Teacher's Guide

INFORMATION TECHNOLOGY

10

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

CAPS

MTN

MTN South Africa, through MTN SA Foundation, is a proud supporter of the CAT and IT digital books.

As an organisation rooted in technology, we believe in providing a new bold digital world to the communities we operate in. This unique digital book provides the fundamental knowledge necessary for a sound grounding from which to make practical use of the complete and indispensable application-oriented information regarding Computer Applications Technology (CAT) and Information Technology (IT). It is a foundational reference for today's secondary school learners and teachers alike - as well as for the next generation of CAT and IT students.

Information Technology Practical Book Grade 10
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INTRODUCTION TO INFORMATION TECHNOLOGY

Welcome to the *IT Grade 10 Teacher's Guide*. This book was developed to guide teachers and provide suggested answers that can be used when assessing learners throughout the year.

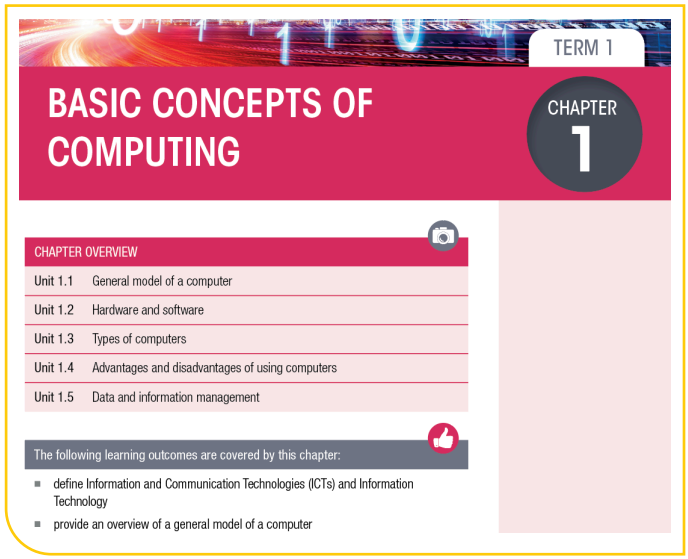
The *IT Grade 10 Theory Book* and the *IT Grade 10 Practical Book* provide learners with interesting, stimulating and challenging learning activities that have been carefully designed and developed so that there is a clear progression of knowledge and skills throughout the FET Phase. These books will make Information Technology an interesting, exciting and meaningful subject that learners will enjoy.

The *IT Grade 10 Teacher's Guide* has been designed so that teachers are able observe and assess their learners' progress and take any corrective measures when necessary. This book is aligned to the CAPS curriculum.

On pages viii – xi you will find the Annual Teaching Plan, which outlines the units, activities and timeframe allocated for each chapter.

HOW THE TEACHER'S GUIDE IS STRUCTURED

Each **Theory** chapter is indicated by this colour:


TERM 1

BASIC CONCEPTS OF COMPUTING

CHAPTER 1

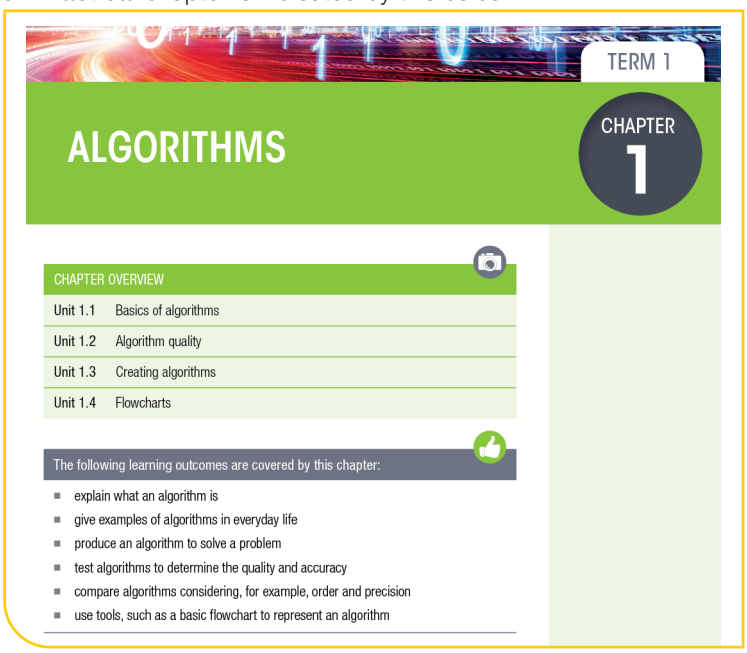
CHAPTER OVERVIEW

Unit 1.1	General model of a computer
Unit 1.2	Hardware and software
Unit 1.3	Types of computers
Unit 1.4	Advantages and disadvantages of using computers
Unit 1.5	Data and information management

The following learning outcomes are covered by this chapter:

- define Information and Communication Technologies (ICTs) and Information Technology
- provide an overview of a general model of a computer

Each **Practical** chapter is indicated by this colour:


TERM 1

ALGORITHMS

CHAPTER 1

CHAPTER OVERVIEW

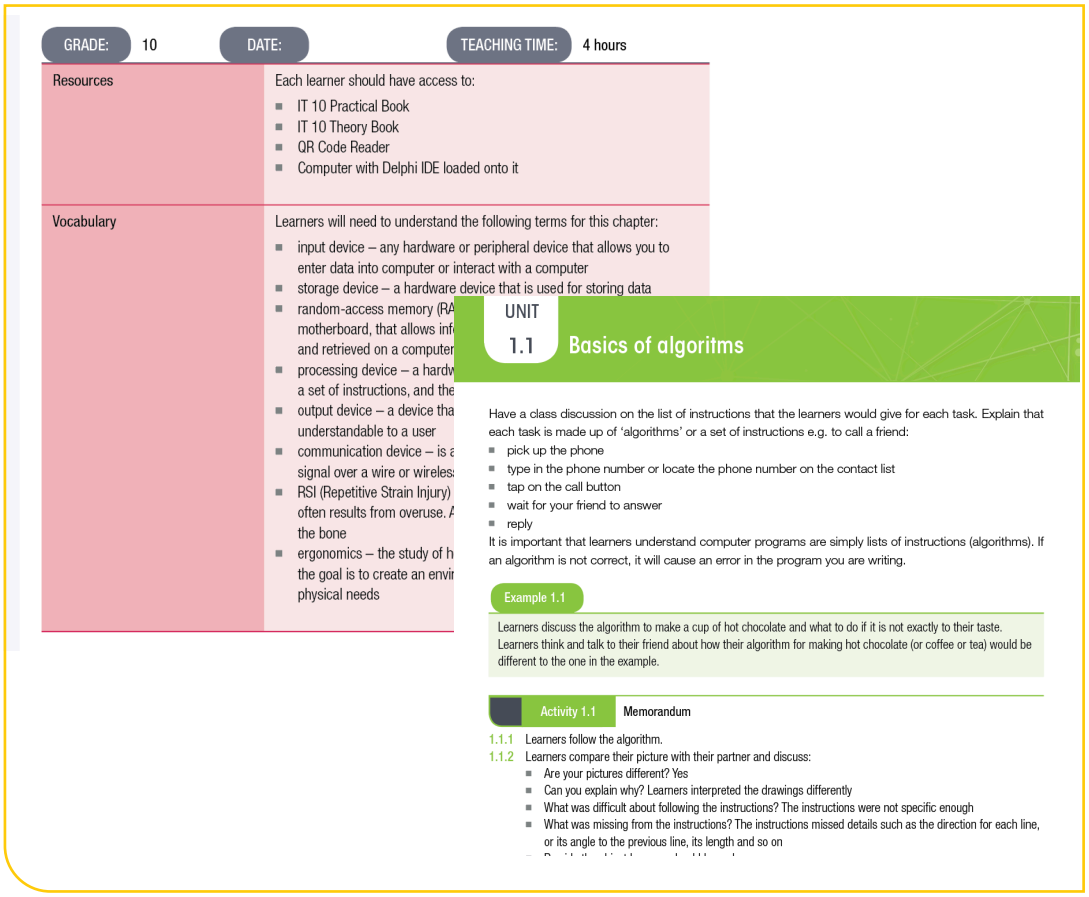
Unit 1.1	Basics of algorithms
Unit 1.2	Algorithm quality
Unit 1.3	Creating algorithms
Unit 1.4	Flowcharts

The following learning outcomes are covered by this chapter:

- explain what an algorithm is
- give examples of algorithms in everyday life
- produce an algorithm to solve a problem
- test algorithms to determine the quality and accuracy
- compare algorithms considering, for example, order and precision
- use tools, such as a basic flowchart to represent an algorithm

For each chapter we have indicated what resources you will need and the teaching time allocated for the content in the CAPS curriculum.

Each unit then has suggested answers for the activities in the Theory and Practical Books.


GRADE: 10 DATE: TEACHING TIME: 4 hours

Resources	Each learner should have access to: ■ IT 10 Practical Book ■ IT 10 Theory Book ■ QR Code Reader ■ Computer with Delphi IDE loaded onto it
Vocabulary	Learners will need to understand the following terms for this chapter: ■ input device – any hardware or peripheral device that allows you to enter data into computer or interact with a computer ■ storage device – a hardware device that is used for storing data ■ random-access memory (RA motherboard, that allows inf and retrieved on a computer ■ processing device – a hardw a set of instructions, and the ■ output device – a device tha understandable to a user ■ communication device – is a signal over a wire or wireles ■ RSI (Repetitive Strain Injury) often results from overuse. A the bone ■ ergonomics – the study of h the goal is to create an envir physical needs

UNIT 1.1 Basics of algoritms

Have a class discussion on the list of instructions that the learners would give for each task. Explain that each task is made up of 'algorithms' or a set of instructions e.g. to call a friend:

- pick up the phone
- type in the phone number or locate the phone number on the contact list
- tap on the call button
- wait for your friend to answer
- reply

It is important that learners understand computer programs are simply lists of instructions (algorithms). If an algorithm is not correct, it will cause an error in the program you are writing.

Example 1.1

Learners discuss the algorithm to make a cup of hot chocolate and what to do if it is not exactly to their taste. Learners think and talk to their friend about how their algorithm for making hot chocolate (or coffee or tea) would be different to the one in the example.

Activity 1.1 Memorandum

1.1.1 Learners follow the algorithm.

1.1.2 Learners compare their picture with their partner and discuss:

- Are your pictures different? Yes
- Can you explain why? Learners interpreted the drawings differently
- What was difficult about following the instructions? The instructions were not specific enough
- What was missing from the instructions? The instructions missed details such as the direction for each line, or its angle to the previous line, its length and so on

ANNUAL TEACHING PLAN - OVERVIEW OF TERMS (THEORY)

TERM 1

CHAPTER 1
Basic concepts of computing
(4 hours)

CHAPTER 2
Data representation, storage and social implication
(10 hours)

TERM 2

CHAPTER 3
Basic concepts of hardware
(4 hours)

CHAPTER 4
Basic concepts of system software
(4 hours)

CHAPTER 5
Networks
(2 hours)

CHAPTER 6
Electronic communication
(4 hours)

TERM 3

CHAPTER 7
Computer management
(4 hours)

CHAPTER 8
The internet and the World Wide Web
(8 hours)

TERM 4

CHAPTER 9
Internet services
(2 hours)

ANNUAL TEACHING PLAN - OVERVIEW OF TERMS (PRACTICAL)

TERM 1

CHAPTER 1
Algorithms
(8 hours)

CHAPTER 2
Delphi
(9 hours)

CHAPTER 3
Variables and components
(9 hours)

CHAPTER 4
Solving basic mathematical problems using Delphi
(6 hours)

TERM 2

CHAPTER 5
Decision making
(16 hours)

CHAPTER 6
Validating data
(20 hours)

TERM 3

CHAPTER 7
Repitition
(8 hours)

CHAPTER 8
String manipulation
(4 hours)

TERM 4

CHAPTER 9
PAT Preparation
(12 hours)

TERM 1					
Hours	Chapters	Units	Informal activities	Date started	Date completed
4	THEORY CHAPTER 1: Basic concepts of computing	Unit 1.1 General model of a computer			
		Unit 1.2 Overview and concepts of the main components of a computer system			
		Unit 1.3 Types of computers			
		Unit 1.4 Advantages and disadvantages of computers			
		Unit 1.5 Data and information management			
10	THEORY CHAPTER 2: Data representation, storage and social implications	Unit 2.1 The link between data, information and knowledge			
		Unit 2.2 Number systems			
		Unit 2.3 Digital character and primitive data types			
		Unit 2.4 File management			
		Unit 2.5 Common file types and extensions			
		Unit 2.6 Social implications			
8	PRACTICAL CHAPTER 1: Algorithms	Unit 1.1 Basics of algorithms			
		Unit 1.2 Algorithm quality			
		Unit 1.3 Creating algorithms			
		Unit 1.4 Flowcharts			
9	PRACTICAL CHAPTER 2: Delphi	Unit 2.1 Opening Delphi and exploring the IDE			
		Unit 2.2 Components and properties			
		Unit 2.3 Creating a simple Delphi project			
		Unit 2.4 Events			
		Unit 2.5 Syntax			

TERM 1 ...*continued*					
Hours	**Chapters**	**Units**	**Informal activities**	**Date started**	**Date completed**
4	PRACTICAL CHAPTER 3: Variables and components	Unit 3.1 Data types			
		Unit 3.2 Variable and component names			
		Unit 3.3 Declaring variables and components			
		Unit 3.4 Assigning values to variables			
		Unit 3.5 Converting data types			
		Unit 3.6 Errors			
10	PRACTICAL CHAPTER 4: Solving basic mathematical problems using Delphi	Unit 4.1 Basic operators			
		Unit 4.2 Formatting numbers			
		Unit 4.3 Mathematical functions			
		Unit 4.4 Variable scope			
TERM 2					
Hours	**Chapters**	**Units**	**Informal activities**	**Date started**	**Date completed**
8	THEORY CHAPTER 3: Basic concepts of hardware	Unit 3.1 Types of hardware			
		Unit 3.2 Ouptut devices			
		Unit 3.3 Storage devices			
		Unit 3.4 Motherboard			
		Unit 3.5 Computer or smartphone			
9	THEORY CHAPTER 4: Basic concepts of system software	Unit 4.1 System software concepts			
		Unit 4.2 Types of operating systems			
		Unit 4.3 Utilities and drivers			
9	THEORY CHAPTER 5: Networks	Unit 5.1 Uses of networks			
		Unit 5.2 Components of a network			
		Unit 5.3 Types of networks: client-server and peer-to-peer networks			
9	THEORY CHAPTER 6: Electronic communications	Unit 6.1 Electronic communication tools			
		Unit 6.2 Email as a form of e-communication			
		Unit 6.3 Social implications			

TERM 2 ...*continued*					
Hours	**Chapters**	**Units**	**Informal activities**	**Date started**	**Date completed**
4	PRACTICAL CHAPTER 5: Decision making	Unit 5.1 Decision in algorithms			
		Unit 5.2 Boolean expressions and IF-THEN statement			
		Unit 5.3 Boolean operators			
		Unit 5.4 IF-THEN-ELSE statement			
		Unit 5.5 Nested IF-THEN statements			
		Unit 5.6 Case statements			
10	PRACTICAL CHAPTER 6: Validating data	Unit 6.1 String comparison			
		Unit 6.2 Validating data			
		Unit 6.3 IN operator			
TERM 3					
Hours	**Chapters**	**Units**	**Informal activities**	**Date started**	**Date completed**
8	THEORY CHAPTER 7: Computer management	Unit 7.1 Computer management tasks			
9	THEORY CHAPTER 8: The internet and World Wide Web	Unit 8.1 The internet and world wide web			
		Unit 8.2 Browsing and searching			
		Unit 8.3 Social issues			
9	PRACTICAL CHAPTER 7: Repitition	Unit 7.1 Using the ListBox and ComboBox components			
		Unit 7.2 Repitition concepts			
		Unit 7.3 FOR...DO loop			
		Unit 7.4 Looping with components			
		Unit 7.5 Using the Input Box			
		Unit 7.6 Repeat...UNTIL loop			
		Unit 7.7 WHILE...DO loop			
		Unit 7.8 Apply loop structures			
		Unit 7.9 Initialising variables using the OnShow event			
		Unit 7.10 Timers			

TERM 3 ...*continued*					
Hours	**Chapters**	**Units**	**Informal activities**	**Date started**	**Date completed**
4	PRACTICAL CHAPTER 8: String manipulation	Unit 8.1 Combining strings and determining the length of a string			
		Unit 8.2 Formatting strings			
		Unit 8.3 Scrolling through a string			
		Unit 8.4 Manipulating strings			
TERM 4					
Hours	**Chapters**	**Units**	**Informal activities**	**Date started**	**Date completed**
8	THEORY CHAPTER 9: Internet services	Unit 9.1 Overview of internet plug-in applications			
9	PRACTICAL CHAPTER 9: PAT preparation	Unit 9.1 Tools and techniques to create a software solution to a problem			
		Unit 9.2 A problem-solving approach			
		Unit 9.3 Analysing user interfaces			

HOW THE TEACHER'S GUIDE WORKS

In this Teacher's Guide, the information you may need for each lesson and some general things that may assist you in your day-to-day teaching is given.

