused on achievement*, not effort. The work, not the student, should be assessed
- *specific to the unit learning outcomes*, so that assessment is clearly linked to learning.

Types of feedback

Feedback can be:

- *informal* or *indirect*—such as verbal feedback in the classroom to the whole class, or person to person
- *formal* or *direct*—in writing, such as checklists or written commentary to individual students, in either written or verbal form
- *formative*—given during the topic with the purpose of helping the students know how to improve
- *summative*—given at the end of the topic with the purpose of letting the students know what they have achieved.

Who assesses?

Teacher assessment

Assessment is a continuous process. You should:

- always ask questions that are relevant to the outcomes and content
- use frequent formative tests or quizzes
- check understanding of the previous lesson at the beginning of the next lesson, through questions or a short quiz
- constantly mark or check the students' written exercises, class tests, homework activities and so on
- use appropriate assessment methods to assess the tasks.

Frequency of assessment

You should schedule the specified assessment tasks to fit in with the teaching of the content of the unit that is being assessed. Some assessment tasks might be programmed to be undertaken early in the unit, others at the end of the unit. You should take care not to overload classes with assessment tasks at the end of the term.

Judging student performance

Student achievement is recorded and reported against standards. You must use performance standards or marking guides, examples of which are provided in this teacher guide, when making a decision about the achievement of your students in relation to the learning outcomes.

The performance standards describe the level at which the student has to be working to achieve a particular standard or mark.

Students should always have access to a copy of the assessment criteria and the performance standards, so that they know what it is they have to know and be able to do to get a good mark in a particular task.

The performance standards will help you in your marking and will help your students improve their performance in the future. They are useful when providing feedback to students, as they explain what it is the student needs to do to improve.

Moderation

To make sure that you are interpreting the performance standards correctly when assessing your students, it is important to undertake ICT and Computer Studies moderation of student work within your school and with teachers of nearby schools.

To moderate student work, a common assessment task must be used and a marking scheme developed so that all students complete the same task under the same conditions, and all teachers use the same marking scheme.

Teachers can then compare (moderate) the students' work and come to a common understanding of the performance standards and the requirements for a particular mark or level of achievement.

Moderation enables you to be sure that your understanding of the required standards for levels of achievement is similar to the understanding of other teachers and that you are assessing students at the appropriate level.

Self-assessment and peer assessment

Self-assessment and peer assessment help students to understand more about how to learn. Students should be provided with opportunities to assess their own learning (self-assessment) and the learning of others (peer assessment) according to set criteria.

Self-assessment and peer assessment:

- continue the learning cycle by making assessment part of learning
- show students their strengths and areas where they need to improve
- engage students actively in the assessment process
- enable students to be responsible for the learning
- help to build self-esteem through a realistic view of their abilities
- help students understand the assessment criteria and performance standards.

Managing assessment tasks for ICT and Computer Studies

Usually, the marking of assessment tasks is done by the teacher. To reduce the amount of work it is necessary to develop a strategic approach to assessment and develop efficiencies in marking.

In ICT and Computer Studies there are some assessment tasks that may be new to teachers and students. Below are suggestions on how to manage some of these tasks to minimise marking or presentation time.

Develop efficiency in marking

Clarify assessment criteria

Plan the assessment task carefully, and make sure that all students are informed of the criteria before they begin. Discuss the task and its criteria in class, giving examples of what is required. Distribute a written copy of the instructions and the criteria, or put them on the board.

Making the assessment criteria explicit speeds marking and simplifies feedback.

Supply guidelines on what is required for the task

Supplying guidelines reduces the amount of time wasted evaluating student work that is irrelevant.

Use attachment sheets such as marking guides

An assignment attachment sheet, which is returned with the assessed work, rates aspects of the task with a brief comment. Such a system enables each student's work to be marked systematically and quickly. This strategy can be applied to posters, presentations and performances.

Assess in class

Use class time to carry out and to assess tasks. Performances or presentations, marked by you or the students, enable instant developmental evaluation and feedback.

Brief assessments of projects, stages of the design process, or practical work take less time to mark and are useful because they give immediate feedback to students on their progress and allow you to mark the project in stages with minimum effort.

Feed back to the whole class

Giving feedback to the whole class can cut down on the amount of individual feedback required. On returning assessed work, emphasise the criteria for judging the work, discuss the characteristics of good and bad answers, and highlight common strengths and weaknesses.

Set group-work alternatives

Assess one performance per group. The student's mark is the group mark, but may include a component based on the contribution of the individual.

A strategy for allocating an individual mark includes each member of the group using criteria to evaluate the relative contributions of individuals, with the marks averaged for the individual.

Set clear deadlines

Set aside a time for marking. Be careful about extending this period (by allowing students to hand in work late).

Treat each task differently

Every piece of work need not be evaluated to the same degree; a mark need not be the outcome in every case; and every piece of student work need not contribute to the final grade. Assessment is designed to enhance the learning and teaching experience for the teacher and the learner, not just to give marks.

Information Communication Technologies

Sample assessment tasks

All assessment tasks must test whether or not the student has achieved the outcome or outcomes. Each task must have clear and detailed instructions. Students must know exactly what they have to do. You should develop marking guides when you are marking tasks to ensure consistency of your assessment.

Grade 11

The following is an example of an assessment task and marking guide for 11.4 Advanced Spreadsheets. The sample task and assessment criteria can be used to assess the outcomes of this unit. Teachers can use the sample to develop other assessment tasks, criteria and performance standards.

Sample task: Assignment

Collect data and calculate cost for a client who would like to go on vacation to three destinations that a travel agent is offering.

Learning outcomes

Students can:

8. apply advanced skills and concepts in creating solutions to information problems using a range of information software.

Assessment criteria

Students will be assessed on the extent to which they can:

- enter data
- calculate total
- calculate average
- create a comparative graph
- modify colour and patterns
- modify font and size
- modify heading
- label axis.

Task specifications

- collect data on cost of accommodation and travel to capital cities
- prepare three packages
- calculate totals and averages
- create comparative graphs
- add header with name and insert date automatically
- apply correct formats for font type, size, colour and so on.

Example of a marking guide

Marking guides, like the one below, should be used to assess the specific tasks you set. You can award marks in full or in part based on the value given per task. Some tasks require more time to complete than others so marks should be given accordingly.

Sample marking guide for 11.4 Advanced Spreadsheets

Marking guide: 11.4 Advanced Spreadsheets	60 marks
Criteria	Mark
Use correct keyboarding skills	/2
Identify appropriate programs for a task	/3
Demonstrate high level skills when using spreadsheet program to enter data	/5
Demonstrate knowledge and understanding of the correct use of formulas (such as calculating totals and averages)	/5
Demonstrate knowledge and understanding of the use of graphs (comparative graphs)	/5
Task completed within required time frame	/10
Product meets all the specifications	/10
Product presented to a high standard with correct spelling, appropriate formatting and spacing, graphics and so on	/20
Total	/60

Note: When recording and reporting student achievement you must record the achievement of the students in each unit and then, at the end of the year, make a final judgement about the overall achievement, or progress towards achievement, of the learning outcomes. The 'Achievement level' table (VHA, HA, SA, LA and BMS), with additional information on recording and reporting student achievement, can be found on page 69.

Grade 12

The following is an example of an assessment task and marking guide for unit 12.3 Internet 2. The sample task and assessment criteria can be used to assess the outcomes of this unit. Teachers can use the sample to develop other assessment tasks, criteria and performance standards.

Sample task: Assignment

Design a webpage or site for an organisation (such as a club, class, school, business, NGO).

Learning outcomes

Students can:

2. identify and describe a variety of information systems and how these are used within organisations
7. demonstrate understanding of the internet and e-mail and the issues involved

8. apply advanced skills and concepts in creating solutions to information problems using a range of software
9. develop multimedia presentations using a range of hardware and software devices.

Assessment criteria

Students will be assessed on the extent to which they can:

- collect suitable data for the type of organisation
- create a simple structured webpage for the type of organisation
- use special effects, hyperlinks and other web components
- integrate other applications in creating a presentable webpage.

Task specifications

- collect suitable data for the type of organisation (is the data relevant and suitable for the audience? Is the data relevant to needs of today's users?)
- create a simple structure webpage for the type of organisation
- include a site map or A to Z index of the site
- apply links from all pages to the homepage
- include dates on pages when created and/or modified
- use special effects, hyperlinks and other web components
- the website can be subdivided into the following categories:
 - purpose of the site; navigation; site administration; conformity to web standards; information; usability; interface; browsers and the site; technology used to create the site; site rating

Sample marking guide

Marking guides, like the one below, should be used to assess the specific tasks you set. You can award marks in full or in part based on the value given per task. Some tasks require more time to complete than others so marks should be given accordingly.

Sample marking guide for reviewing websites (internet): 100 marks

Websites vary considerably in their purpose and design. The list below can be used as a starting point for both analysing and comparing sites.

A rating on a scale of 5 to 0 is provided for each point. If the point is *not* relevant to the site, leave it out.

Note: You may not require the students to complete all the necessary skills as given in the marking guide. Only extract and use what they are able to do within the time frame given. If you wish to challenge the students more, then get them to apply all skills for the creation of a good website.

Marking guide: 12.3 Internet 2		100 marks					
Name: Class: Date:	Name of site: URL of site: http://www	Rating					
		5	4	3	2	1	0
Purpose of the site							
Is the site suitable for the type of business or organisation?							
Is the home page a good indicator of what is available at the site?							
Navigation							
Is a site map provided? If not, is there an A to Z index of the site?							
Is the site structure simple?							
Are navigation elements consistent? Is navigation easy?							
Is a title for each page provided in the browser window? Is the title clear?							
Does each page have a link to the home page?							
Do navigation images have text or accompanying text to make meaning clear?							
Are links provided by navigation graphics also available as hyperlinks?							
Do hyperlinks using page title match the titles of those pages they refer to?							
Are hypertext links in normal text clear and suitable							
Is it easy to find information—for example, maximum 3 to 4 clicks to relevant page?							
Does each page have information that clearly identifies the site?							
Site Administration							
Can an e-mail be sent to the web administrator?							
Do pages contain the date the pages were created and or modified?							
Does the site contain address, phone and facsimile information?							
What is the incidence of broken links—suitable messages if links are broken?							
Conformity to web standards							
Is the colour of unvisited links the browser default?							
Is the colour of visited links the browser default?							
Is text provided for images before they are downloaded?							
Information							
Is the information relevant and suitable for audience?							
Is the information relevant to needs of users today?							
Is the information up to date—how regularly is the site updated?							
Is the information clearly set out?							
Are the paragraphs short?							
Do long pages have an outline at the top of page, anchors to respective section?							
Are there links to top of page on long pages?							
Usability							
Is the page length suitable?							
Is the page width suitable?							