We will start by:

- Explaining how the practical and theory textbooks work.
- Providing various best practices as per DBE booklets.
- Providing general tips, links and ideas that you can use.

After the general section, each module will focus on the following if available:

- Tips and ideas on presenting the specific information.
- Links to additional information.
- Links to websites for additional activities.
- Memorandum for the activities.

HOW THE TEXTBOOK WORKS

There are two textbooks for each grade, a theoretical textbook and a practical textbook, of which both are available in printed format as well as electronic format. The information in these textbooks are combined in learner-friendly topics, that are divided into chapters and units as per school term.

Teaching elements used in these textbooks are:

- Activities – provide opportunities to the learners to apply their skills.
- Additional information – information that the teacher can use to explain certain concepts to the learners that are not covered in the books.
- Animations and videos – used to explain specific concepts (only available in the e-books).
- Case studies – this can be used in class to support the information covered in the unit. The questions should be discussed with the learners in class or can be given as an informal activity.
- Consolidation – a diagram showing the concepts that were taught in that chapter.
- Consolidation activities – a self-assessment covering the most important information and skills focussed on in the chapter.
- Did you know – boxes in the margin of the book containing information not covered in the main text, but important for the learners to know.
- Enrichment activities – optional activities for the learners to help them to better understand the work.
- Examples – the examples are step-by step procedures on various computing tasks and should be done together with the learners. It is strongly recommended that each learner does the activities on their own computers.
- Glossary – a summary of all keywords given at the end of each module.
- Guided activities – guided activities are practical tasks where you as the teacher guide the learners through the activity. The solutions to guided activities are given in the book.
- Examples – guided examples are practical examples where you as the teacher guide the learners through the example, teaching the valuable concepts. The solutions to guided activities are given in the book.
- New words – definitions of important words or terms.
- Overview – a summary of the Units to follow.
- Learning outcomes – a description of what is covered in the chapter as relevant to CAPS.
- QR codes – it provides the learner with links to optional videos or additional reading materials. Learners must have a QR reader on their phones to read these codes.

- Take note – additional information for the learner to aid in further understanding.
- Theoretical activities – provide learners the opportunity to recap, review and reinforce what they have learnt. These activities are mainly theoretical activities but may include group or pair projects as well as research activities.
- Videos – provides step-by step procedures – only available in the e-books.
- Vocabulary – keywords and phrases the learner needs to understand before going through the text.

BEST PRACTICES – LESSONS FOR THE CLASSROOM

The following information was obtained from a study that was done for the DBE on Successful teaching and learning in information technology – Best practices in the classroom.

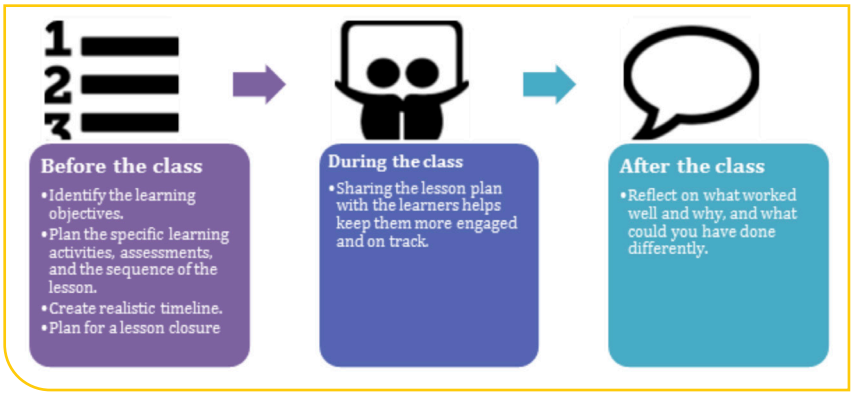
PLANNING

Although the curriculum or CAPS tells you WHAT you will be teaching, and in which SEQUENCE you should teach it, it does not explain HOW you should teach it or which TEACHING STRATEGIES you should apply.

That is where proper and detailed planning of each lesson comes in, breaking up the instruction into small enough chunks of information so that the learners can link it to existing knowledge and synthesise the new knowledge into their understanding.

Planning addresses and integrates the following three key components:

- Learning objectives.
- Learning activities.
- Informal assessment to check for learner understanding.



When doing your planning, it is important that you look at the bigger picture.

The following provides guidelines for effective planning:

- Start with the end in mind – What does the learner need to know and be able to do? Learning goals and objectives.
- Identify curriculum resources – e.g. textbook – does the textbook provide everything needed to achieve the learning goals or does one have to develop/find additional content or activities? What other resources will be needed, e.g. previous papers?
- Identify declarative knowledge – Think about the concepts and ideas learners will need to know. What are developmentally appropriate given the learners' background knowledge and prior learning?
- Identify procedural knowledge – Skills, strategies and processes. Procedural knowledge incorporates the use of declarative knowledge.
- Create, find and select learning activities and assignments – activities are the instructional strategies that allow teacher and learner to interact with content, skills and materials. The goal of classroom activities is to help learners to interact with new knowledge and skills, deepening learner understanding and raising skill levels related to the learning goal(s). Activities often require teacher coaching or guidance. When planning classroom activities, start by selecting the instructional strategies that allow learners to process critical information or vocabulary associated with the learning goals first, i.e. which subject terminology or concepts will be introduced, and when?

ASSESSMENTS

Assessment drives instruction and learning by providing relevant information on the learners' progress and performance. Its main purpose is to support and improve further learning by incorporating artefacts, illuminating various processes, checking in at multiple waypoints and placing value on multiple ways of knowing.

To make sure that tests and examinations are applicable to all learners, you should use Blooms Taxonomy as described below according to the DBE's SBA tasks booklet.

Teachers who are successful also analyse mistakes made by the learners in tests and examinations to inform teaching and to follow-up through improvement strategies.

COGNITIVE LEVELS OF LEARNERS (BLOOMS' TAXONOMY)

The cognitive demand of a question refers to the type and level of thinking learners need to successfully engage with and answer a question.

- High cognitive questions are those which demand that the learners manipulate bits of information previously learnt to create and support an answer with logically reasoned evidence. This sort of question is generally interpretive, evaluative, inquiry-based, inferential, synthesis-based and open-ended.
- Lower cognitive questions are more basic. They ask learners to recall material previously presented and learnt. These questions are generally direct, closed, recall-related and that measure knowledge only – factual and process.

Bloom's revised taxonomy illustrates the different cognitive levels.

COGNITIVE LEVEL		COMMENT	CONTEXT
C1	Knowledge Recall of factual/process knowledge in isolation, i.e. one step/set of steps/ instruction/ process at a time	Requires recalling or recognising only. Practised or learnt the isolatable bit, e.g. fact/skill/ process/steps before.	Exactly the same context as a textbook example or a classroom-based exercise. Explicitly part of the curriculum.
C2	Understanding Convert from one form of representation to another.	Requires knowledge and understanding of steps/process/ isolatable bits. Translating 'words', pictures, symbols, diagrams into e.g. programming code.	Familiar context. Includes interpreting, exemplifying, classifying, summarising, inferring, comparing and explaining.
C3	Application Using known routines/steps/ processes to complete a task. All the information required is immediately available to the learner.	Requires knowledge, understanding and use of steps/ routines/ processes. Application of appropriate abstraction without having to be prompted…and without having to be shown how to use it in a familiar context.	Familiar context but with new elements / new circumstances. Learners have seen the same or very similar steps working with different data or other circumstances.

COGNITIVE LEVEL		COMMENT	CONTEXT
C4	Analysis Understand how parts relate to a whole (pinpoint the core/main aspects) or interact with each other and use appropriate methods to complete task/solve problem.	Requires reasoning/ investigation/ developing a plan or algorithm; has some complexity. Completing task could have more than one possible approach. Organising component parts to achieve an overall objective.	New context. Unseen, unfamiliar problems or tasks.
C5	Evaluation Judging or deciding according to some set of criteria, generally without real right or wrong answers	Requires weighing possibilities, deciding on most appropriate. Testing to locate errors.	
C6	Create Putting elements together to form a coherent or functional whole or re-organising elements into a new pattern or structure.	Requires familiarisation with the task by exploring different approaches and interpreting and analysing relevant approaches. Generalisation.	Novel situation. The learner has no familiarity with completed functional whole.

In IT, the above cognitive levels are collapsed providing for lower-order, middle-order and higher-order levels.

	LOWER ORDER C1	MIDDLE ORDER C2 & C3	HIGHER ORDER C4, C5 & C6
Theoretical	Recall (Knowledge)	Understand and apply	Analyse, evaluate and create
Practical	Routine procedures (Knowledge/Remembering)	Multi-step procedures (Understanding/Applying)	Problem-solving (Analysing/Evaluating/Creating)
Weighing	30%	40%	30%

Cognitive demand describes the type of thought process that is required to answer a question and is not necessarily the same as the level of difficulty of a question, such as the difficulty of the content knowledge that is being assessed.

DIFFICULTY LEVELS

As per the same booklet, the difficulty level of a question refers to the ease with which a learner is able to answer a question. It is described as follows:

LEVEL	DESCRIPTION
1	Easy to answer
2	Moderately challenging
3	Difficult to answer
4	Very difficult (It allows high achieving learners to excel above the others)

The difficulty level of a question is influenced by one or more of the following:

- The content (subject, concept, facts, principles or procedures), e.g.
  - Content that is learnt in Grade 10 and that is repeated and practised in Grade 11 and 12 usually becomes easier by Grade 12.
  - The number of steps required, or the length of the answer could influence difficulty.
- Stimulus (item or question)
  - The language, text or scenario used could influence difficulty.
  - Re-read required or limited time could influence difficulty.
- Task (process)

PRACTICAL ASSESSMENT TASK (PAT)

PAT forms an important part of the learners' learning experience as it consolidates the content done throughout the year and helps learners to make connections and see the relevance of what they learn. The DBE is providing guidelines for PAT each year. These guidelines are usually sent out to schools by the district or provincial IT advisor.

EXAM PREPARATION – TIPS FOR THE TEACHER

Following are some tips on what you can do to prepare your learners for their exams.

- Prepare ahead and make sure that you have an organised schedule covering all the revision work throughout the year. Do not wait till the last minute and then try to cram everything in before the exam. This will also give you the time to include a wider variety of activities to keep the learners' interest.
- Make sure that the learners know and understand what to expect in the exam. This does not only refer to the content of the exam, but also to what is expected of them with each section of the exam. This means they must know how to read and answer multiple choice questions, long questions, true/false questions, etc.
- Narrow the topics down as much as you can so that learners have a clear view of what to expect in the exam. You can even give them a list of topics that they can focus on – even if it is a list of all the topics they covered throughout the year. A list helps them to focus as they can tick items off as they go through the work.
- Make sure that the learners do the work during this period and not you. The more involved they are, the better they will learn.
- Keep your revision activities interesting and use a variety of activity types such as quizzes and other review games. It is here where you can use tools like Kahoot! or Google Quiz with great success. You can also have learners write quizzes for each other as they engage much deeper with the content when they have to write a quiz.
- Teach the learners exam techniques and the meaning of specific keywords that may be used in an exam.

THEORETICAL PAPERS

CLUE WORD	WHAT YOU NEED TO DO	EXAMPLE
Analyse	Separate, examine and interpret	Analyse the correct use of word processing features in the following screenshot:
Categorise	Group concepts/ideas that are similar/have the same characteristics/functions or belong together. How should things be organised	Categorise the following computer devices: keyboard, CPU, printer, mouse, hard drive, SSD according to their main function.
Classify	Divide into groups or types so that things that are similar, are in the same group	Classify the following list of computer devices as input, output or storage devices
Comment on	Write generally about	Comment on the use of a wireless network in the following case:
Compare	Point out or show both similarities and differences between things or concepts. Note that stating the same fact in opposite form, will not earn you another mark.	Compare ROM with RAM
Contrast/ Distinguish	Explain what the difference between certain things are.	Contrast ROM and RAM or Distinguish between a PAN and a HAN

THEORETICAL PAPERS ...*CONTINUED*

CLUE WORD	WHAT YOU NEED TO DO	EXAMPLE
Define	Give a clear meaning of the concept.	Define phishing.
Describe	State in words (using diagrams where appropriate) the main points of a structure or process.	Describe phishing.
Diagram	Make or draw a diagram.	Diagram a generic ICT system.
Differentiate	Use differences to qualify categories.	Differentiate between ROM and RAM.
Discuss	Give a clear, detailed description of the focus topic.	Discuss the use of a PAN in a home office.
Elaborate	Explain in detail	Elaborate on the advice given to Mr X regarding buying a laser printer.
Evaluate	Express an opinion based on your findings	Evaluate the merit of buying computer X for person Y
Examine	Give a clear, detailed description of the focus topic.	Examine the two methods
Explain	Give a clear, detailed description of the focus topic.	Explain how phishing works.
Identify	Name the essential characteristics	Identify the port used to connect the printer.
Illustrate	Give examples to demonstrate or prove something.	Illustrate the information processing cycle.
Interpret	Give the intended meaning of	Interpret the tone of the email message given below: I hate you when you do this J
Justify	Give clear, detailed reasons for taking a particular position.	Justify the use of a table instead of tab stops in the following instance:
List	Write a list of items, with no additional detail.	List the types of information sources one could use when doing research.
Motivate	Provide a reason or justification for an answer or statement	Motivate the use of line and paragraph spacing when working in Word.
Name/ Mention	Write a list of items, with no additional detail.	Name one storage device.
Outline	Give a general summary. It should contain a series of main ideas supported by secondary facts. Show the organisation of the idea.	Outline the information processing cycle.
Order	Provide a chronological or value-based answer by listing several items (terms or events in correct sequence).	Order the storage media according to their capacity
Prove	Show by using an argument or logic or fact that something is true.	Prove that the majority of people like X by looking at the following survey results:
Relate	Show the connection between things, indicating how one causes or is like another	Relate the following terms and explanations:
Review	Give a survey or summary in which you look at the important parts or major points and criticise if necessary. Comment on what is given.	Review Mr X's monthly computer maintenance tasks.

THEORETICAL PAPERS ...*CONTINUED*

CLUE WORD	WHAT YOU NEED TO DO	EXAMPLE
State / Give	Write down information without discussion.	State the functions of the operating system.
Suggest / Recommend	Give your opinion and back it up with facts, reason or an explanation.	Suggest a computer configuration for Mr X.
Summarise	Give a brief, condensed description of the main ideas. Like developing an abstract.	Summarise the problems experienced in the following case:
Trace	Follow the development, progress or history of something, normally from the point of origin, typically in chronological order.	Trace the error in the spreadsheet calculations.

PRACTICAL PAPERS

CLUE WORD	WHAT YOU NEED TO DO	EXAMPLE
Call	Activate a function/method/routine in a program. Similar to invoke.	Call the function/method that will test if a word is a palindrome.
Change	Modify or adjust a structure or program/ program segment according to specific criteria or to produce a different outcome.	Change the loop structure so that it will stop when the user enters 'stop'.
Code	Write program code to accomplish a task. Could be similar to create or develop	Code a Scratch solution to calculate the cost for tiling a specific area.
Complete	Use the code given and finalise a program/ program segment to produce specific output or outcome or add code to finally accomplish a task.	Complete the Scratch program to provide the following output.
Correct	Find the error, often through tracing, then change it to implement a program/program segment correctly	Correct the loop structure so that it will provide the correct output
Create	Write your own program from the problem statement/description given. Analyse, plan and produce a complete program/ program segment from a problem statement by combining elements ('building blocks') in the correct sequence and way to devise algorithm, solve a problem or satisfy a problem statement or produce the required outcomes.	Create a program that will solve the following problem: Convert a fraction to its simplest form, e.g. 8/36 to 2/9
Debug	Find and remove errors in a program/program segment. Similar to correct.	The following code is supposed to determine the average of 10 numbers but is not giving the correct output. Debug the program.
Develop	Plan, write and implement program code Similar to create.	Develop a Scratch program to convert Astronomic Units (AU) to miles and kilometres.
Execute	Run an existing program.	Execute the program and determine if the output is correct

PRACTICAL PAPERS...*CONTINUED*

CLUE WORD	WHAT YOU NEED TO DO	EXAMPLE
Generate	Produce code or code segment(s) to solve a problem or perform a task. Similar to develop or create.	Generate Scratch code to calculate the VAT and the final price of a product.
Implement	Put into effect or activate. Add to existing code to improve/add functionality.	Implement the following function/method/code segment to extend the function of the program.
Invoke	Call or activate a function/method or sub-routine	Invoke a function/method that will validate the ID number entered
Re-factor	Rewrite existing code to make it better or more usable or improve the structure. Change existing code to accommodate added functionality	Re-factor the method/function to provide for the following additional functionality
Rewrite	Transform from one format/approach to another or to correct code or to implement a better/more effective solution or different method to accomplish a task.	Rewrite the program representation in the flow chart as a Scratch program
Trace	Follow the development, progress or history of something, normally from the point of origin, typically in chronological order or in the same sequence it is executed or implemented.	Trace the error in the program
Write	Code a computer program/program segment to perform a specific task or solve a problem	Write a function/method/ set of instructions that will round off a number to 1 decimal place.