If frames are used are there vertical or horizontal scroll bars?					
Line length of paragraphs—are they fixed or a percentage of browser window?					
What are the size of pages—download time?					
What are the size of images—download time?					
Are browser plug-ins required for viewing content on the site?					
Is there a consistent look and feel across pages?					
Do links on pages create additional browser windows?					
Is the text font easy to read?					
Is the text font style easy to read?					
Is the text font colour black or dark for body text?					
Is underlining of text only used for hyperlinks?					
Is bolding used sparingly?					
Are headings used consistently?					
Are paragraphs left aligned?					
Are background images (if any) suitable?					
Are background colours suitable—white or light-coloured background?					
Is there information that can be downloaded in common file formats?					
Is there information that can be downloaded in 'pdf' file format?					
Is the estimated download time shown if the file is large?					
Do pages contain unnecessary animation?					
Interface					
Do pages have pop-up menus?					
Are the pop-up menus suitable for the pages?					
Are 'roll over buttons' a feature of the navigation?					
Do the 'roll over' buttons add to the site usability?					
Browsers and the site					
Browser suitability—are minimum versions of browsers required to view pages?					
Are alternative 'text only' versions of site provided if the site is complex?					
Is the site suitable for different browsers?					
Technology used to create the site					
Are pages 'static' html or created from database; for example queries to a search engine?					
Are pages created using frames?					
If pages are in 'frames', are 'non-framed' versions of the pages also available?					
What 'plug ins' (if any) are required to view the content?					
Can that content be viewed through alternative pages without requiring 'plug ins'?					
Site rating					
Overall how do you rate the site?					
Total sub-columns					
Overall total			100 marks		

Learning activities and assessment tasks

Examples of learning activities and assessment tasks for each of the Information and Communication Technologies (ICT) units are provided in the following sections. Some examples are explained in detail. (For learning activities for Computer Studies, see page 52.)

Grade 11 Information and Communication Technologies units

11.1 Computer Fundamentals

Elaboration of content and activities

This unit is an extension from the Lower Secondary Computer Basics unit. Students should have already grasped the basic knowledge and skills in computer fundamentals. It is your task to expand on what they already know.

The activities below are a starting point to help you with your planning and preparations so that the learning outcomes are measured. You may develop your own to use, as there are no limits to the number required.

However, time is an important factor to consider, as the unit must be covered in the time frame given. Computer Fundamentals covers basic system software, application software operation and the operation of hardware.

Suggested activities

- explain, using diagrams, the information-processing cycle
- identify the main components of a computer system
- explain functions of input devices
- explain functions of output devices
- differentiate between primary and secondary storage
- identify and name basic peripheral devices
- construct a diagram of the basic operations of the computer (input, process, storage, output and communications)
- do a timeline showing the history of the development of computers

Suggested assessment task

Test

Filling in blanks

1. A _____ is an electronic device, operating under the control of instructions stored in its memory, which accepts and processes data and outputs the results to a user. (computer)
2. Computer systems are made up of a number of _____ which function together as a complete unit. (devices)

3. Computers differ from other electronic devices since they can be _____ to solve a wide variety of problems. (programmed)
4. The _____ consists of input, processing, control, output and storage. (information-processing cycle)
5. For a computer to operate, it must be given a detailed set of _____ that tell it exactly what to do. (instructions)
6. The process of initial loading of the operating system is called _____ the computer. (booting)
7. _____ software are programs that tell the computer how to perform specific task(s). (application)

Short answer questions

1. What types of input can your computer system accept?
2. List the types of output that your computer system accepts.
3. What types of storage media are used by your computer system?

11.2 Advanced Word Processing

Elaboration of content and activities

Students have done word processing as a core unit in Lower Secondary. The following suggested activities can be used as a starting point. You should also, however, prepare more challenging activities for your students.

Suggested activities

- create a template of your own fax sheet
- create a template of a school report for Computer Studies
- create a poster to advertise an 'Open Night'. Your poster must include graphics
- design a banner for the school fete
- design a three or four-column school brochure

Suggested assessment task

Assignment: Mail merge

- Design an advertisement for a local computer company.
- Set up a table of 5 names and addresses to which the advertisement is going to be sent.
- Complete a mail merge to all those on the list.

11.3 Computers and Society

Elaboration of content and activities

These activities give an idea of how individuals act in anticipation of problems arising from the use of technology. Students are to describe and make informed judgements about the effects of the use of computers in our society. Students should further discuss social and ethical issues concerning the use of computers.

Students learn about different threats to computers and the importance of safeguarding data at the individual and organisational level. Threats can affect either hardware or software. Hardware threats include vandalism and hardware failure. Software threats include viruses (such as worms and Trojan horses), spyware (malware) and data corruption. Students should also learn various methods of controlling and removing these threats. The national government's ICT policy should also be discussed.

Suggested activities

- research different ways of disposing of obsolete computers and present a report
- research and report on some of the following 'quality-of-life' issues related to computer technology:
 - environmental problems
 - mental health problems
 - workplace problems: impediment to productivity
 - gap between rich and poor
 - technology, the 'job killer'
- draw a diagram of a good ergonomically designed computer workstation (sitting posture, arm and eye position and so on)
- perform a role-play among students to portray both sound and poor ergonomic situations
- compile a brief history of computer viruses and draw a timeline to illustrate their release date
- explain why it is important to back up data regularly
- list some guidelines to safeguard important data

Suggested assessment tasks

Research 1

Images, conversations and other means of communication are readily available to technology in our society today. This can cause problems for individuals who want their identity or property to be protected.

- Conduct research on copyright, privacy and e-crime to find a legal case where a criminal has used technology to commit the crime.
- Identify the technology used to commit the crime and the legal ramifications of the crime.
- Submit a written report on your view of the decision handed down.

Research 2

Images placed on the World Wide Web should be able to be viewed by anyone, otherwise it would be impossible to see any graphics on a webpage. This can cause problems for the people who own the images and want to protect their copyright. There are now methods of storing a hidden electronic identity code inside an image without affecting the image.

- Research and report on a legal or ethical issue when using the World Wide Web (such as copyright, piracy, e-crime, identity fraud).

Assignment

1. Define the following terms:
 - firewall
 - virus
 - antivirus
 - spyware
 - anti-spyware.
2. Explain the difference between a worm and a Trojan horse.
3. Briefly discuss the importance of data security or data protection.

11.4 Advanced Spreadsheets

Elaboration of content and activities

Students have done spreadsheets as an optional unit in Lower Secondary. The following suggested activities can be used as a starting point. You should also, however, prepare more challenging activities for your students.

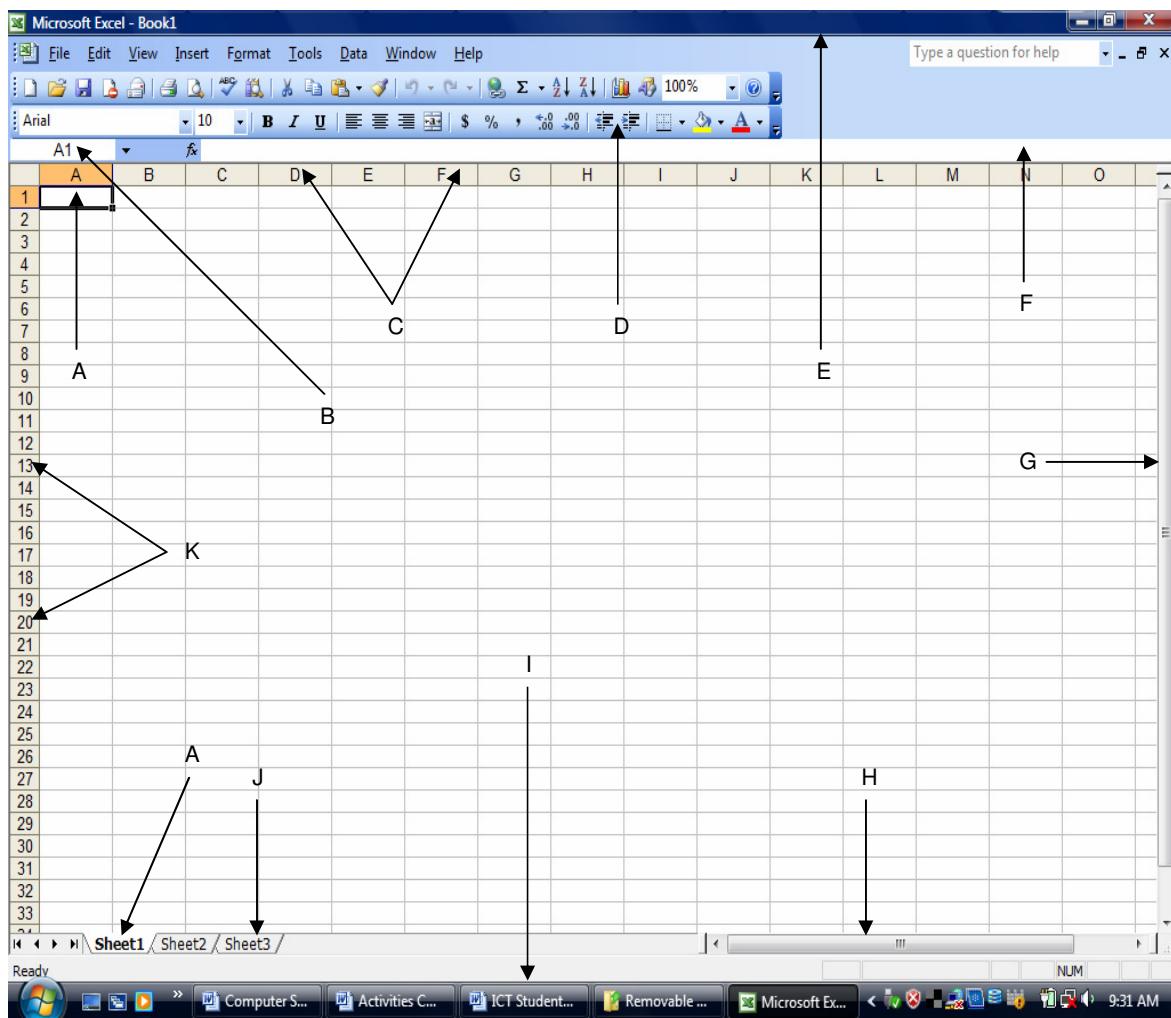
Suggested activities

The teacher of a Mathematics class would like to store all the students' results in a spreadsheet. The teacher asks one of her colleagues if it is possible to create a template that includes formulas that will:

- add up the student marks
- create a table array to convert the mark to a letter grade
- add a comment according to a code

merge the spreadsheet data into a word-processed student report.

Labelling the spreadsheet screen



Suggested assessment tasks

Portfolio

Produce a portfolio (electronic or hard copy) showing evidence of the main skills used in applying advanced features and functions. The portfolio might include:

- rough notes and drafts
- data and formulas
- spreadsheet drafts
- work samples with comments written by the teacher
- assigned spreadsheet projects; saved documents
- activity diary.

Test

1. A _____ consists of a large grid of rows and columns.
(spreadsheet)

2. Spreadsheets are used to organise and present _____ into columns and rows. (data)
3. A _____ reference occurs when a formula refers to itself in some way. (circular)
4. Why are headings important for a spreadsheet? (to explain the data)
5. If cell B5 contained the formula =A5+B5, what would be wrong? (circular reference)
6. List and describe three types of graphs (bar, pie and scatter)
7. What is a template and how is it used in a spreadsheet? (a preformatted document that can be reused)
8. What is the purpose of cell lock? (to protect data in the cell)

Research

Students investigate the following:

- Find the names, prices and manufacturers of the 3 most popular spreadsheet programs.
- List the steps needed to print your spreadsheet in landscape orientation.
- Find and explain the symbol used to indicate an absolute reference in your spreadsheet program.
- How could a spreadsheet program be used to improve reporting of football results?

11.5 Database 1

Elaboration of content and activities

Students have done database as an optional unit in Lower Secondary. They should further learn to use, design, create and evaluate databases. The suggested activities can be used as a guide to develop other activities that could cover the learning outcomes.

Suggested activities

- evaluate sample databases from any available sources: CD or DVD; the internet

Suggested assessment task

- Design and create a simple database of reference books in the school library. The database must include important information like:
 - author
 - publisher
 - date of publication
 - number of stock(s) in the library.

The database should include tables and forms, and at least one report must be produced.

11.6 Internet 1

Elaboration of content and activities

Students have done internet as an optional unit in Lower Secondary. They should be able to use different search techniques to effectively search and retrieve information from the Web. Students should further develop skills in using internet applications in a wider context; for instance, using e-mail.

The suggested activities can be used as a guide to develop more activities to cover the learning outcomes.

Suggested activities

Scavenger hunt

- Search engines do have some common features; for instance, 'simple' and 'refined' search techniques. Simple search strategies involve typing the keyword or topic into the 'Search' box for the search engine to retrieve the information that we want.
If you do not get the desired results using the simple search, then use the refined search option or advanced search. Advanced search techniques include:
 - Boolean operators
 - a search engine's advanced search option
 - search within results
 - search engine mathematics (for example: +, -)

Exercise: Advanced search techniques

- Use various search techniques to complete this exercise. Search the internet for the following information:

1. What is the capital of Sweden?	_____
	URL
2a) Who was the leader of the Bounty Mutiny?	_____
	URL
b) Where did the Bounty Mutineers settle?	_____
	URL
3a) Who was Napoleon Bonaparte?	_____
	URL
b) In which year did he rule France?	_____
	URL

4a) Which two candidates contested the United States presidential seat in 2004?	_____
	URL
b) What is the name of the US First Lady?	_____
	URL
5. Who was the first Governor General of Papua New Guinea?	_____
	URL
6. Choose at least 5 search engines to search for this topic:	
Keyword or query	= “PNG coffee”
Search engine used	_____
Number of hits	_____

Suggested assessment tasks

Searching the internet for information

This activity is to enable students to become more confident in searching the internet more effectively for information. Students search the World Wide Web base on a topic or topics of their choice. They use various search engines to retrieve the information needed, such as: Google, AltaVista, Yahoo, Mama, Alltheweb, Myway, Infoseek, Askjeeves, Metacrawler, Overture, Teoma, Looksmart, Excite. The information is then summarised using the format below.

Topic or keyword _____

Search engine _____

Article titles _____

URL 1

--

URL 2

--

URL 3

--

Summary _____

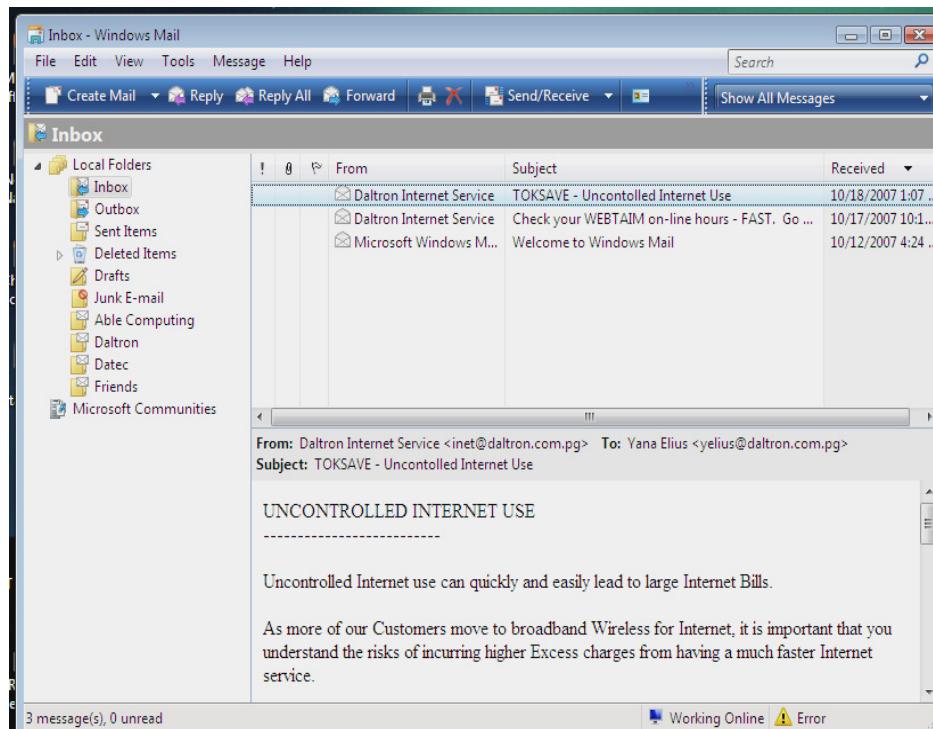
E-mail

Explain the tools listed below:

Inbox _____

Outbox _____
 Sent items _____
 Drafts _____
 Forward _____
 Reply _____

E-mail tools



11.7 Desktop Publishing

Elaboration of content and activities

Students have done presentation graphics as a core unit in Lower Secondary. They should further develop skills in creating and working with documents, including the use of MS Publisher software. The unit emphasises the design and production of desktop publications using a range of multimedia devices and current desktop-publishing software; for example, Pagemaker®, Adobe Illustrator, Photoshop, MS Publisher, Quark Xpress. The suggested activities below can be used as a guide for developing more activities that cover the learning outcomes.

Suggested activities

- produce a well laid-out poster containing the price list for a school canteen or small business
- create a publication from a design template
- identify characteristics of desktop publishing
- present a document using a drawing and painting program

- list and explain other publication software used by different organisations
- apply a range of formatting to various publications
- include graphics in designing a publication (WordArt, clipart, photos)

Suggested assessment task

Using a desktop-publishing application, students undertake a project (for example, a newsletter, brochure, bulletin, advertisement or poster) for an organisation (such as a sporting group, church, school or small business) to help communicate activities and services.

Sample design brief	
Sample design brief: Create a desktop-publishing presentation	
Specifications	<ul style="list-style-type: none"> plan and design the project using annotated sketches use presentation software the presentation must include text and graphics or photos
Investigation	<ul style="list-style-type: none"> What presentation software is available? Which would be the most appropriate for the presentation? Is it easy to use?
Drafts	<ul style="list-style-type: none"> Open a blank document Create different designs on different pages Add the text and graphics; experiment with different fonts and font sizes Save drafts for your portfolio
Producing	<ul style="list-style-type: none"> Edit the publication Present to the class or a group
Evaluation or testing	<p>Consider the questions and write an honest comment about your product.</p> <ul style="list-style-type: none"> Did the presentation suit the purpose for which it was developed? How could you have made it better?

Sample marking guide

Marking guide: Desktop publishing	60 marks
Criteria	Mark
Work safely at all times	/2
Plan and design the project using annotated sketches	/3
Identify appropriate programs for a task	/5
Demonstrate high level skills when using desktop-publishing program	/5
Experiment with different fonts and font sizes	/5
Experiment with graphics and photos	/5
Product completed within required time frame	/5
Product meets all the specifications of the design brief	/5
Product presented to a high standard with correct spelling, appropriate formatting and spacing, use of graphics and so on	/20
Creativity	/5
Total marks	/60

Grade 12 Information and Communication Technologies units

12.1 Information and Communication Systems

Elaboration of content and activities

Information and Communication Systems is a year-long unit. It will be taught in parts as a theory topic under the three sub-topics: Information Systems; Network Systems; and Communication Systems. Students learn about the role computers play in an information system and how communication of data across networks is achieved. These systems support people who are working together by enabling them to exchange and share data and information. The suggested activities can be used as a guide to develop more activities that cover the learning outcomes.

Suggested activities

Information systems

- discuss the role of a network in an information system
- list and explain characteristics of an information system
- compare and contrast two types of information systems

Network systems

- discuss client–server versus peer-to-peer setup
- design a topology of a local area network (LAN) in a virtual office

Communication systems

- discuss the role of a communication system in a network using various forms of transmission media
- list and explain characteristics of a communication system
- compare and contrast two types of communication systems
- discuss current issues to do with communication systems

Suggested assessment tasks

Information systems

- *Research:* Find out how information is processed and communicated with regard to speed, reliability, accuracy and capacity to store and retrieve large volumes.

Network systems

- Discuss client–server versus peer-to-peer setup.
- Draw a plan using a schematic diagram of a simple local area network that will cater for all the needs of 6 computers, printer and a file server.

- Identify and explain the necessary hardware and software functions and capabilities to make the network efficient.

Communication systems

Extended response:

- What is communication?
- Identify and describe the various physical and wireless communication methods.
- Compare the effects of physical and wireless communication on the environment.

Research: Write a report on electronic security as applied to computer communication systems. What methods are used to protect data while allowing authorised users easy access? How are 'hackers' bypassing security systems?

12.2 Database 2

Elaboration of content and activities

Students have done Database 1 in Grade 11 (unit 11.5). They should appreciate that computer database systems have a capacity to store, retrieve and manipulate data better than non-computer systems. Students will further develop skills in modifying existing databases and designing new databases for specific purposes. The suggested activities can be used as a guide to develop challenging activities to cover the learning outcomes.

Suggested activities and/or assessment tasks

- Design and create a student information database. The database must include important information like: personal details, including photograph; student registration number; grade and subjects studied (created in a separate table and linked to student names); sporting house or church denomination.
- Students must produce a report that shows a copy of their subjects and grades.

12.3 Internet 2

Elaboration of content and activities

Students have done Internet 1 in Grade 11 (unit 11.7). This unit introduces students to various authoring languages required to design and publish webpages on the World Wide Web. Students should be given an opportunity to design and develop webpages using web design applications or an HTML editor (WYSIWYG) and will be shown procedures involved in publishing their

websites. The suggested activities can be used to challenge students to produce a webpage.

Suggested activities

- In this activity, students describe various web design applications and identify the different features. Complete the table describing the various web design applications:

Application	Publisher	Features
Netscape Composer		
MS FrontPage		
Adobe PageMill		
Macromedia Dream Weaver		
Adobe Go Live		
Macromedia Fireworks		

- design a website for an organisation (such as a club, class, school, NGO or business). The website should consist of the following: five pages (first page is a home page); links to all pages; an e-mail link; external links; relevant graphics

Suggested assessment task

- Design a webpage or website.
- Evaluate at least 3 websites designed by other members of your class.

Criteria	Scale		
	1	2	3
Can download quickly			
Links are working			
Attractive			
Relevant content			

12.4 Multimedia

Elaboration of content and activities

The suggested activities below should broaden students' knowledge and understanding of different multimedia applications. Students should be given an opportunity to design and develop multimedia presentations using a range of hardware and software devices and peripherals. The assessment task is provided without the marking criteria. You should create a similar guide to desktop publishing to mark your students' work.