- Give the learners various ideas on how to study based on the different learning styles, i.e. visual (read and write), auditory or kinaesthetic. There is a quick quiz that learners can do on their own to determine their learning styles: https://www.thestudygurus.com/learning-styles/
- You can refer to the following link to get ideas on how the various types of learners should study to get the best results: https://www.gavilan.edu/tutor/documents/StudyTipsforDifferentLearningStyles_000.pdf

LEARNING STYLES...*CONTINUED*

The term learning styles refers to the understanding that every student learns differently.

- Visual learners learn best through what they see and should use graphs, diagrams, mind maps and other graphical methods to learn.
- Auditory learners learn through what they hear and remember most things that teachers said in class. They should use audio and video clips or discuss or recite the information with someone.
- Read and write learners focus mostly on interacting with the text. They learn best by reading information and writing it out in their own words. They also learn by answering quizzes in writing as well as from annotated notes.
- Kinaesthetic learners learn by experiencing things and learn best by doing, using models, playing memory games, etc. They also learn by writing things down.

EXAM PREPARATION - GENERAL TIPS FOR THE LEARNERS

The following general notes and tips on how to prepare for exams can be printed and given to the learners.

- Make yourself a schedule so that you will have enough time to study. Do not leave everything until it is too late to study properly.
- Make sure that your study area is organised. Chaos distracts the brain from what it should be focussing on.
- Have all your materials ready before you begin studying – pencils, pens, highlighters, paper, etc.
- Study smaller chunks of information at a time. You will remember them better and for a longer period of time. Trying to learn too much at one time will only result in a tired, unfocused and anxious brain.
- Use visual aids to study, for example, draw mind maps, flowcharts and diagrams to help you remember things better or explain your answers and the reasoning for giving that answer to somebody else.
- Focus on the core material as about 80% of most exams are likely to come from it. Going through old exam papers will help you determine what this is. It will not only help you to study better, it will also show you how exam questions are formulated, and which type of questions are asked.
- Revise new information within 24 hours after you learnt it. Any new information must be recapped, reviewed and reinforced within 24 hours, otherwise you will lose 80% of what you learnt.
- Organise study groups for the various subjects, but make sure that the group members are committed to their studies.
- Make sure that you take regular breaks as your brain loses focus after a while. The optimal time to study consists of periods of 2 hours, broken down into 25 minutes of studying followed by 5-minute breaks. Do not think or do anything study-related during your breaks. Take a walk outside. A change of scenery will stimulate your learning.
- Keep some healthy snacks to nibble on while you are studying. Natural, fresh and vitamin-rich food is good for improving your concentration and memory.
- Drink a lot of water while you are studying to make sure that you do not dehydrate. Staying hydrated is essential for your brain to work at its best.
- Plan the day of your exam beforehand, especially if you are studying at home. Make sure that you know how long it will take you to reach the school during that time of the day and add some extra time to make sure that you are not going to be late.
- Make sure that you sleep sufficiently (7 to 8 hours a night). Proper sleep turns what you learnt (short-term memory) into long-term memory.

STUDY SKILLS TO BOOST YOUR LEARNING

Mobile notes

Mobile notes are excellent tools for learning all the key concepts in the study guide. Mobile notes are easy to make, and you can take them with you wherever you go:

- Fold a blank piece of paper in half. Fold it in half again. Fold it again.
- Open the paper. It will now be divided into 8 parts.
- Cut or tear neatly along the folded lines.
- On one side of each of these 8 bits of paper, write the basic concept.
- On the other side, write the meaning or the explanation of the basic concept.
- Use different colours and add pictures to help you remember.
- As you learn, place the cards in 3 different piles:
  - I know this information well.
  - I am getting there.
  - I need more practice.
- The more you learn them, the better you will remember them.

Mnemonics

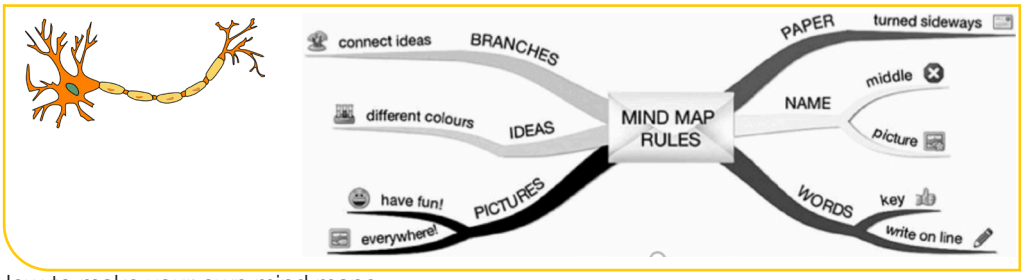
A mnemonic code is a useful technique for learning information that is difficult to remember. This is an example of a word mnemonic using the word BALANCE where each letter of the word stands for something else:

- B – Best – doing your best is more important than being the best.
- A – Attitude – always have a positive attitude.
- L – Load – spread the load so you do not leave everything to the last minute. Use a study timetable to plan.
- A – Attention – pay attention to detail. Only answer what is required.
- N – Never give up! Try, try and try again!
- C – Calm – stay calm even when the questions seem difficult.
- E – Early – sleep early the night before your exam. If you prepare well you will not need to cram the night before.

Mnemonics are code information and make it easier to remember. The more creative you are and the more you link your 'codes' to familiar things, the more helpful your mnemonics will be.

Mind maps

Mind maps work because they show information that we have to learn in the same way that our brains 'see' information. As you study, add pictures to each of the branches to help you remember the content. Make your own mind maps as you finish each section.



How to make your own mind maps:

- Turn your paper sideways so your brain has space to spread out in all directions.
- Decide on a name for your mind map that summarises the information you are going to put on it.
- Write the name in the middle and draw a circle, bubble or picture around it.
- Write only key words on your branches, not whole sentences. Keep it short and simple.
- Each branch should show a different idea. Use a different colour for each idea. Connect the information that belongs together. This will help build your understanding of the learning areas.
- Have fun adding pictures wherever you can. It does not matter if you cannot draw well.

ON THE DAY OF THE EXAM

This section is provided by the Department of Basic Education.

- Make sure you have all the necessary stationery for your exam, i.e. pens, pencils, eraser and calculator (with new batteries).
- Go to the toilet before entering the exam room. You do not want to waste valuable time going to the toilet during the exam.
- Use the 10 minutes reading time to read the instructions carefully. This helps to 'open' the information in your brain. All questions are compulsory, unless indicated otherwise, but you do not have to answer them in order. Start with the question you think is the easiest to get the flow going.
- Break the questions down to make sure you understand what is being asked. If you do not answer the question properly, you will not get any marks for it. Look for the key words in the question to know how to answer it.
- Try all the questions. As each question has some easy marks in, make sure that you do all the questions in the exam.

- Never panic, even if the question seems difficult at first. It will be linked to something you have covered. Find the connection.
- Manage your time properly. Do not waste time on questions you are unsure of. Move on and come back if time allows.
- Check weighting – how many marks have been allocated for your answer? Do not give more or less information than is required.
- Write big, bold and clearly. You will get more marks if the marker can read your answer clearly.

STRUGGLING LEARNERS

You can support struggling learners by doing the following.

SCAFFOLD LEARNING TASKS OR ACTIVITIES

Scaffolding means that you break learning up into chunks and provide a tool or concrete structure for each. This can reduce the cognitive load of the instruction and support the struggling learner.

One of the first things you can do is to choose different activities for different groups of learners. For example, you can take a complex task and divide it into smaller subtasks. Together, these subtasks must achieve the same goal as the big task. After doing this, grade the activities or tasks, with the big task having the highest grading, and all the smaller tasks together having the same grading as the big task.

Have learners then choose whether they want to do the group of smaller activities or tasks or the one big activity or task. Advise struggling learners to do the smaller ones first and then challenge them to try the big one if they feel ready.

Getting the smaller activities or subtasks right could help the learners to feel competent. It allows them to always feel like they are working at a level of challenge that is hard but right for them and that they can accomplish. This will allow them to make much greater progress through learning environments.

Other ways to scaffold learning is to:

- Show and tell. Learners learn best by seeing rather than hearing about something.
- Tap into prior knowledge. You can do this by asking the learners to share their own experiences or ideas about something.
- Give them time to talk about what they learnt in a structured and controlled way.
- Teach them the vocabulary (subject jargon) before you teach them the content. You can do that by introducing the words with photos or in context of things they know and are interested in. You can also use analogies and metaphors to explain the words to them.
- Use visual aids like pictures, graphs, charts and diagrams or graphic organisers such as mind maps, concept maps or story maps.
- Check for understanding by discussing the content, pausing for a moment to let it sink in, and then asking a well thought out question.

BUILD IN AUTONOMY (CHOICE)

- See the principles of gameful learning below.
- Let the learner choose which activities are most relevant, challenging and interesting to them.

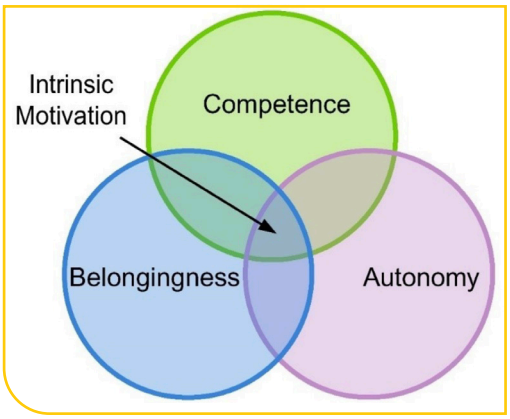
Following are the principles of gameful learning:

- Autonomy is critical, and this is the first of three principles that come from gameful learning.
- The next principle is a sense of belonging, and a really good game environment makes you feel like you are a part of something.
- The third principle is to support feelings of competence.

APPLY GAMEFUL LEARNING

Motivation plays an important role in learning and to be self-motivated, learners must:

- be able to make meaningful choices over what they are doing (autonomy)
- be challenged by a task, but still feel that that they can succeed (competence)
- feel connected to those surrounding them (belongingness).



Supporting these feelings could eventually lead to self-determination and learners becoming self-directed. Other research-based strategies for motivating learners include:

- becoming a role model for learner interest;
- getting to know learners;
- using examples freely;
- using a variety of learner-active teaching activities;
- setting realistic performance goals;
- placing appropriate positive emphasis on testing and grading;
- being free with praise and constructive criticism; and
- giving learners as much control over their own learning as possible (Bain, 2004; Nilson, 2003; DeLong & Winter, 2002). This element is also important when thinking about authenticity. If learners can learn ideas that are connected to their lives and produce representations of their knowledge in ways that matter, they are more motivated.

Gameful learning also relates to personalised learning that supports the notion that children learn best when their individual differences are taken into consideration. Personalised learning is based on the following three principles (Microsoft, 2014):

- It provides multiple means of representation.
- It provides multiple means of action and expression.
- It provides multiple means of engagement.

Another important principle of gameful learning is the freedom to fail (as seen with videogames): you can experiment, take risks and try things you have never done before, fail miserably…and do it again and again until, after much practice, you get it right. Unfortunately, this will not work in all classrooms as it requires a significant amount of grading to manage, and it can hinder the ability to keep a cohort on a specific content progression. But when you can structure learning opportunities in this way, learners' motivation to engage increases, and their learning outcomes improve.

LEARNER EXPERIENCE

Learners:

- respect and value teachers that are positive, enthusiastic about the subject, supportive and have access to a wide range of teaching aids:
- enjoy engaging, interactive and communicative teaching methods;
- value choice and classes that encourage independent learning and learner autonomy.
- want to understand what they are expected to learn – what they are learning, why they are learning it and what quality work looks like.
- enjoy things that interest them.

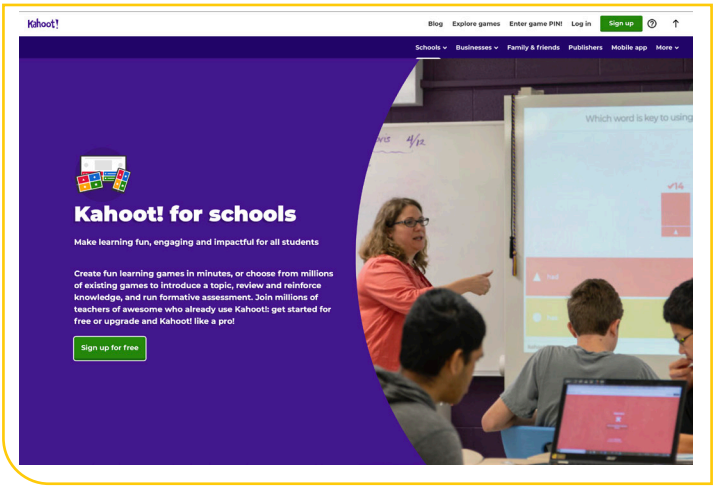
GENERAL TIPS, LINKS AND IDEAS

This section gives you various tips, ideas and links to interesting and/or informative websites.

KAHOOT!

Kahoot! is a free eLearning tool that can be used to create fun learning games, quizzes, surveys or discussion questions, called a Kahoot, in minutes. This can be used to teach, reinforce, assess or share information with learners.

Link: https://kahoot.com/



You can use Kahoot! in your classroom for the following reasons:

- As a class starter or ice breaker.
- To help learners with keywords, terminology or definitions.
- To assess learners' understanding of a subject before or after they learnt about it.
- To zero in on the needs of individual learners by getting a detailed report of which learner missed, which questions.
- To direct classroom activity by organising small groups.
- To review for a test or exam.
- To end a class with Kahoot notes, a quick quiz or formative assessment.
- By encouraging learners to create their own kahoots, the content is reinforced.
- To help learners learn information in a sequential order.

HOW TO USE KAHOOT!

It is easy to use Kahoot!

- To get started, go to the https://kahoot.com/ website and create a free account.

- Use a public kahoots or create your own.

By watching the following video, you can learn how to use Kahoot!

Link: https://www.youtube.com/watch?v=de7G0WioH8E

GOOGLE QUIZ

The Google Quiz is an online assessment tool that will self-mark learners' attempts and give feedback to teachers and learners.

The quiz can be done on desktop or mobile computers and learners need to have access to the Internet. Teachers will provide learners with the link to the quiz (as a URL or QR code).

The platform allows for:

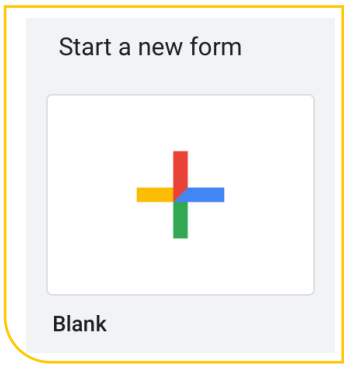
- Learners getting instant feedback to the answers.
- Teachers getting a full report on the performance of the learner.
  Link: forms.google.com

To learn more on how to use google forms to create quizzes, watch the following video.
Link: https://www.youtube.com/watch?v=Pdt8Vv7-3Xk

For a more detailed explanation, you can use the following link.
Link: https://www.youtube.com/watch?v=ayvhVM2BMv0

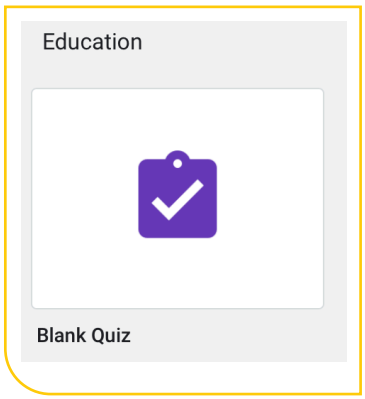
To create a new quiz:

1. Go to forms.google.com.
2. Click on Blank to open a new form.



To create a new quiz from Google Drive:

1. Click New, hover over More and click on the Google Forms arrow.
2. Click on From a template.
3. Scroll to the bottom and click Blank Quiz.

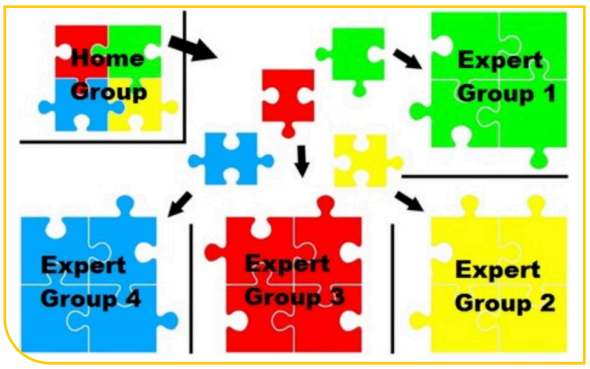


PUZZLEMAKER

You can use the following link to create crossword puzzles step-by-step.
Link: http://puzzlemaker.discoveryeducation.com/CrissCrossSetupForm.asp

JIGSAW ASSESSMENT TECHNIQUE

The cooperative learning strategy known as the jigsaw technique helps learners create their own learning.



To facilitate this, teachers arrange learners in groups. Each group is assigned to research a different topic. Group members then join with members of other groups and share the research about the information.

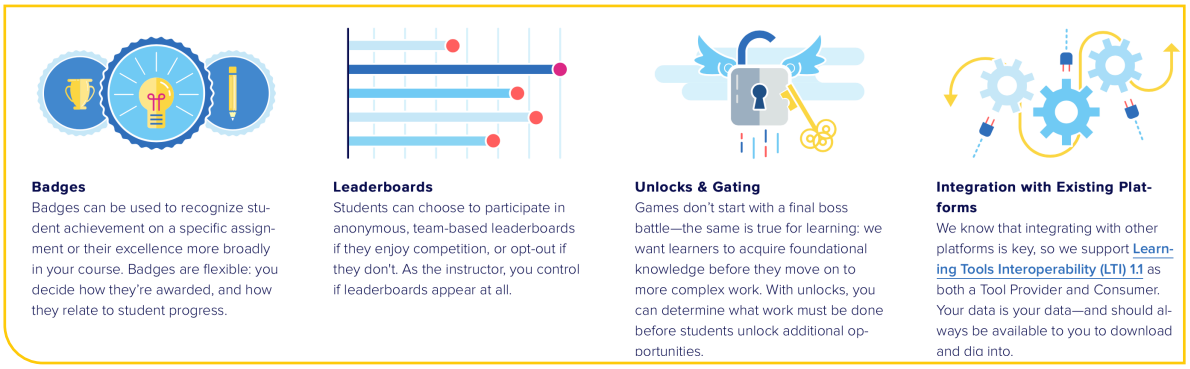
Afterwards, learners must complete a post-assessment questionnaire.

GRADECRAFT

Gameful learning is an educational tool based on the principles that work so well in games, applied to the learning environment. It is about taking elements from games and applying them to non-game settings.

To learn more about the principles upon which gameful learning is based, you can go to the following website: Gameful pedagogy – http://www.gamefulpedagogy.com/

Following are some of the tools you can use from Gradecraft.

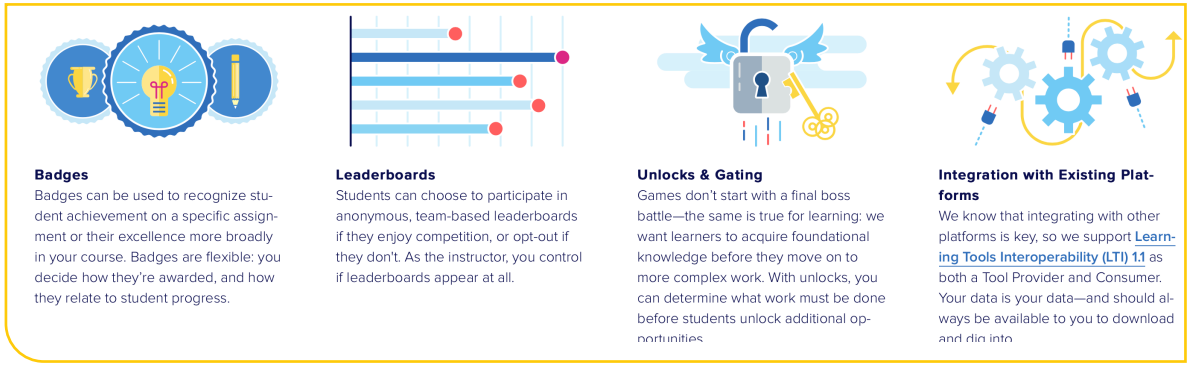


Badges
Badges can be used to recognize student achievement on a specific assignment or their excellence more broadly in your course. Badges are flexible: you decide how they're awarded, and how they relate to student progress.

Leaderboards
Students can choose to participate in anonymous, team-based leaderboards if they enjoy competition, or opt-out if they don't. As the instructor, you control if leaderboards appear at all.

Unlocks & Gating
Games don't start with a final boss battle—the same is true for learning: we want learners to acquire foundational knowledge before they move on to more complex work. With unlocks, you can determine what work must be done before students unlock additional opportunities.

Integration with Existing Platforms
We know that integrating with other platforms is key, so we support Learning Tools Interoperability (LTI) 1.1 as both a Tool Provider and Consumer. Your data is your data—and should always be available to you to download and dig into.



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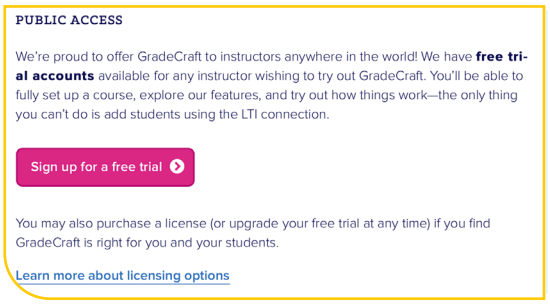
Link: https://www.gradecraft.com/

To sign up with Gradecraft, click on the pink button.

Although it is not a free tool, you can try it out on a free trial basis.



Go to the following YouTube video to listen to an interesting presentation on gameful learning:
Link: https://www.youtube.com/watch?time_contimue=391&v=k)NaJpQbwA0

GENERAL TIPS [H3]

The following are just some general tips that you may want to apply:

- Ensure that you have additional examples other than what the textbook provides to illustrate concepts.
- Encourage learners to compare the world they know today with 30+ years ago - communication, work, family etc. If they explain something clearly with examples, they can often get good marks - e.g. communication using ICTs is much faster than sending a letter by post.
- Teach them the vocabulary (subject jargon) before you teach them the content.
- Read and follow tech blogs (teacher and learner) to stay up to speed with new developments, etc.
- Read and follow http://www.techteachers.co.za/
- Read http://www.techteachers.co.za/category/successful-teacher/ to see what makes a good teacher.
- Become part of the C.A.T and I.T. Teachers group on Facebook https://www.facebook.com/groups/cat.it.teachers

ADDITIONAL RESOURCE SITES [H3]

The following links refer to sites that you can use for additional information on CAT.

- http://www.techteachers.co.za/
- www.gcflearnfree.org/subjects/technology
- www.bbc.com/education/subjects/zqmtsbk
- www.bbc.com/education/subjects/z34k7ty
- www.lifewire.com/
- thenextweb.com/
- toplink.weforum.org/knowledge/explore# (free registration)
- support.office.com/en-us/office-training-center
- www.gcflearnfree.org/subjects/office/

ADDITIONAL ACTIVITIES AND EXAM PAPERS

Various additional activities are provided on the following links or on the DVD at the back of this guide.

- http://www.techteachers.co.za/practical-revision-activities-grades/
- http://www.ecexams.co.za

BASIC CONCEPTS OF COMPUTING

CHAPTER 1

CHAPTER OVERVIEW

The following learning outcomes are covered by this chapter:

- define Information and Communication Technologies (ICTs) and Information Technology
- provide an overview of a general model of a computer
- provide an overview and concepts of the main components of a computer system
- define shareware, freeware, free open source software (FOSS) and proprietary software
- explain the interdependency of hardware and software
- state and differentiate between the types of computers
- categorise computers/classification of computers
- list the advantages and disadvantage of using computers
- explain and differentiate between data and information
- explain the information processing cycle
- provide an overview of uses and examples of information within an organisation
- explain why information is useful
- provide an overview of a general model of an ICT system.

GRADE: 10	DATE:	TEACHING TIME: 4 hours
Resources	Each learner should have access to: • IT 10 Practical Book • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it	
Vocabulary	Learners will need to understand the following terms for this chapter: • input device – any hardware or peripheral device that allows you to enter data into computer or interact with a computer • storage device – a hardware device that is used for storing data • random-access memory (RAM) – is a hardware device, usually on the motherboard, that allows information and data to be temporarily stored and retrieved on a computer while it is on • processing device – a hardware device that receives the data, performs a set of instructions, and then returns the processed data to the RAM • output device – a device that formats and presents data in a form understandable to a user • communication device – is a hardware device capable of transmitting a signal over a wire or wireless connection • RSI (Repetitive Strain Injury) – a painful inflammation of the tendons that often results from overuse. A tendon is tissue that attaches muscle to the bone • ergonomics – the study of how humans interact with fabricated objects, the goal is to create an environment that is well suited to the users' physical needs	

INTRODUCTION

Begin this chapter by introducing your learners to the terms Information Communications Technologies (or ICT) and Information Technology (or IT). ICT focuses on communication technology, which includes the internet, wireless networks, cell phones and computers. IT focuses on the technology that helps to solve the problems faced by people using things like computers, wireless networks, cell phones and computers.

Explain to learners that since 2016, our government have been talking about the Fourth Industrial Revolution (4IR) and how it will impact on development in South Africa. During this year they will be introduced to coding, the internet of things (IoT) and robotics. They will begin to understand how the fields of IT and ICT have shaped many of the things they know and love.

Write the following on the blackboard: Facebook, Amazon, Google, Microsoft. Ask learners what they think about when they see these names. These are all famous ICT companies. You may ask learners to list a few more - then explain to them that the field of ICT continues to grow. And because of the expected future growth in ICT there has never been a better time to improve their understaning of this important field.

Explain to learners that to start off their journey in Information Technology, they will learn:

- what exactly a computer is
- explore the components of a computer
- learn about the different types of computers, including their advantages and disadvantages.

UNIT 1.1

General model of a computer

As a class, read through the information on page 2 and 3 of the Theory book. This information expands on the defintions of ICT and IT and explains them in a more detailed way. Check that learners are able to differentiate between these two terms and are able to provide an explanation including examples for each one.

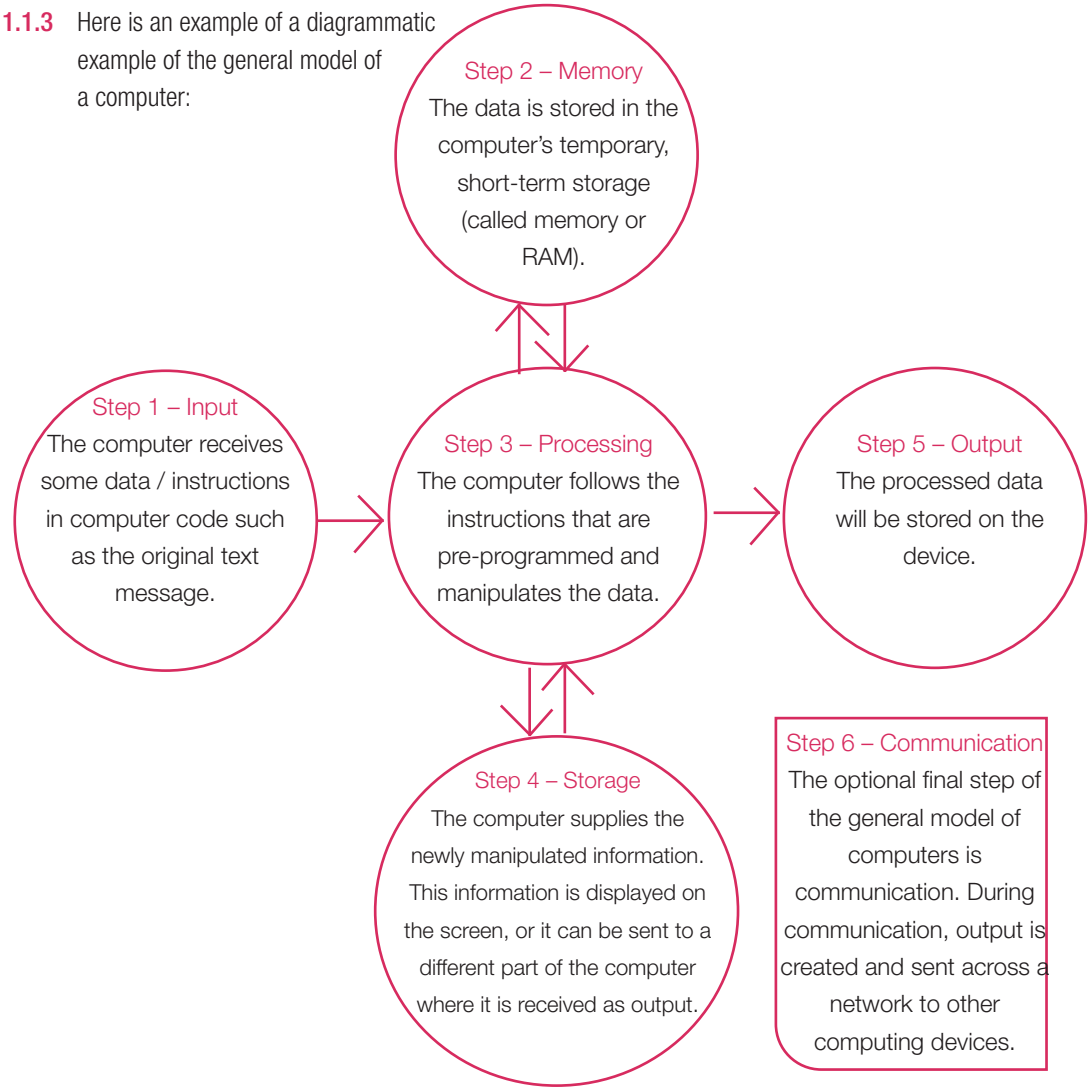
On page 3 we have given you a general model of a computer – however, if you have these components for learners to see and touch, allow them to physically explore each component. Learners also need to understand the functions of each component, that is, the input, storage, processing and output. Work through the example given in the textbook.

Activity 1.1 Memorandum

1.1.1 Information and Communication Technologies (ICT) refers to technologies that capture, transmit and display data and information electronically and includes all devices, applications and networking elements that allow people to connect in a digital world.
Information Technology (IT) is a subset of ICT. It includes the use of computers to store, transmit, retrieve and manipulate data for businesses and other enterprises. Computers refer to the hardware, whereas an ICT system refers to the overall set-up, consisting of hardware, software, data and its users.

1.1.2 Below are some examples that learners can list:
Monitors, sound devices, printers and plotters, data projectors

1.1.3 Here is an example of a diagrammatic example of the general model of a computer:



UNIT 1.2

Hardware and software

Before you begin this unit, ask learners to think about what hardware and software are. Note down their ideas on the blackboard.

Then explain to your learners that hardware are all the physical computer devices they can hold in their hands, whereas software refers to a set of instructions a computer uses to complete a task. Software is stored on a computer's storage device and tells the different hardware devices how to handle the input they receive from a user.

Read the overview and concepts of the main components of a computer system and continue the discussion making sure to answer all question learners may have. Make sure all your learners understand the concepts explained in the textbook before asking them to complete the activity.

Learners will need access to resources to research the answers, where necessary.

Activity 1.2 Memorandum

1.2.1 Hardware consists of the physical components of a computer, also referred to as the equipment of a computer. Hardware devices can be categorised according to their functionality on the computing device.
Software Application software (Apps) and System software (Operating System) refers to the programs used to direct the operation of a computer. It also contains the instructions for how to use the software.

1.2.2 This means that the one will not function without the other – without software, the hardware of a computer will not have a function and vice versa.

1.2.3 1-C, 2-I, 3-J, 4-G, 5-AB, 6-E, 7-H, 8-F, 9-D

1.2.4
- **a.** System software is the specific type of software that manages the flow of data and the information contained on the computer. The operating system (OS) is the most important type of system software.
- **b.** Examples include Microsoft Windows, Linux, MacOS, iOS and Android.
- **c.** Examples includes Microsoft Office, Google Chrome, Mozilla Firefox and Skype.

1.2.5
- **a.** Shareware is also copyright software distributed free of charge, but after a trial period it notifies the user that they might need to pay for the program if they want to keep it. Some developers distribute shareware with a built-in expiration date, for example after 30 days the user can no longer use the program, while other types of shareware are limited in terms of what functionality it offers unless you buy the complete program.
  Freeware is copyright software that is available to you, free of charge. However, the developers or company that distributes the software keeps the rights to the software.
  Free open source software (FOSS) has a source code that is available to the public or anyone that wants to use it. It also allows the user to change or modify the code itself if need be. You can also distribute this type of software to anyone and for any purpose.
  All computer software is developed using a source code. This code is the original design or technical blueprint used to create the program. Proprietary software is where the source code is not given to the public or the user. It still belongs to the distributor or developer, even if you have bought the program.
- **b.** Learners can support their answers, these are suggestions.
  - **i.** a gamer – Proprietary
  - **ii.** a businessman who has online meetings – Freeware
  - **iii.** a student researching for a project - Free open source software (FOSS)
  - **iv.** a teacher designing lesson plans – Proprietary

1.2.6 **a.** and **b.** Below are suggestions:

COMPONENT	DESCRIPTION
Input device	Any hardware or peripheral device that allows you to enter data into a computer or interact with a computer e.g. Mouse, keyboard, touchscreen keyboard, light pen, microphone, camera, web cam
Storage device	A hardware device that allows you to store data for later use e.g. HDD, SSD
RAM	Refers to a fast, temporary form of storage. All data and instructions that is currently being executed is stored in RAM. RAM is volatile, that is, all data is erased from your RAM when your computer is turned off. RAM is also referred to as memory.
Processing device	A device that receives the data from the RAM, perform sets of instructions, and returns the processed data to the RAM e.g. CPU and GPU
Output device	A device that returns the computer's instructions, as results, to the user, for example, monitors/screens and printers.
Communcation device	Is a hardware device capable of tranmitting an analog or digital signal over a wired or wireless connection, for example, an NIC

1.2.7 A storage device is a hardware device that allows you to store data for later use e.g. ROM, USB flash drive, memory cards, CD, DVD, Cloud, Punch card, magnetic tape, hard disk drives (HDDs) and solid-state drives (SSDs).