Suggested activities

- use a digital or video camera to capture images
- list the steps involved in developing multimedia presentations (plan, design, create and support)
- develop multimedia presentations integrating sound and animations
- use different multimedia authoring programs
- incorporate interactivity in multimedia presentations

Suggested assessment task

Sample design brief	
Design brief: Multimedia production (PowerPoint, Macromedia Flash, Adobe Photoshop, Picasa2, Moviemaker)	
Specifications	<ul style="list-style-type: none"> • plan and design the project using annotated sketches • use multimedia software • the presentation must include text, graphics or photos, animation, sound effects, captions and so on
Investigation	<ul style="list-style-type: none"> • What multimedia software is available? • Which would be the most appropriate for the production? • Is it user friendly? Explain
Drafts	<ul style="list-style-type: none"> • Open a blank document • Do different designs on different pages • Add the text, graphics or photos, animation, sound effects, and captions • Save drafts for your portfolio
Producing	<ul style="list-style-type: none"> • Edit the publication • Present to the class or a group
Evaluation or testing	<p>Consider the questions and write an honest comment about your product:</p> <ul style="list-style-type: none"> • Did the presentation suit the purpose for which it was developed? • How could you have made it better?

12. 5 Computers and Employment

Elaboration of content and activities

The activities provide students with opportunities to search for job vacancies on the internet or in other media and to prepare application letters and curriculum vitae (CVs). Give students enough time to complete the activities. It is a good idea to allow them to use the templates available.

There is no assessment task for this unit, as all assessments would have been completed in term 3.

Suggested activities

- Search the internet, print media, television or radio for a suitable job vacancy. Students prepare suitable job application letters and a CV and/or résumé supporting the application letter.

Computer Studies

Learning activities and assessment tasks

Examples of learning activities and assessment tasks for each of the Computer Studies units are provided in the following sections. Some examples are explained in detail.

Grade 11 Computer Studies units

11.1 Computer Fundamentals

Elaboration of content and activities

The activities are starting points to help with your planning and preparations so the learning outcomes can be measured. You may develop your own activities for the unit, but it must be covered in the timeframe given.

Suggested activities

- construct a diagram of a computer system and label the parts
- identify main components of a computer system
- identify and demonstrate appropriate use of hardware
- name input and output devices
- differentiate primary and secondary storage
- list examples of peripheral devices
- distinguish between system and application software
- construct a diagram of the basic operations of the computer (input, process, storage, output and communications)
- do a timeline showing the history of the development of computers

Suggested assessment tasks

Theory test

1. Name the 2 basic parts of a computer system. (hardware and software)
2. Give an example of an input device. (mouse, keyboard and so on)
3. Give an example of an output device. (monitor or printer)
4. Name two examples of secondary storage devices. (from CD-R/RW, DVD/RW, floppy disks, flash drives, hard disk, MP 3/4, iPod)
5. Name the initial loading process of the operation system. (boot up)
6. Name the main circuit board in the computer that contains a CPU, BIOS, memory, ports and interfaces for other devices. (motherboard or mainboard or system board)

Extended response

- These abbreviations refer to a computer system: CPU, RAM, ROM, CD, DVD. Write what they stand for and explain their main functions.

11.2 File and Information Management

Elaboration of content and activities

Access to a computer with database, word-processing and spreadsheet applications is required. A searchable database is also needed. Use of electronic encyclopaedias is highly recommended. Students should have access to a variety of electronic reference software or databases and be given time to familiarise themselves with their features and to learn how to use them. Teachers may construct a set of guidelines that will help students to accomplish this.

This unit is a research unit, which requires students to search for information from various sources. It is important to emphasise ethical issues relating to use of information. The emphasis is on developing the skills to search for usable and appropriate information. The unit also requires students to create and manage files and folders.

Suggested activities

- create a backup from the local disk (drive 'C') or from your personal folder on the file server to a secondary storage device
- create and manage folders and files in your personal folder on file server
- use electronic encyclopaedias, databases and spreadsheets to find and manage information
- visit the library and check what CD-ROMs and DVD-ROMs are available. Classify them under the following categories:
 - encyclopaedia
 - dictionary
 - magazine
 - game
 - collection of images
 - collection of sounds

Suggested assessment tasks

Research 1: Virtual private networks

People who telecommute to work must often connect to a corporate Local Area Network (LAN) or a Virtual Private Network (VPN).

- Conduct research and report as follows:
 - describe what a VPN is and what it does
 - differentiate a VPN from accessing files from a company website
 - discuss advantages and disadvantages of the VPN system.

Research 2: Find and present information

The following is a sample design brief for finding and presenting information.

Sample design brief	
Design brief: Find and present information on (a topic)	
Specifications	<ul style="list-style-type: none"> Access information about a topic using at least two different retrieval methods Evaluate the accuracy, relevance and appropriateness of the information Present the information on the topic using an appropriate application Prepare a brief report on the steps taken in accessing the information using a word-processing program
Investigation	<p>What information is required? What sources of information are available? Which would be the most appropriate source from which to obtain the information for the topic? Is it easy to use?</p>
Drafts	<p>Open a blank document Word process findings from the investigation Save drafts for your portfolio Format the document, use a spell check and save</p>
Producing	<p>Select the information that will be used for the final presentation Collate the important information Add the text and graphics and experiment with different fonts and font sizes to make the presentation interesting Edit the document, making sure that references are included Save all the drafts and final document electronically Print the final document</p>
Evaluation or testing	<p>Consider these questions and write an honest comment about your product:</p> <ul style="list-style-type: none"> Did you use appropriate sources of information? Was the information appropriate for the purpose?

11.3 Word Processing

Elaboration of content and activities

For all activities in this unit, students need to have enough time for hands-on practice, which means that you will have to provide opportunities for students to use computers as much as possible. Note that all practice activities need constant monitoring and evaluation. You should try to mark all practice activities.

Suggested activities

- identify and label the parts of a word-processing screen and their functions

- create a Word document using correct formats for:
 - job application letters
 - class period timetable
 - letters to the editor
 - class or student meeting minutes
 - reports or assignments
- create a Word template

Suggested assessment tasks

Assignment or test

1. Which command from the file menu allows you to save another copy of your document? (Save As)
2. Which menu allows you to check your spelling and grammar? (Tools)
3. Which alignment option allows both the left and right margins to be aligned? (justify)
4. Which command from the file menu would allow you to adjust margins, paper size and orientation? (Page Setup)
5. From which menu would you find the WordArt and ClipArt? (Insert menu)

Design an advertisement

- Design an advertisement using WordArt and ClipArt with common word features for any area of interest.

Sample design brief	
Design brief: Design an advertisement using WordArt and ClipArt with common word features for any area of interest	
Specifications	The advertisement must include text and at least one of the following: <ul style="list-style-type: none"> • graphics • Word Art or ClipArt
Investigation	Investigate different fonts and font sizes used in advertisements
Drafts	Open a blank document Do different designs of advertisement on different pages Add text and graphics and experiment with different fonts and font sizes Save drafts for your portfolio Choose the advertisement design you like best and save
Producing	Edit the advertisement Print
Evaluation or testing	Consider the questions and write an honest comment about your product: <ul style="list-style-type: none"> • Does the advertisement suit the purpose for which it was developed? • How could you have made it better?

Sample marking guide for word processing

Marking guide: Create word-processed documents using a variety of techniques		60 marks
Criteria		Mark
Work safely at all times		/3
Use correct keyboarding skills		/5
Identify appropriate programs for a task		/5
Demonstrate high level skills when using programs		/5
Demonstrate knowledge and understanding of file management (such as save, save as, access documents)		/7
Product completed within required time frame		/5
Product meets all the specifications of the design brief		/10
Product presented to high standard with correct spelling, appropriate formatting and spacing, graphics and so on		/20
Total marks		/60

11.4 Computers and Society

Elaboration of content and activities

In this unit, students learn to appreciate and understand the impact that developments in information and communication technologies have on themselves and communities worldwide. This unit introduces students to different threats to computers and the importance of safeguarding data at the individual and organisational level. Threats can be to the hardware or software. Hardware threats include vandalism and hardware failure. Software threats include viruses (such as worms and Trojan horses), spyware (malware) and data corruption. Students learn various methods of controlling and removing these threats.

Suggested activities

- research different ways of disposing of obsolete computers and present a report
- research and report on some of the following quality-of-life issues related to computer technology:
 - environmental problems
 - mental health problems
 - workplace problems: impediment to productivity
 - gap between rich and poor
 - technology, the 'job killer'
- draw a diagram of an ergonomically designed computer workstation (good sitting posture, arm and eye position and so on)

- perform a role-play among students to portray both sound and poor ergonomic situations
- compile a brief history of computer viruses and draw a timeline to illustrate their release dates
- explain why it is important to back up data regularly
- list some guidelines for safeguarding important data

Suggested assessment tasks

Research 1

Images, conversations and other means of communication are readily available through technology in our society today. This can cause problems to individuals who want their identity or property to be protected.

- Conduct research on copyright, privacy and e-crime to find a legal case where a criminal has used technology to commit the crime.
- Identify the technology used to commit the crime and the legal ramifications of the crime.
- Submit a written report on your view of the decision handed down.

Research 2

Images placed on the World Wide Web should be capable of being viewed by anyone, otherwise it would be impossible to see any graphics on a webpage. This can cause problems for the people who own the images and want to protect their copyright.

There are now methods of storing a hidden electronic identity code inside an image without affecting the image.

- Research and report on a legal or ethical issue when using the World Wide Web (such as copyright, piracy, e-crime, identity fraud).

Assignment

1. Define the following terms:
 - firewall; virus; antivirus; spyware; anti-spyware.
2. Explain the difference between a worm and a Trojan horse.
3. Briefly discuss the importance of data security or data protection.

11.5 Desktop Publishing

Elaboration of content and activities

In this unit, students are introduced to basic skills in desktop publishing, including text and graphic manipulation to enhance document production.

Students should have more hands-on activities to develop skills in creating and working with documents, including the use of MS Publisher software.

Emphasis is placed on the design and production of desktop publications using a range of multimedia devices and desktop-publishing software, such as Pagemaker®, Adobe Illustrator, Photoshop, MS Publisher, Quark Xpress.

Suggested activities

- create a publication from a design template
- identify characteristics of desktop publishing
- present a document using a drawing and painting program
- list and explain other publication software used by different organisations
- apply a range of formatting to various publications
- include graphics in designing a publication (WordArt, clipart, photos)

Suggested assessment tasks

Publication

Using a desktop-publishing application, students undertake a project (for example, a newsletter, brochure, bulletin, advertisement or poster) for an organisation (such as a sporting group, church, school or small business) to help communicate activities and services.

Sample design brief	
Design brief: Create a desktop-publishing presentation	
Specifications	<ul style="list-style-type: none">• plan and design the project using annotated sketches• use presentation software• the presentation must include text, graphics or photos
Investigation	What presentation software is available? Which would be the most appropriate for the presentation? Is it easy to use?
Drafts	Open a blank document Do different designs on different pages Add text and graphics and experiment with different fonts and font sizes Save drafts for your portfolio
Producing	Edit the publication Present to the class or a group
Evaluation or testing	Consider the questions and write an honest comment about your product: <ul style="list-style-type: none">• Does the presentation suit the purpose for which it was developed?• How could you have made it better?