1.2.8 **a.** Information and Communication Technologies (ICT) refers to technologies that capture, transmit and display data and information electronically and includes all devices, applications and networking elements that allow people to connect in a digital world.
Information Technology (IT) is a subset of ICT. It includes the use of computers to store, transmit, retrieve and manipulate data for businesses and other enterprises. Computers refer to the hardware, whereas an ICT system refers to the overall set-up, consisting of hardware, software, data and its users.

b. In computing, a legacy system is an old method, technology, computer system, or application program, 'of, relating to or being a previous or outdated computer system'.

c. ICT infrastructure refers to the composite hardware, software, network resources and services required for the existence, operation and management of an enterprise IT environment.

d. Connectivity is the quality, state or capability of being connective or connected; especially the ability to connect to or communicate with another computer or computer system.

UNIT 1.3

Types of computers

In this unit learners are introduced to the different types of computers and their uses. Work through the introduction on page 11 of the textbook with your learners. Make sure they understand how computers can be classified and are able to explain the purpose of each computer. Next, ask learners to work in small groups and assign one type of computing device to each group. The groups can read the information in Table 1.2 but also need to do a bit of research of their own. They can then present their computing device to the rest of the class. Once the groups have presented, assign Activity 1.3 as homework for learners to complete.

Activity 1.3 Memorandum

1.3.1

a. Desktop computer
b. iPad
c. smartphone
d. server

1.3.2

COMPUTING DEVICE	USES
Laptops	Laptop computers are used for almost anything, from document processing in an office environment, to graphic design and video editing, to browsing the internet and playing games. However, laptop computers are easily moved around allowing you to work anywhere and any time.
Desktop computers	A desktop computer's uses are exactly the same as those of a laptop except that a desktop is not mobile.
Smart phones	Smartphones are better than desktops at tasks that require a very mobile device, like taking photos, setting alarms, navigating the roads, making calls and sending and receiving short messages
Tablets	Info on keyboard, screen size and applications. Reading of books is better on a tablet than on a smartphone.
Servers	Servers are designed for managing networks, providing access to specific files and hosting websites, as well as processing huge amounts of data.
Embedded computers	Embedded devices are devices designed for a fixed purpose, whether that purpose is to wake you up in the morning, control the temperature of the air conditioner or refrigerator, or any navigation system.

1.3.3 Learners need to support their answers, below are some examples.

a. Mobile phone is an example of an embedded device because it is designed for a fixed purpose, it has an alarm to wake you, can count your steps and help you navigate a route etc.
b. Navigating system in a motor vehicle is an example of an embedded device because it is designed for a fixed purpose, it can help you navigate a route.
c. A tablet is an example of an embedded device because it is designed for a fixed purpose, it has an alarm to wake you, can provide accurate weather and help you navigate a route etc.
d. A robotic vacuum cleaner is an example of an embedded device because it is designed for a fixed purpose, it can be programmed to vacuum at a set time.
e. Television decoder is not an example of an embedded device because it needs input from you to function.

1.3.4 Teacher discretion is advised. Learners need to support their opinion.

UNIT 1.4

Advantages and disadvantages of computers

So far learners have been taught about how incredibly quickly the field of ICT has grown and about the many advantages and opportunities it has given to us – computers have improved productivity, helped scientists cure diseases, helped architects design and construct new buildings and empowered people from poorer countries by giving them opportunities that were not available to them in the past.

Ask your learners to think about these advantages listed above and ask some volunteers to talk about how they think some of these have been made possible using ICT.

Then, read the advantages and disadvantages of using computers. Ask learners if they can come up with any others that may not be listed in the textbook. Once complete, learners may complete Activity 1.4.

Activity 1.4 Memorandum

1.4.1

- Provides access to more information: computers give anyone with access to the internet access to an incredible amount of information. People can use this information to keep up to date with current events, improve their skills or learn new skills.
- Completes tasks that might be impossible for humans to complete: for example, auto-calculate a difficult mathematical equation.
- Saves time: computers can also save humans a lot of time. For example, navigation tools like Google Maps allow you to choose a faster route to a shopping centre, work or home; while online shopping sites can give you the choice of never going to a shopping centre again.
- Automate repetitive tasks: while people do not enjoy doing the same thing repeatedly, computers are extremely good at it. Many repetitive tasks like completing a sentence entry automatically, are programmed and completed automatically by computers.
- Allows for greater productivity: regardless of the task you are undertaking, computers can make you more effective at it, for example, you can research any topic on the internet in less than an hour.
- Allows for better communication and connections: computers connect people all around the world and allows people to be more social, or catch-up with someone even when they are kilometres away.
- Entertainment: computers allow people to play music, videos and games.

1.4.2

- Social risks: computers provide humans access to social media, which can be addictive, make people less happy, lead to jealousy and get in the way of real-world friendships.
- Health risks: research has shown that excessive computer use can result in several medical problems, including back pain, eyestrain, obesity, carpal tunnel syndrome (CTS) and repetitive strain injury (RSI).
- Security risks: computer security risk can be created by malware; computers are programmed to follow instructions, and sometimes people program computers to act in a way that harms a user.
- High cost: computers can be expensive. Since computers empower people, the high cost of computers puts pressure on people who are not able to afford computers, and places them at a disadvantage.
- Distractions/disruptions: if you have ever spent hours browsing the internet or watching videos on YouTube, then you know how distracting computers can be.
- Environmental impact: computers use a lot of electricity and in most cases the generation of electricity is harmful to the environment because of the carbon emissions. This has a huge impact on our planet.

1.4.3 Teacher discretion as there are many uses, below are suggestions:
Document processing, graphic design and video editing, browsing the internet and playing games.

1.4.4 Explain to the learners the process of a debate and how to write argumentative statements that are supported with research. Provide learners with resources on the uses of computers or learners can research the topic. Then learners can develop their argument. Hold the debate.

UNIT 1.5

Data and information management

Data and information are terms that people use interchangeably, but learners need to be able to differentiate between these two concepts. Read through the definitions of data and information on page 16 of the textbook. To help learners understand the difference, use an example of sending a WhatsApp message.

Step one A computer receives some data or instructions
Step two The data is stored
Step three The computer follows the programmed instructions and manipulates the data
Step four The computer supplies the new information, where it is received
Step five Output is created (optional step)

Activity 1.5 Memorandum

1.5.1 Data can be defined as unprocessed numbers, signals or facts.

1.5.2 **Scenario 1:** customer demands **Scenario 2:** reported issues **Scenario 3:** trends

1.5.3 **Scenario 1:** big data **Scenario 2:** JRA **Scenario 3:** IoT

1.5.4 iPad

1.5.5 Below are examples.

Scenario 1:

Customer demands	Testing Feedback Response	New burger on menu
Input	Process	Output

Scenario 2:

Report issues	Identify issues Input Response	Issue dealt with
Input	Process	Output

Scenario 3:

Trends	Input Processing Response	IoT
Input	Process	Output

1.5.6 Teacher discretion, learner's answers must be supported. Below are suggestions:

Scenario 1: Information can give the restaurant feedback on the items on the menu so that the menu can be changed or maintained according to the customer's demands.

Scenario 2: Information can allow JRA to respond speedily to customers' demands and keep informed of any road related issues.

Scenario 3: Information helps to create trends that match with customers' needs.

1. c – Input, processing, storage, output
2. a – ICT
3. b – Keyboard
4. b – RAM
5. b – Application software
6. Here are the answers for the True/False activity.
   a. True. A communication device is any device that allows a computer to connect to a network.
   b. False. Software refers to the set of instructions a computer uses to complete any task.
   c. True. Smartphones and tablets have less processing power than notebooks. They also do not have a dedicated keyboard.
   d. False. Data can be defined as raw, unorganised numbers, signals or facts.
   e. True. Supercomputers are devices designed for a single purpose.
7. Here is the completed table:

PROCESS	DESCRIPTION
Input	(a) The computer receives some data / instructions in computer code such as the original text message.
(b) Memory	In the second step, the data is stored in the computer's temporary, short-term storage (called memory or RAM).
(c) Processing	In the third step of computing, the computer follows the instructions programmed into it and manipulates the data in some way.
Output	(d) The computer supplies the newly manipulated information. This information is displayed on the screen.
Storage	(e) The processed data will be stored on the device.

8. Input devices are any hardware devices allowing you to input data into a computer or interact with a computer. Output devices are devices that return the computer's instructions, as results, to the user.
9. Modem, NIC, wi-fi, access points
10. Touchscreen keyboard
11. Data can be defined as unprocessed numbers, signals or facts.
12. Information can be defined as facts and numbers that have been organised / processed so that it is useful / meaningful to people.
13. For a computer to function properly, it must consist of both hardware and software, because the hardware and software are interdependent. This means that the one will not function without the other – without software, the hardware of a computer will not have a function and vice versa.

14. Learners can choose any three of the disadvantages listed below:

- **Social risks:** computers provide humans access to social media, which can be addictive, make people less happy, lead to jealousy and get in the way of real-world friendships
- **Health risks:** research has shown that excessive computer use can result in several medical problems, including back pain, eyestrain, obesity, carpal tunnel syndrome (CTS) and repetitive strain injury (RSI).
- **Security risks:** computer security risk can be created by malware; computers are programmed to follow instructions, and sometimes people program computers to act in a way that harms a user.
- **High cost:** computers are expensive. Since computers empower people, the high cost of computers puts pressure on people who are not able to afford computers, and places them at a disadvantage.
- **Distractions/disruptions:** if you have ever spent hours browsing the internet or watching videos on YouTube, then you know how distracting computers can be.
- **Environmental impact:** computers use a lot of electricity and in most cases the generation of electricity is harmful to the environment because of the carbon emissions. This has a huge impact on our planet.

15. One of the main functions of a computer is to take data and turn that into meaningful information. The computer takes unprocessed data (data that is useless to humans) and then turns it into something that is meaningful and easy to understand for humans.

16. Here are some sample answers. Accept all reasonable answers from your learners.

a. Laptop

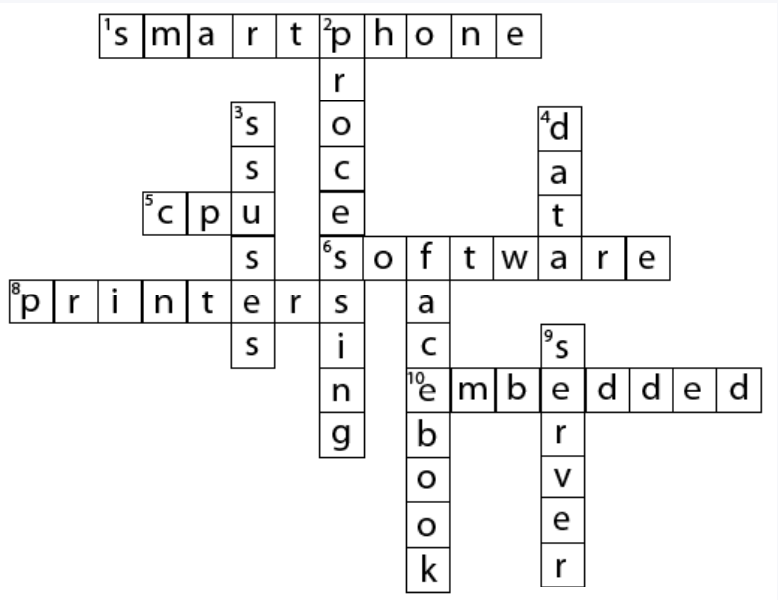
b. Intel Core i5

c. High cost

17. Embedded devices are devices designed for a ¬fixed purpose, whether that purpose is to wake you up in the morning, control the temperature of the air conditioning or refrigerator, or any navigation system.

18. General purpose computers are used for almost anything, from document processing in an office environment, to graphic design and video editing, to browsing the internet and playing games.

19.



DATA REPRESENTATION AND STORAGE, SOCIAL IMPLICATIONS

CHAPTER 2

CHAPTER OVERVIEW

The following learning outcomes are covered by this chapter:

- provide an overview and link between data, information and knowledge
- explain data representation and data storage
- discuss bits and bytes
- provide an overview and convert between number systems: decimal, binary, hexadecimal
- provide an overview of digital character representation; ASCII/UTF-8, Unicode
- provide an overview of primitive data types and their storage
- provide an overview of data structures and collections of data storage
- explain computer file management processes
- explain the various software licence agreements
- discuss the social, ethical and legal issues pertaining to ICTs
- list the economic reasons for using computers
- explain the digital divide.

GRADE: 10	DATE:	TEACHING TIME: 8 hours
Resources	Each learner should have access to: • IT 10 Practical Book • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it	
Vocabulary	Learners will need to understand the following terms for this chapter: • input device – any hardware or peripheral device that allows you to enter data into computer or interact with a computer • storage device – a hardware device that is used for storing data • random-access memory (RAM) – is a hardware device, usually on the motherboard, that allows information and data to be temporarily stored and retrieved on a computer while it is on • processing device – a hardware device that receives the data, performs a set of instructions, and then returns the processed data to the RAM • output device – a device that formats and presents data in a form understandable to a user • communication device – is a hardware device capable of transmitting a signal over a wire or wireless connection • RSI (Repetitive Strain Injury) – a painful inflammation of the tendons that often results from overuse. A tendon is tissue that attaches muscle to the bone • ergonomics – the study of how humans interact with fabricated objects, the goal is to create an environment that is well suited to the users' physical needs	

INTRODUCTION

Computers and computer users create and use a large amount of data daily. In 2017, there were 103 million emails and 15 million messages sent, 4 million YouTube videos watched and 3.5 million Google searches one every minute of every day!

How do computers deal with and process enormous amounts of data like this? In this chapter learners will be taught how computers store, understand and organise data. Learners will also be taught how users can work with data and make it easier to find.

Learners will then learn about the different numbering systems computers use to store data (such as binary and hexadecimal), how these numbering systems work and how to convert these numbering systems to the base-10 numbering system – which is the numbering system we work with on a daily basis.

UNIT 2.1

The link between data, information and knowledge

In Chapter 1 learners were taught that data is raw, unorganised numbers, signals or facts. Check their understanding by asking some learners to offer an explanation and examples that show what data is. If there are still learners who are unsure of the definition of data, revise the work.

Explain to learners that one way in which data can be shared between people is by using letters and words. We know that each letter in our alphabet represents a sound and if you add enough letters together, they form a word, which represents a concept. In this way, useful information can be communicated between people.

Explain that computers have their own way of representing data – they use billions of ON and OFF switches. These are called resistors and is shown on page 23 of the Theory Book. An electrical signal flows up to these switches, and depending on whether the switch is on or off, the electricity either flows through the switch or is stopped. By changing the swithes that are on and off, a computer can do everything from representing letters and numbers, representing detailed instructions, to creating incredible virtual reality worlds.

Activity 2.1 Memorandum

2.1.1 Data can be defined as unprocessed numbers, signals or facts.
Information can be defined as facts and numbers that have been organised / processed so that it is useful / meaningful to people. The processed data becomes meaningful information.
The information becomes knowledge and can be understood and used by people for different purposes.

2.1.2 Data representation refers to the form in which data is stored, processed and transmitted.

2.1.3 You can combine several bits (0s and 1s) together. If you combine 8 bits together, it is called a ''byte". A byte can represent any number between 0 (represented in bits as 00000000) and 255 (represented in bits as 11111111).

2.1.4 Below is an example, learners need to support their answers.

- **a.** Data as it is unprocessed.
- **b.** Knowledge as the data has been processed into information that can be understood and used by people for different purposes.
- **c.** Information as the data has been processed.
- **d.** Information as the data has been processed.

Extension

Since 2015, artificial intelligence (AI) has been on the rise. In the past a programmer may have wanted to create an object that is yellow, soft and sweet, but the computer would not have known that this object was supposed to be a banana. Since the rise of (AI), if you entered a picture of a dog onto Google, Google would not only tell you it was a dog, but would give you the exact breed of the dog.

Google and Facebook are now better at recognising people's faces than their friends are, and Google's voice recognition software can understand speech better than native speakers in 119 different languages!

Ask learners if they can think of any other ways in which AI is changing the way computers process data.

UNIT 2.2

Number systems

A number system is a technique that can be used to represent and work with numbers. We work with the decimal number system on a daily basis.

In a computer system, number systems are the technique used to represent numbers in its architecture. Explain to your learners that every value they are saving or getting into/from a computer's memory has a defined number system.

Computer architecture supports following number systems.

- Binary number system
- Octal number system
- Decimal number system
- Hexadecimal (hex) number system

In this unit learners will work with the following number systems:

- Decimal
- Binary
- Hexidecimal

In Examples 2.1 - 2.6, learners will be converting binary numbers to decimal numbers and vice versa. We have included step-by-step instructions, which learners can follow until they are confident enough.

Work through each example carefully, making sure all your learners understand how the conversions work.

Example 2.1

Guide the learners through the example to convert the binary number 00101101_2 to a decimal number.

Example 2.2

Guide the learners through the example to convert the binary number 11000011_2 to a decimal number.

Example 2.3

Guide the learners through the example to convert the binary number 11111111_2 to a decimal number.

Example 2.4

Guide the learners through the example to convert the decimal number 71 into a binary number.

Example 2.5

Guide the learners through the example to convert the decimal number 168 into a binary number.

Example 2.6

Guide the learners through the example to convert the decimal number 241 into a binary number.

Once learners have completed all the examples, ask them to complete Activity 2.2 on their own, then make time for them to work in pairs to check their working. Allow them to fix any errors they may have made.

Activity 2.2 Memorandum

2.2.1 In the decimal system, each time the value of a number increases by 1, you increase the size of the digit by 1. This works well until you reach the largest digit possible that is 9. Once you are at 9, there are no larger digits left, so the next time you increase the value of your number by 1, you need to add a new digit to your number. The value of this digit increases from 0 to 1, and you restart the first digit at 0. When you reach the number 19 and increase the value by 1, the second digit goes up again, and you start with 20. This means that the value of any digit in the second position is 10, with 20 equal to 2 × 10. As you continue counting, the value of your second digit eventually reaches 9 (for example in 90), and when you need to increase it again, (for example when adding 1 to 99) you find that impossible, so you reset both 9's to 0 and add a third digit, that is 100. The place value of the third digit is thus always a 100, or 10 × 10 or 102.

2.2.2 The binary numbering system is a numbering system in which there are only two unique values: 0 and 1. To count in binary, you use the same logic you use to count in the decimal system. You increase the value of a digit until it reaches the largest digit possible (1), then add a new digit and restart the previous digit.

Work on your own to complete the following two activities, then review your work with a partner. Compare your answers and if they differ, try to find out where the mistake occurred and correct it.

2.2.3

a.	$00001001_2 = 9$	**b.**	$10001011_2 = 13$
c.	$01001110_2 = 78$	**d.**	$10001000_2 = 136$
e.	$00010001_2 = 17$	**f.**	$11101111_2 = 239$
g.	$01010100_2 = 84$	**h.**	$10011001_2 = 153$
i.	$11000001_2 = 193$	**j.**	$00010100_2 = 20$

2.2.4

a.	$00001001_2 = 9$	**b.**	$10001011_2 = 13$
c.	$01001110_2 = 78$	**d.**	$10001000_2 = 136$
e.	$00010001_2 = 17$	**f.**	$11101111_2 = 239$
g.	$01010100_2 = 84$	**h.**	$10011001_2 = 153$
i.	$11000001_2 = 193$	**j.**	$00010100_2 = 20$

Case Study

Read the Case study on page 30 of the Theory Book.

Allow learners to work in small groups of four or five learners to discuss the case study, then ask each group to provide some feedback on their discussions.

In Examples 2.7 - 2.12, learners will be converting hexidecimal numbers to decimal numbers and vice versa. We have included step-by-step instruction, which learners can follow until they are confident enough.

Work through each example carefully, making sure all your learners understand how the conversions work. Once complete, ask learners to complete Activity 2.3 on page 35 of the Theory Book.

Example 2.7

Guide the learners through the example to convert the hexadecimal number 65 to a decimal number.

Example 2.8

Guide the learners through the example to convert the hexadecimal number $F9_{16}$ to a decimal number.

Example 2.9

Guide the learners through the example to convert the hexadecimal number $2BC_{16}$ to a decimal number.

Example 2.10

Guide the learners through the example to convert the decimal number 37 to a hexadecimal number.

Example 2.11

Guide the learners through the example to convert the decimal number 222 to a hexadecimal number.

Example 2.12

Guide the learners through the example to convert the decimal number 2060 to a hexadecimal number.

Activity 2.3 Memorandum

2.3.1

a. $DB_{16} = 219$
b. $29C_{16} = 668$
c. $48_{16} = 72$
d. $F0_{16} = 240$
e. $C9F_{16} = 3231$
f. $8A_{16} = 138$
g. $55_{16} = 85$
h. $73_{16} = 115$
i. $101_{16} = 257$
j. $AC2_{16} = 2754$

2.3.2

a. $15 = F_{16}$
b. $16 = 10_{16}$
c. $81 = 51_{16}$
d. $49 = 31_{16}$
e. $172 = AC_{16}$
f. $252 = FC_{16}$
g. $391 = 187_{16}$
h. $77 = 4D_{16}$
i. $200 = C8_{16}$
j. $3751 = EA7_{16}$

2.3.3

a. $17_{16} = 23 = 10111_2$
b. $A2C_{16} = 2604 = 101000101100_2$
c. $00110011_2 = 51 = 33_{16}$
d. $10000010_2 = 130 = 82_{16}$

Digital characters and primitive data types

Remind learners that ASCII stands for American Standard Code for Information Interchange.
The ASCII originally used seven bits to encode each character; the modern version uses 8 bits that assign numeric values to letters, digits, punctuation marks and other characters Refer learners to Annexure A on page 159 of the Theory Book. Here they will find all the programming and visible characters.

Explain to your learners that primitive data types are 'primitive' because they are the basic building blocks that do not have the complete object structure. Work through the table on page 36 of the Theory Book, where the different primitive data types are explained. Explain each type referring to their examples. To check their understanding, ask them to write two to three of their own examples for each primitive data type.

Make sure to check learners' work to make sure they understand the work covered in this unit. Provide additional examples for those learners who might be struggling to grasp the concepts taught in this unit. Once complete, ask learners to complete Activity 2.5 on page 37 of the Theory Book.

Activity 2.4 Memorandum

2.4.1 a – A data type that can only be TRUE or FALSE.
2.4.2 c – Multiple bytes of data
2.4.3 a – Char
2.4.4 a – '!'
2.4.5 b – Information is the result of data that has been processed into something that is meaningful.
2.4.6 The data type that would be used to store the items are:
- **a.** '1' – Boolean
- **b.** 'FALSE' – Boolean
- **c.** 'Perhaps' – String
- **d.** '85' – integer
- **e.** '75.299' – float
- **f.** '43.0' – float
- **g.** 'True' – Boolean
- **h.** 'a' – char
- **i.** '0.851' – float
- **j.** '4951327' – integer

2.4.7 The correct primitive data type for each item is:
- **a.** Test marks
- **b.** Yes / No
- **c.** Number mm – decimal value
- **d.** String of numbers
- **e.** Number l – decimal value
- **f.** String of letters
- **g.** Integer

2.4.8 For example, Peter 112 101 116 101 114:
Resource to convert text to ACSII: http://www.unit-conversion.info/texttools/ascii/

File management

Explain to your learners that wile a computer may be able to understand billions of 1s and 0s, most people do not. To help us understand the way in which data are stored on a computer, the data are grouped into files and folders, with each being a single collection of data.

Explain to the learners that a document stored on their computer is an example of a file, while a smartphone with 10 000 songs might have 10 000 separate files – one for each song. Once a file has been created, it can be saved on a storage device where it will stay until the user decides to remove the file. This means that files will stay on a storage device even if the computer is turned off or the storage device is removed from the computer and placed in a different computer.

Before the lesson, create different types of files and provide various images on the Desktop for the learners to access and manage. Together as a class, work through the explanations of databases and files on page 38 of the Theory Book. Systematically work through each section, making sure learners have enough hands-on opportunities to work with the files and folders.

Provide opportunities for learners to create their own files and folders. They can then work in pairs and give each other their file paths and ask the other person to, for example, find a specific file, etc.

Learners must work through the processes with the examples given in the Theory Book as well as any additional examples you provide.

Make sure to check learners' work to make sure they understand the work covered in this unit. Provide additional examples for those learners who might be struggling to grasp the concepts taught in this unit. Once complete, ask learners to complete Activity 2.5 on page 46 of the Theory Book.

Activity 2.5 Memorandum

2.5.1 1-B, 2-F, 3-E, 4-5-H, 6-DA, 7-I, 8-C, 9-G

2.5.2

a. Files are stored on a computing device in folders or directories. These folders are used to help organise the computer's files so that they can be easy to search and locate. Each folder can contain either files or different subfolders each containing files.

b. Teacher discretion, below is an example.
Rasheed can create a folder for each year, then within each year he can create subfolders titled: television series, movies, music, games and school projects. Within each subfolder he can create further subfolders for each genre or type.

c. The storage device's drive letter

d. A backslash ('\') is used to separate the drive letter and the different folders and files.

e. To move files, you need to cut and paste them rather than copy and paste them.

2.5.3 Observe learners and create a checklist of the tasks each learner can complete independently. Assist only if necessary.

UNIT 2.5

Common file types and extensions

On pages 47 – 52 of the Theory Book, we have listed the common file types and extensions. Assign one or two to groups (depending on the size of your class) and ask each to read through their assigned type, then prepare a short presentation where they explain what each type of file is and when they will use it. They must use examples to help with their explanation.

Ensure learners understand these concepts before asking them to complete Activity 2.6 on page 52 of the Theory Book.

Activity 2.6 Memorandum

2.6.1 .bmp (bitmap image), .gif (graphics interchange format), .jpeg or .jpg (Joint Photographic Experts Group), .png (portable network graphics), .tiff (tagged image file format)

2.6.2 .gif (graphics interchange format), .swf (small web format)
Animations show moving images

2.6.3 Source code files contain instructions to create a computer program e.g. .c (C/C++ ¬ le), .pas (Delphi), .java (Java file), .js (JavaScript), .py (Python)

2.6.4 Shared library are saved as separate ¬files so that the instructions can be used by more than one program. This reuse of programs saves time and money in the development process.

2.6.5 Text files (.txt) are used to store text. Document files has information about the fonts, font sizes or multimedia, such as photos and videos.

2.6.6 Each line in the CSV file represents one row of data, while the data from the different columns are separated using commas. Since CSV files only contain text, they cannot include any type of formatting that you might be familiar with from spreadsheet applications like Excel.

2.6.7 **a.**

1. A presentation that she created for her biology class. C:\Users\Shelley\Documents\School\20190201 - bio.pptx
2. The Microsoft Word executable file. C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE
3. A funny animated picture that she would like to send to a friend. C:\Users\Shelley\Downloads\cat.gif
4. A text files containing her list of to-do tasks. C:\Users\Shelley\Downloads\t-d.txt
5. A table with information on her win percentages in games.
   D:\Games\game_stats.csv

b. [AW file extensions are bolded]
Text - C:\Users\Shelley\Downloads\t-d.txt
Audio - D:\Music\Ariana Grande\fav1.mp3
Presentation - C:\Users\Shelley\Documents\School\20190201 - bio.pptx
Text - D:\Games\game_stats.csv
Text - C:\Users\Shelley\Downloads\t-d.txt
Animation - C:\Users\Shelley\Downloads\cat.gif
Executables - D:\Games\Origin Games\Apex\r5apex.exe
Executables - C:\Program Files\Microsoft Office\root\Office16\WINWORD.EXE

c. No, some files are in the incorrect folder, incorrect extension

d. An .xls file does calculations and analyse large sets of data. A.csv file stores the data.

e. This is usually a disc drive, such as a DVD or CD drive. However, if a computer has more than one internal hard drive, or a single hard drive is partitioned, then one of those drives takes the D letter assignment.

f. You will change how the information will be interpreted.

2.6.8 Two advantages of DLL files are: they are saved as separate files so that the instructions can be used by more than one program. This reuse of programs saves time and money in the development process.

2.6.9 Source code contain instructions to create a computer program. Unlike other file formats, the raw data for most source code files is in plain text. They can usually be opened in a normal text editor like Notepad. The file extensions of source code files are used to tell programmers which programming language the files are written in.
Machine code a central processing unit can understand.

2.6.10 To share data, access the data with another program or access data with an older version of the software program.

Social issues

Explain to your learners that ICT has become one of the world's largest industries with an unbelievable amount of money at stake. Apple, for example, has enough money in the bank to pay the salary of every person in South Africa for a year without going bankrupt!

More than this, however, ICT has also changed the way the world works, how people communicate, the way information and value is created and even the role of people in the world. Ask them to think about a few examples of these. List them on the board. Then ask them to think about whether this has had a positive or negative impact on society as a whole. Listen to the opinions of your learners and list them on the blackboard.

Explain to them that anything with such transformative impact will create new legal and ethical questions. In this unit they will learn about some of these.

On page 54 of the Theory Book, learners will learn about Copyright and Copyleft. Copyleft is a relatively 'new' idea, and has been introduced because information has become so accessible on the internet. Ask learners to look at the imprint page of their textbook – can they tell whether the textbook is copyrighted? Ask them to explain their answers.

Create class discussion on the various social issues; also discuss the Did you know box and QR code links. Ensure learners understand these concepts before asking learners to complete Activity 2.7 on page 59 of the Theory Book. Learners will need access to resources to research the answers, where necessary.

Activity 2.7 Memorandum

2.7.1 **a.** Piracy
b. No, teacher discretion, learners need to support their answers
c. Teacher discretion, learners need to support their answers

2.7.2 **a.** The right to privacy is an element of various legal traditions to restrain governmental and private actions that threaten the privacy of individuals.
b. Computers can record and analyse everything you do therefore there is no privacy as all your information is known
c. Teacher discretion, for example, they are able to monitor remotely
d. Teacher discretion, for example, it takes away your right to choose what you tell people about yourself.

2.7.3 Teacher discretion, monitor learners' answers and that they support their opinion with evidence

Here is a fun extension activity that you can do with your learners (if you have the time).

Extension

Can a monkey own copyright?

In 2011, David Slater lived in Indonesia near a group of Celebes crested macaques, a type of monkey. Slater wanted to document the macaques that were an endangered species. He wanted a close-up shot of the monkeys, but they were too shy, so he came up with an idea for them to take selfies.

Later he sold these pictures to the Daily Mail, but weeks later, the Wikimedia Foundation saw the images and uploaded them on Wikimedia as 'copyright free' images. Because of this, Slater said he lost roughly R200 000.

To read more about this story, visit https://en.wikipedia.org/wiki/Monkey_selfie_copyright_dispute

1. b – automating non-repetitive tasks
2. a – the use of automatic equipment to complete a job.
3. c – both people and machines.
4. c – Consumers can now compare a shop's prices to other prices.
5. a – True
6. d – all the above.
7. a – Bit
8. b – Char
9. c – 399
10. c – Extension
11. d – Storage
12. Learners' own answers. Here are some suggested answers that you may use:
    a. Digital divide refers to the growing gap between those people with access to and knowledge of using digital technology ('haves') and those people without access or knowledge to digital technology ('have-nots'). The digital divide is believed to reinforce social inequalities and to cause a persisting information or knowledge gap.
    b. Teacher discretion, learners' answers must be supported with evidence. For example, he might not be able to correctly research pertinent information for his studies or create he necessary documents for is assignments.
    c. A desktop computer is used for almost anything, from document processing in an office environment, to graphic design and video editing, to browsing the internet and playing games.
    d. He will be able to research his studies
    e. Teacher discretion, learners' answers must be supported with evidence. For example, I think he has a disadvantage as he will need more time to research necessary information and construct documents for assignments.
    f. Teacher discretion, learners' answers must be supported with evidence.
13. Here are the correct answers:
    a. True. Computers use billions of tiny ON and OFF switches called transistors.
    b. False. A Char refers to several characters, letters or numbers.
    c. True. Files are data structures that are stored on a computer's storage devices.
    d. False. A text file is a file that stores information in a large table.
    e. False. A single switch (called a bit) can represent the value 1 (when it is switched ON) and 0 (when it is switched OFF).
14. Here are the suggested answers, but accept all reasonable answers from learners:
    a. A float refers to any number with a decimal value.
    b. The data:
        - contains the instructions that a computer uses to function and run applications
        - is loaded into memory, RAM, that the computer is currently using in its applications
        - storage allows users to keep information that they would like to access on the computer (be it short-term or long-term)
        - can also contain data your applications need to use, such as data files or images.
    c. Organising files

d. If you combine 8 bits together, it is called a ''byte". A byte can represent any number between 0 (represented in bits as 00000000) and 255 (represented in bits as 11111111).

e. Computer window

f. Source code files contain instructions to create a computer program.

g.
- .c (C/C++)
- .pas (Delphi)
- .java (Java)
- .js (JavaScript)
- .py (Python) Accept any two of these.

h. A document stored on your computer is an example of a file. On each drive, files are grouped in separate containers called folders.

i. Databases store data in table structures, with each database containing one or more tables. Each table is made up of columns and rows (or fields and records), with each column containing a specific type of data. Tables can be filtered, thus each row containing all the information fitting the criteria can be viewed. By using relationships between tables, records from different tables can be connected.

j. Compressed files compress different files into one file.

k. Text files (.txt) are used to store text. They do not have any information about the fonts, font sizes, or multimedia, such as photos and videos.
Rich-text format files (.rtf) can save more information including different formatting options such as bold, italic, font size and font colour, as well as images and drawings.
Comma separated value (or CSV) files are text files that can be used to store tables of information.
Hypertext Markup Language file .html contains text, text references to other external files, like images in the article and references other files like video, CSS, or JS files.

l. Teacher discretion, check learners understand the concept, structure is logical and contains all aspects

15.