Sample marking guide (adjust to suit your needs)

Marking guide: Desktop-publishing presentation	60 marks
Criteria	Mark
Work safely at all times	/3
Use correct keyboarding skills	/5
Identify appropriate programs for a task	/5
Demonstrate high level skills when using programs	/5
Demonstrate knowledge and understanding of file management (such as save, save as, access documents)	/7
Product completed within required time frame	/5
Product meets all the specifications of the design brief	/10
Product presented to a high standard with correct spelling, appropriate formatting and spacing, graphics and so on	/20
Total marks	/60

11.6 The Internet

Elaboration of content and activities

This unit is a research unit, which requires students to search for information from various sources. It is important that ethical issues relating to use of information are emphasised in this unit

No one controls or verifies the vast majority of information posted on the internet. With a little money and 30 minutes, almost anyone can publish a basic webpage. Although some sites have editorial staff and experts to ensure accuracy and quality, many do not. Choosing quality websites to use in your classroom can be very time consuming. You can make this easier and more successful, however, by using 'COCOA P':

C = Coverage

O = Objectivity

C = Currency

O = Origin (Author)

A = Accuracy

P = Purpose

Strategies for using the internet

- Ensure that all students have an understanding of how to access the internet and how to perform basic functions, such as searching, sending and receiving e-mail. Construct a set of guidelines that will help students to accomplish this, such as step-by-step instructions on how to use a search engine.

- Ensure that all students have plenty of time to explore and familiarise themselves with the technologies, navigation tools, e-mail facilities and texts on the internet. It is likely that students have varying degrees of expertise in searching for information and navigating the internet. Students also have varying experiences and familiarity with the way texts are presented on the World Wide Web.
- Students with more experience in using the internet may have information that will benefit the whole class. Provide opportunities for students to share their experiences, interests, information and understandings. As well as planning lessons to instruct students in these skills, pairing students and peer tutoring on the computer can enable more experienced students to assist other students.
- Ensure that students critically analyse information gathered on the internet just as they would for any other text. They should be aware that material posted on the Web is not necessarily subject to the conventional editorial checks and processes generally applied to print-based publications. When evaluating information, students might consider:
 - the intended audience of the site
 - bias in the presentation of information, or in the information itself, including commercial or political motives
 - accuracy of information
 - balanced points of view
 - currency of information, including publishing dates
 - authority of source or author (institution, private individual)
 - ownership of the website (such as corporate, small business, government authority, academic)
 - cultural or gender stereotyping.
- Ensure that software and hardware (computer, modem) are maintained in good working order.
- Ensure that all students are given equal opportunities to use the computer.

Assessing student work containing material from the internet

- Students can download large quantities of information from the internet. By itself, this information provides very little evidence of student effort or student achievement. Students must make judgements about the validity and safety of information when working from the World Wide Web. They must consider the purpose of the text, identify bias and consider the validity of arguments presented and the nature and quality of the evidence provided.
- When assessing student work that includes material drawn from the internet, it is important to recognise how students have accessed the information, what value they place on it and how they have used it for the particular topic being studied in class. It is useful to look for evidence of critical evaluation, and the development of students' capacities to access, manipulate, create, restore and retrieve information.

Suggested learning activities

- use the internet to create an e-mail account
- browse any of the following websites as a part of job-hunting or as guide for a career path:
 - <www.monster.com>
 - <www.google.com>
 - <www.yahoo.com>
 - <www.youtube.com>
 - <www.hotmail.com>
 - <www.friendster.com>
- search the World Wide Web based on a topic or subject of interest
- make a list of useful search engines
- use search engines to retrieve information needed
- use search techniques (simple and refined)
- send and receive e-mails with and/or without attachments

Suggested assessment tasks

Research 1

Locate and evaluate several websites that you think make effective use of multimedia.

- What is the address for each site visited?
- What is the purpose of each site?
- How effective is the site's use of multimedia?
- Present your findings.

Filling in blanks

1. Today's data transmission speeds are measured in _____, _____, _____ and _____. (bps, kbps, mbps, gbps)
2. A space station that transmits data as microwave is a _____. (satellite)
3. Unsolicited e-mail in the form of advertising or chain letter is known as _____. (virus)
4. _____ comprises the communications rules that allow browsers to connect to the web servers. (internet protocol [IP])

Short-answer questions

1. What does 'log on' mean?
2. What is 'netiquette', and why is it important?
3. Briefly explain what TCP/IP does.

Research 2: Find and present information

Sample design brief	
Design brief: Find and present information from the internet on (a topic)	
Specifications	<ul style="list-style-type: none"> • find information about the topic using a range of different websites • evaluate the accuracy, relevance and appropriateness of the information • present the information on the topic using an appropriate application • prepare a brief report on the steps taken in accessing the information using a word-processing program
Investigation	<p>What information is required?</p> <p>What sources of information are available?</p> <p>Which would be the most appropriate websites to obtain the information for the topic?</p> <p>Are they easy to use?</p>
Drafts	<p>Open a blank document</p> <p>Copy information from the webpages</p> <p>Save drafts for your portfolio</p>
Producing	<p>Select the information that will be used for the final presentation</p> <p>Collate the important information</p> <p>Edit the document making sure that references are included</p> <p>Save all the drafts and final document electronically</p> <p>Print the final document</p>
Evaluation or testing	<p>Consider these questions and write an honest comment about your product:</p> <ul style="list-style-type: none"> • Did you use appropriate websites? • Was the information appropriate for the purpose? • How could you have done better?

Grade 12 Computer Studies units**12.1 Information Communication Systems****Elaboration of content and activities**

In this unit students will learn about the role computers play in an information system and how communication of data across networks is achieved. Information and Communication Systems is a year-long unit. It will be taught in parts as a theory topic under the three sub-topics: Information Systems; Network Systems; and Communication Systems.

Suggested activities**Information systems**

- discuss the role of a network in an information system
- list and explain characteristics of an information system

- compare and contrast two types of information systems

Network systems

- discuss client-server versus peer-to-peer setup
- design a topology of a LAN in a virtual office

Communication systems

- discuss the role of a communication system in a network using various forms of transmission media
- list and explain characteristics of a communication system
- compare and contrast two types of communication systems
- discuss current issues on communication systems

Suggested assessment tasks**Information systems***Research*

Find out how information is processed and communicated with regard to speed, reliability, accuracy and capacity to store and retrieve large volumes.

Network systems

- Discuss client-server versus peer-to-peer setup.
- Draw a plan using a schematic diagram of a simple local area network that will cater for all the needs of 6 computers, printer and a file server.
- Identify and explain the necessary hardware and software functions and capabilities to make the network efficient.

Communication systems*Extended response*

- What is communication?
- Identify and describe the various physical and wireless communication methods.
- Compare the effects of physical and wireless communication on the environment.

Research

Write a report on electronic security as applied to computer communication systems. What methods are used to protect data while allowing authorised users' easy access? How are 'hackers' bypassing security systems?

12.2 Multimedia

Elaboration of content and activities

Multimedia provides students with the opportunity to learn about different types of presentation software and to master skills in producing various types of multimedia presentations. Because all activities require students to have enough time for hands-on practice, you will have to allow students to use the computers as much as possible.

Suggested activities

- use a digital or video camera to capture images
- list steps involved in developing multimedia presentations (plan, design, create and support)
- develop multimedia presentations integrating sound and animations
- use different multimedia authoring programs
- incorporate interactivity in multimedia presentations

Suggested assessment tasks

Sample design brief	
Design brief: Multimedia production (PowerPoint, Macromedia Flash, Adobe Photoshop, Picasa2, Moviemaker)	
Specifications	<ul style="list-style-type: none"> • plan and design the project using annotated sketches • use multimedia software • the presentation must include text, graphics or photos, animation, sound effects, captions and so on
Investigation	<p>What multimedia software is available? Which would be the most appropriate for the production? Is it user friendly? Explain</p>
Drafts	<p>Open a blank document Do different designs on different pages Add the text, graphics or photos, animation, sound effects, and captions Save drafts for your portfolio</p>
Producing	<p>Edit the publication Present to the class or a group</p>
Evaluation and/or testing	<p>Consider these questions and write an honest comment about your product:</p> <ul style="list-style-type: none"> • Did the presentation suit the purpose for which it was developed? • How could you have made it better?

12.3 Spreadsheets

Elaboration of content and activities

This unit aims to develop students' knowledge and skills to equip them to use spreadsheets as a tool to make informed personal and work-place choices. Students will use spreadsheets to solve information problems in a business or organisational setting.

Suggested activities

- explore the features of spreadsheet window
- draw up an accounting journal
- create a template for an invoice or quotation
- create a class list of 10 students
 - sort students' names into ascending or descending order
 - enter five sets of marks
 - calculate total marks, rank and grade
 - calculate minimum, maximum, mean and average
 - use chart wizard to create a chart to show the outcome of the activity

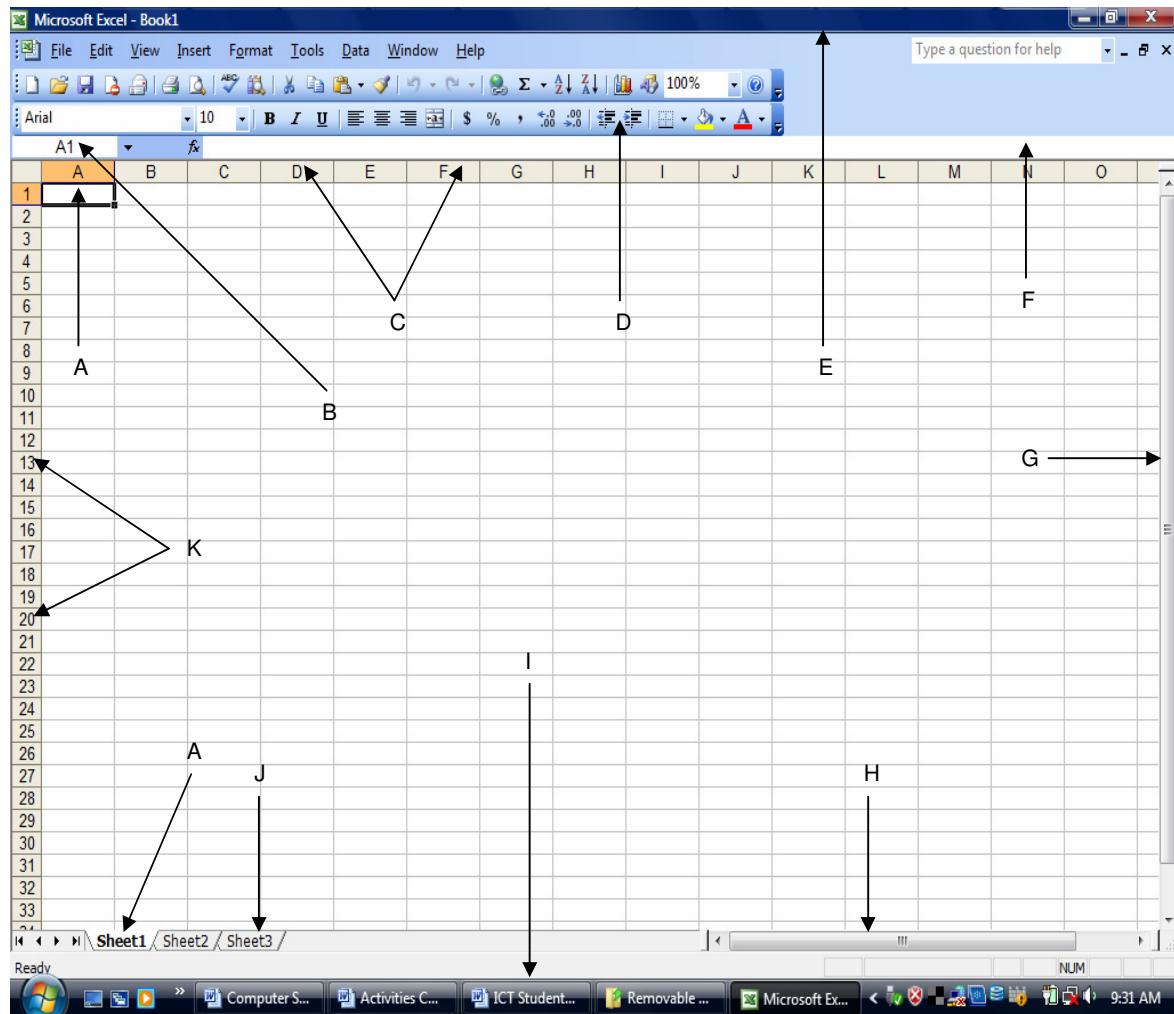
Suggested assessment tasks

Theory test

1. _____ consists of a large grid of rows and columns. (spreadsheet)
2. Spreadsheets are used to organise and present _____ into columns and rows. (data)
3. A _____ reference occurs when a formula refers to itself in some way. (circular)
4. Why are headings important for a spreadsheet? (to explain the data)
5. If cell B5 contained the formula =A5+B5, what would be wrong? (circular reference)
6. List and describe three types of graphs (bar, pie and scatter)
7. What is a template and how is it used in a spreadsheet? (a preformatted document that can be reused)
8. What is the purpose of cell lock? (to protect data in the cell)

Labelling parts

- Identify and label the parts of the Microsoft Excel window below.



Practical test

Use features and functions of spreadsheet tools to record and analyse data.

- The teacher of a Mathematics class would like to store all the students' results in a spreadsheet. The teacher asks one of her colleagues if it is possible to create a template that includes formulas that will:
 - add up the student marks
 - create a table array to convert the mark to a letter grade
 - add a comment according to a code
 - merge the spreadsheet data into a word-processed student report.
- Produce a portfolio (electronic or hardcopy) showing evidence of the main skills undertaken in the application of features and functions. The portfolio should include:
 - rough notes and drafts
 - data and formula
 - work samples with comments written by the teacher.

12.4 Databases

Elaboration of content and activities

Students learn to appreciate that computer database systems have a capacity to store, retrieve and manipulate data better than non-computer systems. Students will develop skills in modifying existing databases and designing new databases for specific purposes.

Suggested activities

- what is a database and what are its benefits?
- describe the basic features of a relational database
- design a simple database that would be used by your school library

Suggested assessment tasks

Research

Do research on businesses or other institutions located near your school.

- Find out if they use database management systems (DBMS) in their organisations.
- What type of data do they keep, if any?
- Write a report of your findings.

12.5 Computers and Employment

Elaboration of content and activities

The activities provide students with opportunities to search for job vacancies on the internet or other media and to prepare application letters and CVs.

You must make sure you give adequate time to students to complete the activities. It is recommended that you allow students to use the templates available.

There is no assessment task for this unit, as all assessments would have been completed in term 3.

Suggested activities

- Use the internet, print media, television or radio to find job vacancies.
- Prepare suitable job application letters and CV and/or résumé to support your application.

Recording and reporting

All schools must meet the requirements for maintaining and submitting student records as specified in the *Grade 12 Assessment, Examination and Certification Handbook*.

Recording and reporting student achievement

When recording and reporting student achievement you must record the achievement of the students in each unit and then, at the end of the year, make a final judgement about the overall achievement, or progress towards achievement, of the learning outcomes. To help you do this, descriptions of the levels of achievement of the learning outcomes are provided in the 'Learning outcome performance standards' table.

When reporting to parents, the school will determine the method of recording and reporting. In an outcomes-based system, student results should be reported as levels of achievement rather than marks.

Remember that the final school-based mark will be statistically moderated using the external exam results. The students' overall level of achievement may change.

Levels of achievement

The level of achievement of the learning outcomes is determined by the students' performance in the assessment tasks. Marks are given for each assessment task, with a total of 100 marks for each 10-week unit, or 50 marks for each 5-week unit. The marks show the students' level of achievement in the unit, and hence their progress towards achievement of the learning outcomes.

There are five levels of achievement:

- Very high achievement
- High achievement
- Satisfactory achievement
- Low achievement
- Below minimum standard

A **very high achievement** means overall that the student has an extensive knowledge and understanding of the content and can readily apply this knowledge. In addition, the student has achieved a very high level of competence in the processes and skills and can apply these skills to new situations.

A **high achievement** means overall that the student has a thorough knowledge and understanding of the content and a high level of competence in the processes and skills. In addition, the student is able to apply this knowledge and these skills to most situations.

A **satisfactory achievement** means overall that the student has a sound knowledge and understanding of the main areas of content and has achieved an adequate level of competence in the processes and skills.

A **low achievement** means overall that the student has a basic knowledge and some understanding of the content and has achieved a limited or very limited level of competence in the processes and skills.

Below the minimum standard means that the student has provided insufficient evidence to demonstrate achievement of the learning outcomes.

Achievement level					
Total marks	Very high achievement	High achievement	Satisfactory achievement	Low achievement	Below minimum standard
600	540–600	420–539	300–419	120–299	0–119
500	450–500	350–449	250–349	100–249	0–99
400	360–400	280–359	200–279	80–199	0–79
300	270–300	210–269	150–209	60–149	0–59
200	180–200	140–179	100–139	40–99	0–39
100	90–100	70–89	50–69	20–49	0–19
60	54–60	42–53	30–41	12–29	0–11
50	45–50	35–44	25–34	10–24	0–9
40	36–40	28–35	20–27	8–19	0–7

Sample format for recording assessment task results over two years

Student name:

Grade 11 assessment task results			
Unit	Assessment task	Mark	Student mark
11.1			
11.2			
11.3			
Total marks Grade 11			300

Student name:

Grade 12 assessment task results			
Unit	Assessment task	Marks	Student mark
12.1			
12.2			
12.3			
	Total marks Grade 11	300	
	Total marks Grade 11 and 12	600	

Learning outcomes and levels of achievement

Levels of achievement in Grade 11 and Grade 12 are recorded and reported against the learning outcomes. The performance standards for the levels of achievement are described in the tables on pages 19-21.

Steps for awarding final student level of achievement

1. Assess unit tasks using unit performance standards and assessment criteria and marking guides.
2. Record results for each task in each unit.
3. Add marks to achieve a unit result and term result.
4. Add term marks to get a year result.
5. Determine the overall achievement using the achievement level grid.
6. Report results using the learning outcome performance standards.

The following is an example of reporting using the learning outcomes performance standards descriptors.

Using the learning outcomes performance standards descriptors

Student	Antonio
Subject	ICT
School-based assessment	High achievement
This means Antonio:	
Independently identifies and describes in detail a wide range of hardware and software and their functions and capabilities	
Independently identifies and describes in detail a wide range of information systems and demonstrates understanding of how these are used within organisations	
Demonstrates extensive knowledge and understanding of a wide range of complex legal and ethical issues of using information technology	
Researches, identifies and describes in detail suitable network designs to solve complex small business or organisational needs	
Demonstrates extensive knowledge and understanding advanced procedures for protecting and keeping data securely on a computer and network	
Researches, identifies and describes in detail a range of hardware and software required for electronic communication between computers and computer systems including alternative methods of connection	
Demonstrates extensive knowledge and understanding of the internet and e-mail and a wide range of complex issues involved	
Independently selects and proficiently applies a wide range of relevant, advanced skills and concepts in creating original solutions to information problems using a range of software	
Independently develops advanced multimedia presentations using advanced features and a range of hardware and software devices	

Resources

Information Communication Technologies and Computer Studies become more interesting and meaningful when you use a variety of resources and materials in your teaching.

Types of resources for ICT and Computer Studies

Hardware and software

- computers (for class use)
- used computers (stripped for demonstration)
- file or internet server
- storage devices
- image-capturing devices
- peripheral devices
- software (applications and operating system)

Other resource materials

- textbooks, reference books
- electronic material (internet, CD, DVD)
- magazines
- diagrams, charts, posters
- worksheets, information sheets
- pamphlets, brochures
- television and radio broadcasts
- pictures, photographs
- models
- newspapers

General guidelines for selecting and using resources

How effective a resource is depends on whether it is suitable for the knowledge or skill to be learned and the attitude of the students. Classroom organisation is the key to using resources successfully. You need to:

- prepare thoroughly. Make sure that you are familiar with the resource so that you use it with confidence and assurance. If equipment is involved, check that it is in working order, make sure that you know how to operate it and that it is available when you need it.
- use the resource at the right place and time in the lesson. The resource should fit in with the flow and sequence of the lesson. It should serve a definite teaching purpose.
- (if the resource is radio, film, video or television), introduce the program by outlining the content. You might also set some questions to guide listening or viewing. Follow up after using the resource, by discussing and drawing appropriate conclusions.

Resource books and websites

Books

Microsoft® Encarta® 2007, © 1993-2006 Microsoft Corporation

Websites

<http://www.AcronymFinder.com> Acronym Finder: Searchable index of over 90,000 acronyms and their meanings

<http://www.curriculum.edu.au> Curriculum Corporation: Curriculum material for schools

<http://www.edna.edu.au> EdNA Online: Resources and directory of resources and information

<http://www.icttaskforce.edna.au> ICT Task Force Innovation and emerging opportunities for use of Internet

<http://www.thelearningfederation.edu.au> Learning Federation Online interactive curriculum content

<http://www.sofweb.vic.edu.au/internet> Softweb—Victoria Department of Education—Victoria—Internet Policy in Schools

<http://www.schoollink.org/twin/> Teaching with the Internet Teaching resources

<http://www.research.microsoft.com> Microsoft Research Microsoft development of new technologies

<http://www.peachpit.com> Peach Pit Press Computer software instruction books

<http://www.redhat.com> Red Hat Software publisher—Linux operating system

<http://www.whatis.com/> The IT-Specific encyclopaedia

<http://www.wired.com> Wired New Technology Magazine

<http://www.toshiba.com.au> Toshiba—Computers and other hardware

<http://www.usr.com> US Robotics Modem and wireless network accessories

<http://www.verbatim.com.au> Verbatim Data storage products

<http://www.computerhistory.org> Computer Museum History Non-profit entity dedicated to the Centre preservation and celebration of computing history

<http://www.bluetooth.com> Bluetooth Wireless communication technology

<http://www.citrix.com> Citrix Networking and Virtual Private Network technology

<http://www.novell.com> Novell Networking technologies

<http://www.freeonline.com.au> Free online: Free Internet Service Provider

<http://www.icann.org> Icann: Internet Corporation for Assigned Names and Numbers—IP allocation

<http://www.adobe.com/products/main.html> Adobe—software for print, digital and the web

<http://www.macromedia.com/software/> Macromedia Software

<http://www.microsoft.com/catalog/> Microsoft Product Catalog

<http://www.symantec.com> Symantec Software publisher

<http://computer.howstuffworks.com/virus.htm> How computer viruses work

<http://www3.ca.com/virusinfo> Computer Associates Virus Information Centre

<http://www.vil.nai.com/vil/default.asp> McAfee Avert Virus Information Library

<http://www.maran.com/> Maran Graphics: Computing books on hardware and software

<http://www.microsoft.com> Microsoft operating systems and desktop applications

<http://www.apple.com.au/airport> Apple—Airport Wireless networking

<http://www.apple.com/quicktime/> Apple QuickTime

<http://www.macromedia.com/software/flashplayer/> Macromedia Flash Player

<http://www.macromedia.com/software/shockwaveplayer/> Macromedia Shockwave Player