D:\	Movies\	Superheroes\	Blackpanther	.mp4
Drive letter	Folder	Subfolder	Filename	Extension

16. a Every file contains a file extension that determines the type of file it is and how the operating system should interpret it.

b. dox

c. .doc, .docx

d. For the format that you want to read it in

17.

a. The science of right conduct and character

b. Piracy

c. Piracy is the illegal copying, distribution or use of software.

d. The creation can be used for any purpose not aimed at making money (that is, non-commercial use).

e. Teacher discretion, for example, to rather download from a legal site

18.a. Freedom of expression allows people to express their opinions and find communities in which they feel safe.

b. Nobody knows who you are, so you can be and say almost anything.

c. Learners' opinion. Accept all reasonable answers.

d. Learners' opinion. Accept all reasonable answers.

e. Learners' opinion. Accept all reasonable answers.

ALGORITHMS

CHAPTER 1

CHAPTER OVERVIEW	
Unit 1.1	Basics of algorithms
Unit 1.2	Algorithm quality
Unit 1.3	Creating algorithms
Unit 1.4	Flowcharts

The following learning outcomes are covered by this chapter:

- explain what an algorithm is
- give examples of algorithms in everyday life
- produce an algorithm to solve a problem
- test algorithms to determine the quality and accuracy
- compare algorithms considering, for example, order and precision
- use tools, such as a basic flowchart to represent an algorithm

GRADE: 10	DATE:	TEACHING TIME: 8 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • algorithm – an ordered list of steps for carrying out a task or solving a problem • unambiguous – not open to more than one interpretation	

INTRODUCTION

As a class, work through the introductory text on page 1 of the Learner's Book. Learners need to understand that they use algorithms on a daily basis, so this is not a new concept for them.

Explain to your learners that an algorithm is an ordered list of steps used to carry out a task or solve a problem. Algoriths are important to both computers and programmers. As a programmer, their job will be to tell a computer what to do in different situations. To do this, they must be equipped to create algorithms and write a computer programs.

Basics of algoritms

Have a class discussion on the list of instructions that the learners would give for each task. Explain that each task is made up of 'algorithms' or a set of instructions e.g. to call a friend:

- pick up the phone
- type in the phone number or locate the phone number on the contact list
- tap on the call button
- wait for your friend to answer
- reply

It is important that learners understand computer programs are simply lists of instructions (algorithms). If an algorithm is not correct, it will cause an error in the program you are writing.

Example 1.1

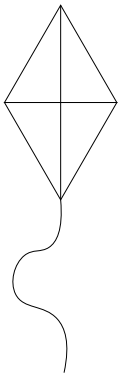
Learners discuss the algorithm to make a cup of hot chocolate and what to do if it is not exactly to their taste. Learners think and talk to their friend about how their algorithm for making hot chocolate (or coffee or tea) would be different to the one in the example.

Activity 1.1 Memorandum

1.1.1 Learners follow the algorithm.

1.1.2 Learners compare their picture with their partner and discuss:

- Are your pictures different? Yes
- Can you explain why? Learners interpreted the drawings differently
- What was difficult about following the instructions? The instructions were not specific enough
- What was missing from the instructions? The instructions missed details such as the direction for each line, or its angle to the previous line, its length and so on
- Provide the object learners should have drawn.



- Learners write a set of instructions that someone could follow to draw that object. Explain that good instructions/algorithms that work on a first try are hard to develop.

1.1.3 An algorithm should meet the following criteria:

- There must be a limited number of steps.
- The steps must be:
  - easy to understand and follow
  - detailed and specific
  - clear and unambiguous.
- Each step should:
  - consist of a single task
  - be at the most basic level that cannot be broken into simpler tasks.
- All repetitions must have clear ending conditions there must be at least one result (or output).

Activity 1.2 Memorandum

Teacher discretion. Learners write instructions (or an algorithm) that will enable someone to make a paper shape from one sheet of A4 paper. Once their instructions (algorithm) are complete, swap them with another learner and test if it was easy to follow. Learners answer the following questions.

1.2.1 Were the instructions easy to follow? Did it work?

1.2.2 If the instructions did not work, where did your classmate go wrong?

1.2.3 a. What do you need to do to x it?

b. Adjust the instructions.

Activity 1.3 Memorandum

Example answers – the learners may provide more detailed answers.

Learners write down instructions on how to do the following physical activities. Each activity must have at least five steps that are properly explained.

1.3.1 How you make coffee:

- Put water in kettle
- Boil kettle
- Put 1 teaspoon coffee powder in cup
- Put 2 teaspoon sugar in the cup
- Pour boiling water into cup
- Add milk

1.3.2 How you do a sit-up:

- Lie down on sit-up bench
- Place hands behind head
- Lift upper body till 90 degrees with legs at the waist
- Hold for a count of five
- Lower upper body back onto bench
- Repeat steps 2 to 5 twenty times

1.3.3 How to buy a packet of chips at the tuckshop using a R100-note:

- Choose brand of chips
- Choose flavor
- Cashier rings up sale
- Hand over R100-note
- Cashier deducts the cost from the R100
- Cashier makes up the change in notes and coins
- Cashier hands back sales slip
- Cashier hands back the change
- Cashier gives you the bag of chips

1.3.4 How you travel from your house to your school.

- Leave the house by the front door
- Lock the door
- Walk to the bus stop
- Wait for the school bus
- Get onto the bus
- Show ticket
- Take seat
- Travel to school
- Get off bus
- Enter the school gate
- If there is time, learners can share their algorithms with a partner and discuss how they are different and why, what would they fix or change in their algorithms.

UNIT 1.2

Algorithm quality

Discuss with learners why precision is important. What can happen if an algorithm is not precise. Precision refers to how accurately and reliably an algorithm solves a problem. The more precise an algorithm is, the better it is at solving the problem correctly regardless of the situation.

Guided activity 1.4

Learners read through the algorithms provided in the Practical Book and pay careful attention to their quality. They then decide which two outfit selection algorithms they think have the highest order and precision. Learners need to support their answer with an explanation.

Explain the solution in terms of the order, the first algorithm has a much smaller order than the second algorithm. The first algorithm will always take exactly five steps to complete, while the second algorithm could take hundreds of steps to complete.

In terms of precision, the first algorithm will only give the best combination of clothes if the closest items make up the best combination. The algorithm will fail most of the time and is therefore not precise. The second algorithm will always give the best combination of clothes and is therefore more precise.

Activity 1.5 Memorandum

1.5.1 Precision refers to how accurately and reliably an algorithm solves a problem. The more precise an algorithm is, the better it is at solving the problem correctly regardless of the situation.
Order refers to the total number of steps needed (including repeats) to complete an algorithm. The order of an algorithm is usually shown as a mathematical formula based on the number of inputs. Order will have a significant effect on the time it takes to complete an algorithm, especially when working with large numbers of items.
The answer should reflect the fact that an algorithm with greater precision produces more reliable results, while one with a lower order will always complete faster.

1.5.2 Algorithm 2 has the higher order and precision. The full comparison will ensure the best value for money and may take several steps, while the first algorithm always completes in 5 steps, but does not guarantee the best buys.

Creating algorithms

Discuss each of the steps needed to create an algorithm. Learners can provide examples for each step. Caution learners in creating algorithms, computers will follow the given instructions even if it is wrong, some steps can have disastrous effects.

Example 1.2

Learners use the steps listed to create a 'Getting dressed algorithm' and record it in their workbooks. Assist learners where necessary.

Activity 1.6 Memorandum

1.6.1 Goal: Provide directions to reach the IT classroom to a stranger to the school.
1.6.2 I will be successful if the person is able to find the IT classroom without getting lost or asking for assistance.
1.6.3 The person will need the classroom number and on which floor it is located.
1.6.4 These steps will differ for each school and classroom.

1. Enter at the front door.
2. Sign in at reception.
3. Go past reception through the sliding door.
4. Turn right.
5. Go up one flight of stairs.
6. Stop at the first floor.
7. Turn left.
8. Proceed past two classrooms.
9. Room 15 is the third door on the right.

1.6.5 Swap algorithms with one of your classmates, then test each other's algorithms. Make sure you follow the steps exactly as they are written.
1.6.6 Update your algorithm if it did not successfully guide your classmate to the IT classroom.

UNIT 1.4

Flowcharts

Discuss the five different elements that make up a flowchart. A flowchart is a visual representation of an algorithm.

Example 1.3

Learners discuss the flowchart of the algorithm.

- What elements of the flowchart are being used?
- Is the algorithm precise and in order?
- Would you change anything in the flowchart? Explain.

Example 1.4

Learners discuss the flowchart of the algorithm.

- What elements of the flowchart are being used?
- Is the algorithm precise and in order?
- Would you change anything in the flowchart? Explain.

Example 1.5

Learners discuss the flowchart of the algorithm.

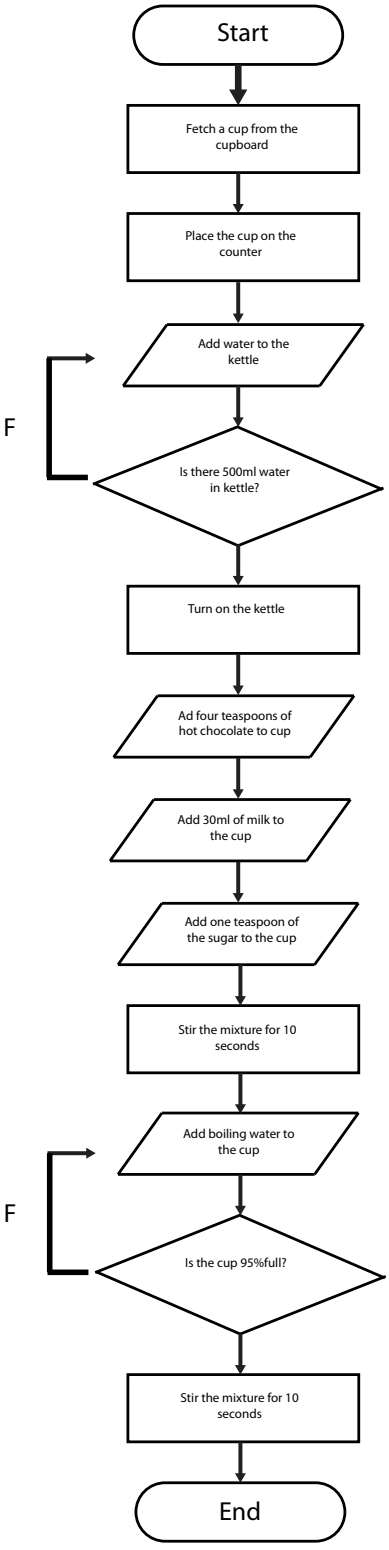
- What elements of the flowchart are being used?
- Is the algorithm precise and in order?
- Would you change anything in the flowchart? Explain.

Activity 1.7 Memorandum

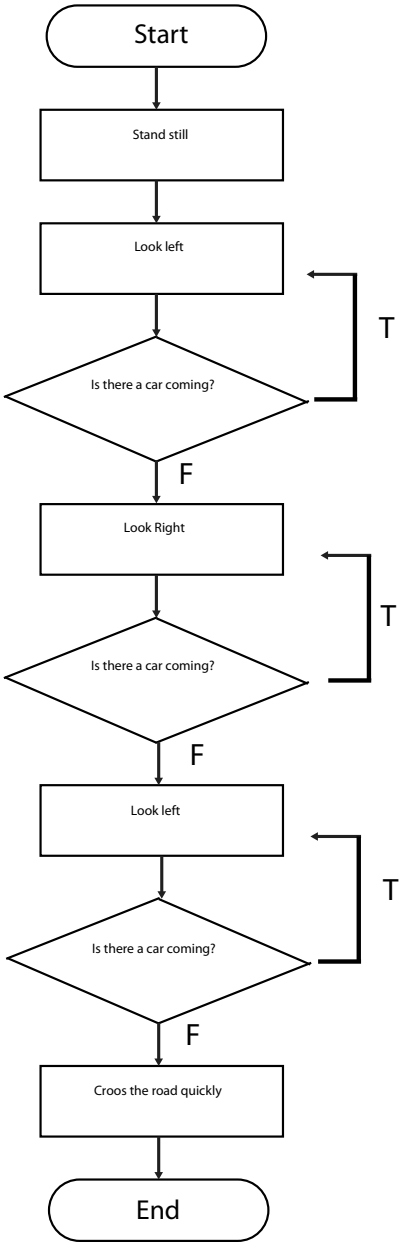
Teacher discretion. Assist learners where necessary. Use peer evaluation to see if the algorithms are precise and in order.

1.7.1 Here are the flowcharts for the algorithms:

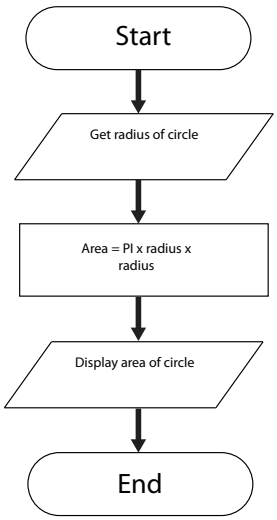
a. Making hot chocolate (refer to algorithm on page 3).



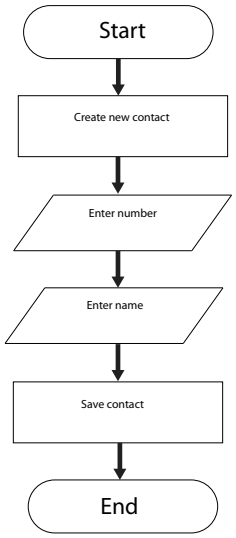
b. Crossing the street.



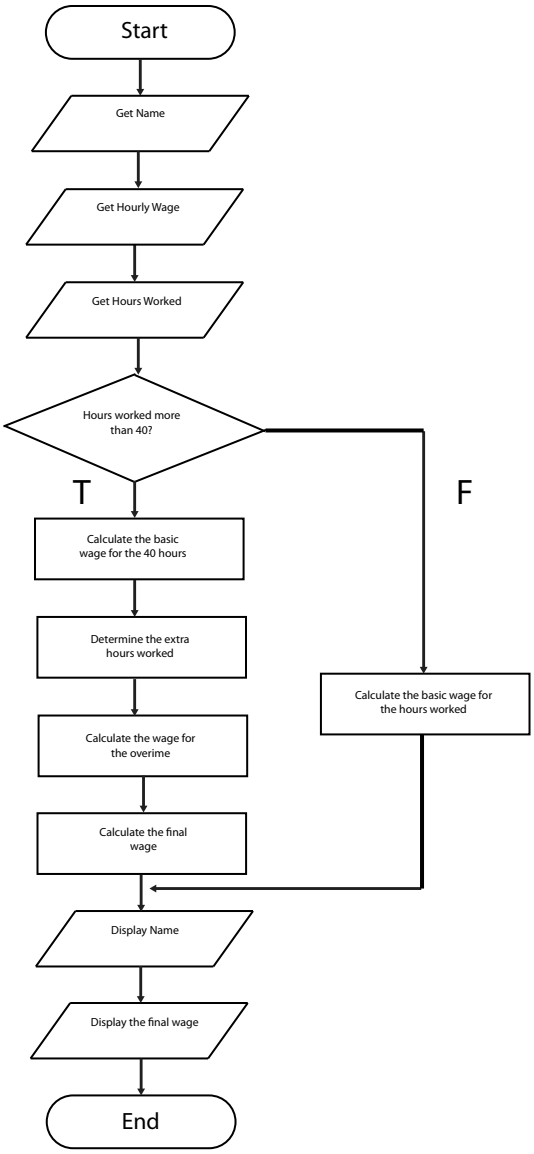
c. Finding the area of a circle



d. Entering a contact into your cellphone



1.7.2 Learners need to evaluate the following flowchart, by checking that all needed steps are listed, and if there is anything wrong or missing, they need to be able to identify it. Once learners are complete, hold a class discussion and invite feedback from various learners.

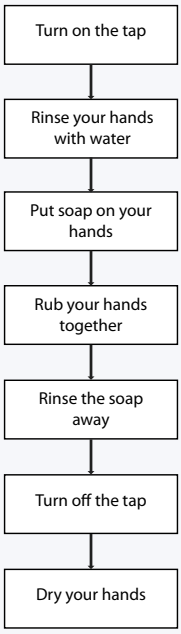


1. Learners answer the questions in their own words:
   a. An algorithm is an ordered list of steps for carrying out a task or solving a problem
   b. Here are the criteria an algorithm should meet:
      - There must be a limited number of steps
      - The steps must be:
        - easy to understand and follow
        - detailed and specific
        - clear and unambiguous
      - Each step should:
        - consist of a single task
        - be at the most basic level that cannot be broken into simpler tasks
      - All repetitions must have clear ending conditions
      - There must be at least one result (or output).
   c. The steps to create a high-quality algorithm are as follows:
      - **Understanding the problem:** The first step in creating an algorithm is to understand what problem the algorithm should solve. If you do not know this, you can easily create an awesome algorithm, but it will solve the wrong problem.
      - **Defining the desired solution or output:** Defining what your solution or output is, will depend on the problem you are trying to solve. In other words, defining your desired output is closely linked to understanding what the problem is. You may need an exact answer, or you may simply need a close enough estimate. Defining the desired output could therefore have a significant effect on the time it takes to solve the problem.
      - **Defining the inputs:** The third step is to define what information you will need for the algorithm to work. This information can be entered by a user or obtained from a different source, such as an existing file.
      - **Designing a set of steps to complete the task:** The fourth step is to design a set of steps that will use your inputs to complete the task. These steps need to be specific and detailed enough that they will always give you the correct answer.
      - **Testing the algorithm:** Every algorithm should be tested, and not just using the situations or data you are most likely to come across. One technique for testing an algorithm is to create a trace table.
      - **Updating the algorithm:** If your tests reveal any problems with the algorithm, you should change the steps to fix the problem. Once changed, the new algorithm should be tested to ensure it works as expected.
   d. What criteria do you need to evaluate the quality of an algorithm?
      - Precision refers to how accurately and reliably an algorithm solves a problem.
      - Order refers to the total number of steps needed (including repeats) to complete an algorithm.