<http://www.microsoft.com/windows/ie/> Windows—Microsoft Internet Explorer

<http://www.combo.com/ergo/index.html> Ergonomics at Work

<http://www.adobe.com/products/acrobat/main.html> Adobe Acrobat Adobe Acrobat

<http://www.adobe.com/products/acrobat/adobepdf.html> Adobe Reader: Reader for Adobe Portable Document Format

<http://www.google.com> Google Search engine

<http://www.hotbot.com> Hotbot Search engine

<http://www.webwombat.com.au> WebWombat Search engine

<http://www.excite.com> Excite Search engine

<http://www.LookSmart.com> LookSmart—Search Directory Search engine and directory—United States

<http://au.yahoo.com> Yahoo—Search Directory—Search directory and web portal Australian Site

<http://www.auscharity.org> Auscharity Online charity directory

<http://www.copyright.org.au> Australian Copyright Council Independent non-profit organisation

<http://www.asx.com.au> Australian Stock Exchange Information about the share market

<http://office.microsoft.com> Microsoft Office Microsoft site about its 'Office' software suite

<http://www.microsoft.com/word> Microsoft Word Microsoft Word

<http://www.visualthesaurus.com/> Visual Thesaurus

<http://www.m-w.com/thesaurus.htm> Webster's Thesaurus—Merriam Webster Online

<http://www.wordreference.com/> Word Reference—translation

<http://www.m-w.com/home.htm> Webster's Dictionary: Merriam Webster Online

<http://www.apple.com/ilife/iphoto> Apple—iPhoto Digital photo album/retouching application

<http://www.eudora.com> Eudora—Email software Email client

<http://www.adobe.com/products/dngmain.html> Adobe—DNG Digital Negative, open standard raw format

<http://www.yahoo.com.au> Yahoo email Free web email from Yahoo

<http://www.adobe.com/products/photoshop/main.html> Adobe Photoshop Image editing software

<http://www.macromedia.com/software/> Macromedia Freehand Macromedia object oriented illustration freehand/ software

<http://www.agag.com> Animated GIF Artists Guild Excellence in GIF animation

<http://www.adobe.com/products/aftereffects/main.html> Adobe After effects Adobe imaging editing software

<http://www.allExperts.com> All Experts Information about spreadsheets

<http://www.j-walk.com/ss/> Excel Developer Information about excel

<http://www.mrexcel.com> Mr Excel Information about Excel

<http://www.filemaker.com.au> Filemaker Australia Software publisher—Filemaker Database

<http://www.adobe.com/products/indesign/main.html> Adobe InDesign Adobe desktop publishing software

<http://www.apple.com/iwork/pages/> Apple—iPages Word processor/page layout application

<http://www.webstyleguide.com> Yale Web Style Guide Web design reference

<http://www.webmonkey.com> Web Monkey Information about web authoring and websites

<http://www.australia.internet.com> Internet World Internet Magazine

<http://www.adobe.com/products/golive/main.html> Adobe GoLive Web authoring software

<http://www.macromedia.com/software/> Macromedia Dreamweaver: Web authoring software

<http://www.macromedia.com/software/fireworks/> Macromedia Fireworks Create and optimise web graphics

<http://www.macromedia.com/software/flash/> Macromedia Flash Design and animation for the web

<http://www.apple.com.au/itunes> Apple—iTunes Digital music organisation application

<http://www.apple.com.au/ilife/imovie> Apple—iMovie HD Digital video editor

<http://www.microsoft.com/windowsxp/> Microsoft Movie Maker: Movie editing software moviemaker

<http://www.adobe.com/products/photoshop/main.html> Adobe Photoshop
Image editing for graphics professionals

<http://www.adobe.com/products/premiere/main.html> Adobe Premiere Video
editing for video professionals

<http://www.apple.com/finalcutpro/> Apple Final Cut Pro Video editing for
video professionals

<http://www.apple.com/ilife/idvd/> Apple idvd Apple Computer software for
DVDs

<http://www.apple.com/ilife/imovie/> Apple imovie Apple's bundled video
editing software

<http://www.apple.com/ilife/itunes/> Apple itunes Apple's bundled sound
editing software

<http://www.apple.com/appleworks/> Apple—Appleworks Apple's bundled
integrated package software

<http://www.encarta.msn.com> Encarta Online Encyclopedia

<http://www.britannica.com/> Encyclopaedia Britannica Free online version of
the Encyclopaedia Britannica

<http://office.microsoft.com/templates> Document templates for Microsoft
software

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Glossary for ICT and Computer Studies

Abacus	A counting device for making calculations, consisting of a frame mounted with rods along which beads or bails are moved
Adware	Adware describes programs that monitor browsing habits and deliver individually tailored ads. These ads often arrive as pop-ups independent of those delivered by websites. The adware is often piggybacked on free programs, including popular file-sharing programs like Kazaa and Grokster (See spyware)
Animation	The rapid sequencing of still images to create the appearance of motion
Anti-spyware	A software program that is used to protect your computer against spyware or malware (see spyware or malware)
Antivirus	A software program that is used to protect your computer against viruses (see computer virus)
Application software	Software that has been developed to solve a particular problem for users to perform useful work on specific tasks; for instance word processing, spreadsheets and Adobe Photoshop (see system software).
Asynchronous	Ending data in one direction: relating to or using an electronic communication method that sends data in one direction, one character at a time
Backup	The procedure for copying computer data with which somebody is working and storing it in another alternative storage device or area for safe keeping as a security measure. A backup of very important files is crucial in any organisation
Binary coding schemes	The representation of characters as 0s and 1s , or 'off' and 'on' electrical states, in a computer
Biometric scanning	The use of measurable, biological characteristics such as fingerprints or iris patterns to identify a person to an electronic system
Bit	Unit of information in computer: the smallest unit of information storable in a computer or peripheral device, expressed as 0 or 1. Eight bits make a byte, the common measure of memory or storage capacity. Short for binary digit
Bit rate	The number of bits transferred per unit of time, typically expressed in bits per second (bps)
Bluetooth	A trademark for a wireless technology that enables devices such as portable computers, mobile phones, and portable hand-held devices to connect to each other and to the internet
Booting	Loading an operating system into a computer's main memory
Bridge	Is an interface used to connect the same types of network. Similar networks (LAN) can be joined together to create larger area networks
Broadband	A transmission medium designed for high-speed data transfers over long distances. Cable modem services and DSL are examples of broadband networks
Browser	Special internet software connecting you to remote computers, opens and transfers files, displays text and images, and provides an uncomplicated interface to the internet and Web documents
Byte	Unit of computer information: a group of eight bits of computer information, representing a unit of data such as a number or letter; computer storage unit: a unit of computer memory equal to that needed to store a single character
Cathode ray tube (CRT)	Desktop-type monitor built in the same way as a television set (see monitor)
Compact disk	or CD is a storage device that uses laser technology to read data (see DVD)
Cell	The basic unit of a spreadsheet or some other table of text, formed by intersection of a row and column. It contains a label, value or formula with attributes such as size, font and colour
Central processing unit (CPU)	The main circuit chip in a computer. It performs most of the calculations necessary to run the computer

Client server network	Describes a computer network in which processing is divided between a client program running on a user's machine and a network server program. One server can provide data to, or perform storage-intensive processing tasks in conjunction with, one or more clients
Clip art	Simple drawings held in digital form on a computer. These items are often supplied in large libraries of files that can easily be incorporated into word processor or presentation graphics documents
Com port	A serial communications port used to connect a device, such as a modem, printer or mobile device to a computer
Communication	Exchange of information: the exchange of information between people by means of speaking, writing or using a common system of signs or behaviour
Computer	An electronic device that accepts, processes, stores and outputs data at high speeds according to programmed instructions
Computer crime	Is an illegal action in which the perpetrator uses special knowledge of computer technology
Copyright	Exclusive legal right that prohibits copying of intellectual property without the permission of the copyright holder (see copyright law)
Copyright law	Law that prevent people from taking credit for and profiting from other people's work
Cracker	Somebody who breaks into computer system: somebody who gains unauthorised access to a computer system with the intention of doing damage or committing a crime (slang). See hacker
Database	A body of information held within a computer system using the facilities of a database management system
Database software	Application software (database management system) that sets up and controls the structure of a database and access to data (see database, DBMS)
Desktop	The desktop is the main screen area that you see after you turn on your computer and log on to the operating system (such as Windows)
Desktop publishing	Application software and hardware system that involves mixing text and graphics to produce high-quality output for commercial printing, using a computer and devices such as digital camera, scanners and printers. Microsoft Publisher, QuarkXPress and PageMaker are examples of desktop-publishing software
Device drivers	Specialised software programs, usually components of system software, that allow input and output devices to communicate with the rest of the computer system. For instance printers, digital camera, mouse, scanner, keyboard all require drivers in order to work
Digital video disk (DVD)	DVD (digital video disk) sometimes called 'digital versatile disk' is a storage device that uses laser technology to read data from optical disks
Disk operating system (DOS)	The original operating system produced by Microsoft that has a command-driven user interface (command prompt)
Domain	A location on the internet. The second part of the URL, and is the name of the server where the resource is located. For example: www.nri.org.pg
Domain name system (DNS)	Internet-addressing method that assigns names and numbers to people and computers. Because the numeric IP addresses are difficult to remember, the DNS system was developed to automatically convert text-based addresses to numeric IP addresses
Download	To copy a file from one computer to another using a modem or network
Electronic commerce (e-commerce)	Commerce using electronic media. Usually it is taken to mean commerce using the internet for sale of goods and services
Electronic mail	Transmission of electronic messages over the internet. Also known as e-mail
Encryption	A method of converting computer data and messages into something incomprehensible using a key, so that only a holder of the matching key can reconver them
Ergonomics	The study of how a workplace and the equipment used there can best be designed for comfort, efficiency, safety and productivity
Expansion card	Optional device that plugs into a slot inside the system unit to expand the computer's capabilities

Field (data field)	An item of data consisting of a number of characters, bytes, words, or codes that are treated together to form, for example, a number, a name or an address. A number of fields may be fixed in length or variable
File name extension	A set of characters added to the end of a file name that identifies the file type or format. Often the rules allow (or require) the final section of the name (the file extension) to be separated by a period (full stop) and used to indicate the file type
File server	Computer that other computers access: a computer in a network that stores application programs and data files accessed by other computers
File transfer protocol (FTP)	Method whereby you can connect to a remote computer called an FTP site and transfer publicly available files to your own hard disk via the internet
Firewall	Software or hardware that can help protect a computer from hackers or malicious software. A firewall helps prevent malicious software (such as worms) from gaining access to a computer through a network or over the internet, and helps prevent a computer from sending malicious software to other computers
Folders	A named area on a disk that is used to store related subfolders and files
Font	A set of characters with a specific design. Also known as typeface. A font describes a certain typeface, along with other qualities such as size, spacing, and pitch
Formula	Instructions for calculations in a spreadsheet. It is an equation that performs calculation on the data contained within the cells in a worksheet spreadsheet
Function	A variable quantity whose value depends upon the varying values of other quantities
Gateway	An interface permitting communication between dissimilar networks; for instance, between a LAN and a WAN (see network).
Hacker	A computer user who gains unauthorised access to a computer system or data belonging to somebody else
Hard disk drive	It is a storage device inside the computer case that stores billions of characters of data on a non-removable disk platter
Hardware	Computer equipment and peripherals: the equipment and devices that make up a computer system as opposed to the programs used on it
Hub	A device used to connect computers on a network. The computers are connected to the hub with cables. The hub sends information received from one computer to all other computers on the network
Hyperlink	A connection between an element (such as a word, phrase, image) in a document to somewhere else in the same document, or to a different destination on the Web. Hyperlinks are usually in different colour to the rest of the document or are underlined; they are activated by a mouse click
Hypertext	Data storage system: a system of storing images, text, and other computer files that allows direct links to related text, images, sound and other data
Hypertext mark-up language (HTML)	A text markup language used to create documents for the Web. HTML defines the structure and layout of a web document by using a variety of tags and attributes
Hypertext transfer protocol (HTTP)	The client–server protocol that defines how messages are formatted and transmitted on the World Wide Web
Icons	A small picture that represents a file, folder, program or other object or function
Information	The meaningful material derived from computer data by organising it and interpreting it in a specific way
Information system	A computer-based system with the defining characteristic that it provides information to users in one or more organisation. Information systems are thus distinguished from, for example, real-time control systems, message-switching systems, software engineering environments or personal computing systems
Input device	Any device that transfers data, programs or signals into a processor system. Such devices provide the human-computer interface, the keyboard being the most common example

Internet	Network that links computer networks all over the world by satellite and telephone, connecting users with service networks such as e-mail and the World Wide Web
Internet protocol (IP)	A protocol that allows traffic to pass between networks. The most widely used is IP, the internet protocol
Internet service provider (ISP)	Company that connects you through your communications line to its servers or central computer, and then to the internet via another company's network access points
Internet telephony	Using the internet to make phone calls, either one to one or for audioconferencing
Intranet	A private network, set up by an organisation or company, that resembles the World Wide Web but which is inaccessible to external users
Liquid crystal display (LCD)	See monitor or visual display unit
Local area network (LAN)	A network of computers, printers and other devices located within a relatively limited area (for example, a building). A LAN enables any connected device to interact with any other on the network. A LAN uses the infrastructure and standards of the internet and the Web
Mail merge	The process of producing a personalised letter for each person on a mailing list by combining a database of names and addresses with a form letter created in a word-processing program
Mainframe computer	A fast powerful computer with a large storage capacity that can accommodate several users simultaneously
Metropolitan area network (MAN)	A communication network covering a city or a suburb
Micro-computer	A small computer in which the central processing unit is a single silicon chip microprocessor
Modem	Modem stands for modulator/demodulator. A device that sends and receives data over telephone lines to and from computers
Monitor	A computer screen also referred to as visual display unit (VDU) that displays data or files that a user is working on. There are two types: cathode ray tube (CRT); liquid crystal display (LCD)
Motherboard	Also called 'system board'. The main circuit board in the computer to which other components of the computer, such as RAM, hard disk drive and processor, are attached
Multifunction device	A device containing the functions of scanner, printer, copier and fax in one unit
Multimedia	The combined use of digitised information representing text, sound, and still or video images, or the media so used
Online	Attached to or available through a central computer or computer network
Operating system	The computer program that manages all other programs on the computer. The operating system stores files, allows you to use software programs and coordinates the use of computer hardware
Output device	Any device that converts the electrical signals representing information within a computer into a form that can exist or be sensed outside the computer. Printers and visual displays are the most common type of output device for interfacing to people, but voice is becoming increasingly available
Peer-to-peer network	All computers on the network communicate directly with one another without relying on a server
Peripheral devices	Any component or piece of equipment that expands a computer's input, storage and output capabilities. Peripheral devices can be inside the computer or connected to it from the outside
Plagiarism	The process of copying another person's idea or written work and claiming it as original
Printing device	Any piece of equipment that can be attached to a network or computer, for example, printers, keyboards, external disk drives, or other peripheral equipment. These devices require special software (device drivers)
Privacy	Exclusive legal right that prohibits copying of intellectual property without the permission of the copyright holder (see copyright law)
Program	A list of instructions in a programming language that tells a computer to perform a task

Query	A question or request for specific data contained in a database. Used to analyse data
Random access memory (RAM)	The main internal storage area the computer uses to run programs and store data. Information stored in RAM is temporary, designed to clear when the computer is turned off
Relational database model	A data model that views information in a database as a collection of distinctly named tables. Each table has a specified set of named columns, each column name (also called an <i>attribute</i>) being distinct within a particular table, but not necessarily between tables
Read only memory (ROM)	Built-in computer memory that can be read by a computer but cannot be modified. Unlike random access memory (RAM), the information stored in ROM is not cleared when the computer is turned off
Router	Is an electronic device that directs communicating messages when networks are connected together
Satellite or airconnection services	Connection services that use satellites and the air to download or send data to users at a rate seven times faster than dial-up connections
Scanner	Device that identifies images or text on a page and automatically converts them to electronic signals that can be stored in a computer to copy or reproduce
Search engine	A computer program (such as Google or Yahoo) that searches for specific words and returns a list of documents in which they were found
Server	A powerful computer that manages shared devices, such as laser printers. It runs server software for applications such as e-mail and web browsing
Software	Computer program consisting of step-by-step instructions, directing the computer on each task it will perform
Spam	electronic junk mail: an unsolicited, often commercial, message transmitted through the internet as a mass mailing to a large number of recipients
Spreadsheet	An application software or program that is used to manipulate numeric data and create workbook files. Popular spreadsheet programs are Microsoft Excel, Corel Quattro Pro and Lotus 1-2-3
Spyware (malware)	The term is sometimes used to describe brazen advertising programs that slow computer performance and disrupt browser settings. Spyware is conventionally defined as software that enables an outsider to obtain information from a computer without the user's knowledge and consent
Storage device	Devices that can be used to store data (for instance flash drives, CDRW)
Super computer	Fastest calculating device ever invented, processing billions of program instruction per second
Switch	A device used to connect computers on a network. The computers are connected to the switch with cables. A switch is similar to a hub, except that it sends the information received from one computer to the specific computers that are supposed to receive it
Synchronous	In Windows Media Player, the process of maintaining digital media files on a portable device based on the rules in a partnership or actions specified by the user. This may require copying digital media files from a computer to a device, updating information on the device, or deleting files from the device
System box or unit	Part of the microcomputer that contains the CPU that houses most of the electronic components that make up a computer system
System software	Software that helps the computer perform essential operating tasks; for instance, Windows XP Professional, Windows Vista
Table (in database)	The list of records that make up the basic structure of a database. Their columns display field data and their rows display records
Template	A sample form or presentation that can be used as a pattern to help guide you in designing your own layout
Terminal	An input and output device connecting to a mainframe or type of computer called a host computer or server
Text	Letters, words, sentences and paragraphs

Toolbar	Bar located typically below the menu bar containing icons or graphical representations for commonly used functions
Topology	The configuration of a network. The four principles of network topology are star, bus, ring, hierarchy
Transmission control protocol or internet protocol (TCP/IP)	The standard protocol for the internet. The essential features of this protocol involve <ul style="list-style-type: none"> • identifying, sending and receiving devices • reformatting information for transmission across the internet
Trojan horse	A Trojan horse is a malicious software program that hides inside other programs. It enters a computer hidden inside a legitimate program, such as a screen saver. It then puts code into the operating system, which enables a hacker to access the infected computer. Trojan horses do not usually spread by themselves; they are spread by viruses, worms or downloaded software
Uniform resource locator (URL)	An address that uniquely identifies a location on the internet. A URL is usually preceded by http:// , as in http://www.microsoft.com
Universal serial bus (USB)	A narrow, rectangular connector used to attach a device, such as a keyboard or a mouse, to a computer
Upload	A process of transferring information from the user's computer to a remote computer
Video	Moving images displayed on a monitor
Video conferencing	Also called teleconferencing; use of television video and sound technology as well as computer networks(including the internet)
Virus	Software designed to deliberately harm your computer; for example, worms and Trojan horses are malicious software
Webpage	Location on World Wide Web: a computer file, encoded in HyperText Markup Language (HTML) and containing text, graphics files and sound files, which is accessible through the World Wide Web. Browsers interpret HTML documents to display webpages
Website	Group of related webpages
Wide area network (WAN)	A network that connects geographically separated locations by using telecommunications services
Wireless	The transmission of information without a physical connection between the sender and the receiver. Uses radio frequencies, hardware, software and various technologies to transmit information
Wireless local area network	Network without physical connection: a local area network that uses high-frequency radio signals to communicate between computers over relatively short distances
Word processing	The act of creating a word document on a computer using a program (for example, MS Word or ClarisWorks)
Workbook file	Contains one or more related worksheets or spreadsheets
Worksheet	Also known as spreadsheet or sheet. A rectangular grid of rows and columns used in a program like Excel
Workstation	Computer that is part of the computer network
World Wide Web (WWW)	The interconnected system of internet servers that support documents in multimedia form and include sounds, photos and video as well as text
Worm	A self-replicating program, similar to a virus. A worm can make it possible for a malicious user to take over your computer or can send out enough copies of itself to cause your computer or a web or network server to stop responding

Glossary for assessment

Syllabus outcomes, criteria and performance standards, and examination questions all have key words that state what students are expected to be able to do. A glossary of key words has been developed to help provide a common language and consistent meaning in the syllabus and teacher guide documents.

Using the glossary will help teachers and students understand what is expected in response to examinations and assessment tasks.

Glossary of key words for assessment

Account	Account for: state reasons for, report on. Give an account of: narrate a series of events or transactions
Analyse	Identify components and the relationship between them; draw out and relate implications
Apply	Use, utilise, employ in a particular situation
Appreciate	Make a judgement about the value of
Assess	Make a judgement of value, quality, outcomes, results or size
Calculate	Ascertain or determine from given facts, figures or information
Clarify	Make clear or plain
Classify	Arrange or include in classes or categories
Compare	Show how things are similar or different
Construct	Make; build; put together (items or arguments)
Contrast	Show how things are different or opposite
Critically (analyse, evaluate)	Add a degree or level of accuracy, depth, knowledge and understanding, logic, questioning, reflection and quality to (analysis or evaluation)
Deduce	Draw conclusions
Define	State meaning and identify essential qualities
Demonstrate	Show by example
Describe	Provide characteristics and features
Discuss	Identify issues and provide points for and/or against
Distinguish	Recognise or note or indicate as being distinct or different from; to note differences between
Evaluate	Make a judgement based on criteria; determine the value of
Examine	Inquire into
Explain	Relate cause and effect; make the relationships between things evident; provide why and/or how
Extract	Choose relevant and/or appropriate details
Extrapolate	Infer from what is known
Identify	Recognise and name
Interpret	Draw meaning from
Investigate	Plan, inquire into and draw conclusions about
Justify	Support an argument or conclusion
Outline	Sketch in general terms; indicate the main features of

Predict	Suggest what may happen based on available information
Propose	Put forward (for example, a point of view, idea, argument, suggestion) for consideration or action
Recall	Present remembered ideas, facts or experiences
Recommend	Provide reasons in favour
Recount	Retell a series of events
Summarise	Express, concisely, the relevant details
Synthesise	Putting together various elements to make a whole