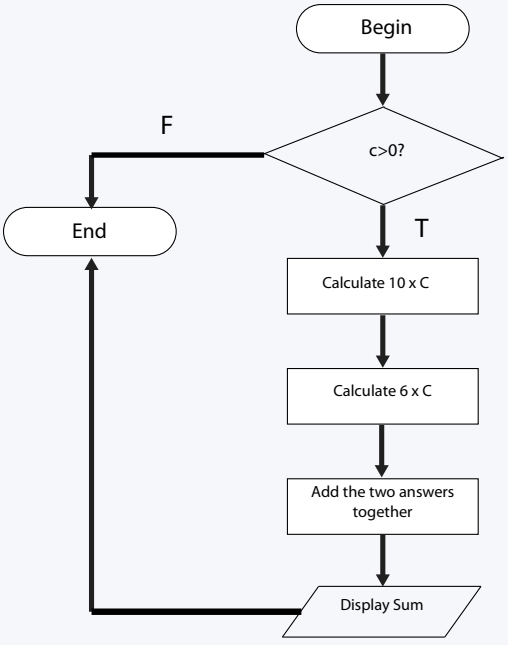
a. Name each element in a flowchart and draw their relative shapes.

ELEMENT	FUNCTION	SHAPE
Terminal	Indicates the start and end of an algorithm.	
Input/Output	Shows when data is added to the algorithm or given to the user.	
Instruction	Gives an instruction that the algorithm must follow.	
Decision	Shows a decision (or condition) that affects the algorithm's behaviour.	
Connector	Connects one element of the algorithm to the next element. Shows the direction in which you move from one element to the next.	

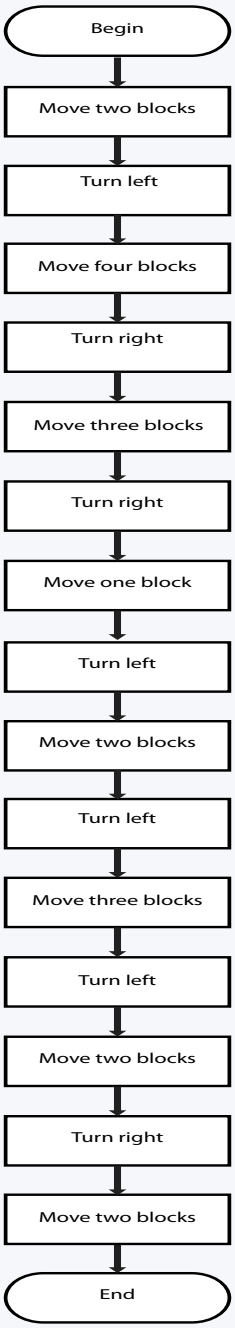
2. Here are the steps for washing hands in a logical sequence:



3. & 4. Teacher discretion, you will need to watch each learner accomplish this task.



5. Here is an flowchart for the instructions:



1. B
7. Teacher discretion, you will need to watch each learner accomplish this task.

DELPHI

CHAPTER 2

CHAPTER OVERVIEW	
Unit 2.1	Opening Delphi and exploring the integrated development environment (IDE)
Unit 2.2	Components and properties
Unit 2.3	Creating a simple Delphi project
Unit 2.4	Events
Unit 2.5	Syntax

The following learning outcomes are covered by this chapter:

- clearly explain the Delphi programming environment and principles
- explain how the Delphi IDE can be used to create programs
- identify, discuss and use various Delphi components
- identify, discuss and apply different component properties
- create various Delphi events
- use the correct Delphi syntax.

GRADE: 10	DATE:	TEACHING TIME: 8 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • algorithm – an ordered list of steps for carrying out a task or solving a problem • unambiguous – not open to more than one interpretation	

INTRODUCTION

Delphi is one of many high-level programming languages. This means that it was designed to be easier to write and be read by people. This quality makes it an ideal language to use when learning about programming.

In this chapter, they will learn:

- how the Delphi IDE can be used to create programs
- how to create, open and save Delphi projects
- about the basic components you can use to create a simple graphical user interface (GUI)
- how to work with component properties
- how to create a Delphi event to change component properties and behaviour
- how to create basic Delphi code.

UNIT 2.1

Opening Delphi and exploring the Delphi IDE

Delphi is one of many high-level programming languages that is designed to be easier to write and be read by people. In this unit you will explore the Delphi IDE and begin creating simple programs. Learners should focus on understanding the programming concepts and logic in order to learn the programming language. Guide the learners in following the steps to open and explore the IDE.

Example 2.1

Guide the learners in following the steps to save a project.

Activity 2.1 Memorandum

1.1.1 When learners are confident with the example, check they can:
2.1.1 Create a new folder, called Activity2_1.
2.1.2 Create a new project.
2.1.3 Save the unit fi le in the folder you created as Activity2_1_u.
2.1.4 Save the project file in the folder you created as Activity2_1_p.

Components and properties

Discuss the components and properties of Delphi while learners explore the features on IDE. Ask learners why the last two properties from the table (Font.Size and Font.Color) both have a full stop in them. Read and discuss the Take note box. Ensure learners understand this concept before moving on to the activity.

Activity 2.2 Memorandum

2.2.1 Check the learners can follow the activity steps, the solution can be found in Basic_Properties_p.dproj.
2.2.6

COMPONENT	PROPERTY	RESULT OF THE CHANGE
Form	Caption	The title bar displays your name and surname
btnRed	Name	The text on the button changes to btnRed
btnRed	Caption	The text on the button changes to Red
btnGreen	Name	The text on the button changes to btnGreen
btnGreen	Caption	The text on the button changes to Green
btnBlue	Name	The text on the button changes to btnBlue
btnBlue	Caption	The text on the button changes to Blue
btnPurple	Name	The text on the button changes to btnPurple
btnPurple	Caption	The text on the button changes to Purple
btnGreen	Height	The button's height increases
btnGreen	Width	The button's width increases
btnBlue	Width	The button's width increases
btnBlue	Height	The button's height increases
Form	Font size	The size of the font of all the components increases

UNIT 2.3

Creating a simple Delphi project

Discuss the design and view properties of Delphi while learners explore the features on the user interface.

Example 2.2

The solution can be found in the 02 – Hello Delphi folder.

Example 2.3

Check the learners can follow the activity steps; the solution can be found in the 02 – Hello Delphi folder. Check that learners have used the punctuation correctly before moving on to the activity.

Activity 2.3 Memorandum

2.3.1 The solution can be found in the 02 – Hello Delphi folder.
2.3.2 The solution can be found in the 02 – Hello Delphi folder.
2.3.3 The solution can be found in the 02 – Code Properties folder.

Events

Discuss creating an event in Delphi while learners explore the features on IDE..

Example 2.4

The solution can be found in the 02 – Disappearing Cats folder. Check the learners can follow the activity steps to create the user interface 'Disappearing Cats' for their application.

Example 2.5

- The solution can be found in the 02 – Disappearing Cats folder. Check the learners can follow the activity steps for coding the hide and show methods for the cat image.
- Teach learners the shortcut key to run an application, press the CTRL + SHIFT + F9.

Activity 2.4 Memorandum

2.4.1 An event is something that happens when a component changes in some way. For example, when a button is clicked and it changes from not being clicked to being clicked.

2.4.2 Any code executed as a result of an event is handled by an event handler.

2.4.3 A statement ends with a semicolon (;). The semicolon tells Delphi that it is the end of a statement.

2.4.4 The solution can be found in the 02 - Image Show Hide folder.

UNIT 2.5

Syntax

Discuss syntax rules in Delphi, learners provide their own examples. Learners need to understand that the two forward slashes (//) show that the text after the slashes are a comment. These comments can help to understand the program but are ignored by Delphi.

Activity 2.5 Memorandum

2.5.1 Teacher discretion is needed for the learner's examples in correcting the syntax of the following examples:

a. imgCat.Hide;

b. lblMessage.Caption := 'Hello, World';

c.
```
procedure TFrmHelloDelphi.btnChangeClick(Sender: TObject);
begin
  lblMessage.Caption := 'Hello, Delphi!';
end;
```

d. imgCat.Hide;

2.5.2 The solution can be found in the 02 - Syntax Errors folder. Check the learners can follow the activity steps and can run the program.

Discuss the Chapter Overview, learners can tick each of the aspects that they understand. Explain any concepts that learners query.

1. An event happens when the state of a component changes – such as being clicked. The event handler handles any code that runs as a result on the event being triggered.
2. Design mode is used to is used to design the user interface for the program you are writing. Runtime mode happens after the run button has been clicked and the program you have coded is running.
3. Syntax refers to the specific rules of a language. Every programming language has its own sets of rules for creating instructions for the computer.
4. Property of a button is an attribute such as height that determines the height of the button on the form. A method of a button carries out a set of instructions related to the button. For example, Button1.Hide causes the button to be hidden and become invisible.
5. The solution can be found in the 02 - Disappearing Buttons folder.
6. The solution can be found in the 02 - Traffic Light folder.
7. The solution can be found in the 02 - Special Occasion Card folder.
8. The solution can be found in the 02 - Faulty App folder.

VARIABLES

CHAPTER 3

CHAPTER OVERVIEW	
Unit 3.1	Data types
Unit 3.2	Variable and component names
Unit 3.3	Declaring variables and components
Unit 3.4	Assigning values to variables
Unit 3.5	Converting data types
Unit 3.6	Errors

The following learning outcomes are covered by this chapter:

- explore the use of variables
- use descriptive variable and component names, as well as correct naming conventions
- assign values to variables
- explore data types such as integers, strings, floats, Boolean
- identify, categorise and fix errors.

GRADE: 10	DATE:	TEACHING TIME: 6 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • keyword – a word with a predefined meaning in a programming language. You cannot use keywords as variable names. It is for this reason that each new variable has to be declared before use	

INTRODUCTION

A variable refers to a memory location that can hold one item of data at any given time. Each variable in Delphi is given a unique name and can be used to store data. You simply need to refer to the variable's name when you must access the data stored at a particular memory location. Variables can only store one piece of information at a time, but you can change the variable's value as often as you want to.

In this chapter, learners will be taught about:

- different data types
- variable naming convention
- variable declarations
- assigning values to variables
- converting certain variable types to another data type (typecasting)
- understanding and fi xing basic programming errors.

UNIT 3.1

Data types

Variables in a computer program are similar to 'boxes' where information can be kept, maintained and referred to. Discuss the five data types with learners, use the provided examples and learners can give their own examples.

Show the animation explaining the types of values that can be stored in the different types of variables. For example, you can show a string variable and then show different values being stored in it, then show an integer with different numbers stored in it. Also illustrate which compatible types can be stored in a variable, for example, integer value in real type or char in string type.

By guided questions learners should conclude that only strings and chars are surrounded by quotation marks. Numbers and Boolean values are not.

Guided activity 3.1

3.1.1 'Kagiso' String
3.1.2 17 Integer
3.1.3 '?' Char
3.1.4 14.3 Real or double
3.1.5 False Boolean
3.1.6 'Numbers should be stored as integers' String
3.1.7 005 String
3.1.8 18142.23779 Real or double
3.1.9 True Boolean
3.1.10 '12i34' String

Activity 3.1 Memorandum

3.1.1 b – a place in memory that keeps a data value
3.1.2 a – a type of variable that hold data values made up of ordered sequences of characters
3.1.3
a. True. A variable of type string can store a single character.
b. False – a variable of type real or double can store a real number.
c. True – a variable of type real can store an integer number.
d. True – a variable of type string can store values that contain special characters such as '*'.
e. False – a variable of type char can only store a single digit or a single character.
f. True – a variable of type Boolean can only store one of two values.

3.1.4 sSchool: String
sName: String
sInitials: String
iGrade: Integer
sID: String
sDateOfBirth: String
cGender: Char
cCellNumber: String
bProgressed: Boolean
iPreviousMark: Integer
iCurrentMark: Integer

Variable and component names

Discuss the rules for naming conventions and why they are necessary. Explain to learners that variable names have no impact on the values stored in variables. They simply make it easier to understand what the variable should be used for. Discuss the Did you know boxes. Go through the details of the naming conventions and examples.

Activity 3.2 Memorandum

3.2.1 When naming Delphi variables:

a. False: names may not start with a number, but they can contain a number

b. False: variable names should start with a single letter prefix describing the data type the variable will hold

c. False: names should use CamelCase. This means the first word or letter is in lowercase, and each word afterwards starts with an uppercase letter. Names may not contain any special characters except for underscores (_).

3.2.2 *lblHeading*: displays the title of the application or screen
edtLength: the user will type in the length of the lawn
edtWidth: the user will type in the length of the lawn
btnCalcArea: will calculate the area of the lawn after reading the values from edtLength and *edtWidth*, then display the area on *lblArea*
lblArea: will display the area of the lawn
btnCalcAmount: will work out the cost for mowing the lawn and display it on *lblAmount*
lblAmount: will display the cost for mowing the lawn

UNIT 3.3

Declaring variables and components

Explain to learners that the process of creating a variable by giving it a name and type is known as declaring the variable. Discuss the rules for declaring variables and why it is necessary. Read and discuss the Take note boxes. After each activity check that learners are confident with the steps and information.

Guided activity 3.2

3.2.1 rAmount: Real
3.2.2 bResult: Boolean
3.2.3 cLetter: Char
3.2.4 iYear: Integer
3.2.5 rFraction: Real
3.2.6 sPhoneNumber: String
3.2.7 sIDNumber: String

Guided activity 3.3

3.3.1 a. iAge
b. sEmailAddress
c. rPrice
d. cGender
e. bPensioner
f. sName or sSurname

3.3.2 a. sMobileNumber is declared as a string type because the leading 0 will disappear if it is declared as an Integer. A mobile number often contains spaces that can only be represented in a String variable
b. bPensioner is declared as a Boolean type because there are only two possibilities: the person is either a pensioner (True) or not a pensioner (False).
c. rPrice is declared as a real type because currency amounts contain Rands and cents with the cents in the decimal part of the number.

Example 3.1

The coded solution can be found in the 03 - Report Card folder. Assist learners to follow the steps to use the report card user interface and identify variables to store inside the application.

Activity 3.3 Memorandum

3.3.1 The var statement
3.3.2 To allocate a memory location to the variable.
3.3.3 The name and type of the variable.

3.3.4

DECLARATION ERROR	BRIEFLY DESCRIBE THE ERROR	CORRECT DECLARATION STATEMENT
iNumber = Integer;	Incorrect operator	iNumber: Integer;
bStatus : Boolean	Missing semicolon at end of statement	bStatus: Boolean;
cDigit = char;	Incorrect operator	cDigit: char;
rNumber, iTotal : Real;	Cannot declare and integer and a real number variable on the same line	rNumber: Real; iTotal: Integer;
sGrade : chaintegerr;	Incorrect data type	sGrade: String;

UNIT

3.4

Assigning values to variables

Explain to learners that the process of assigning values to variables. Discuss the rules for assigning values and why it is necessary. Read and discuss the Watch out! Boxes and the examples. After each activity check that learners are confident with the steps and information.

Example 3.2

- The coded solution can be found in the 03 - Report Card folder.
- Follow the steps with the learners to assign values to the variables in the report card application.
- Guide learners to understand what variables can and cannot do.

Activity 3.4 Memorandum

- The coded solution can be found in the 03 – StringsToThings folder.
- Provide the learners with the Delphi program StringsToThings.
- Learners write code for btnGetAndDisplay that will display the information entered through each edit component on the corresponding label component.

Converting data types

Explain to learners that there are different ways to convert data types. Discuss the steps and read the Take note boxes. After each activity check that learners are confident with the steps and information.

Guided activity 3.4

3.4.1 a. '7321.52', String
b. 121.3, Real
c. 15, Integer
d. '112', String

3.4.2 a. Correct
b. Correct
c. Incorrect – String input given, should be a real number without the quote marks
d. Incorrect – String input given, should be an integer value without the quote marks

Example 3.3

- The coded solution can be found in the 03 - Report Card folder.
- Provide the learners with the project ReportCard_p.dproj and guide them to follow the steps.
- Learners should be able to run the application.
- Watch the screen capture showing how to create the code for the report card application.

Guided activity 3.5

- The coded solution can be found in the 03 - Name Swap folder.
- Guide learners to complete the name and surname swap application.
- Watch the screen capture showing the swap names application.

Activity 3.5 Memorandum

- The coded solution can be found in the 03 - Name Swap folder.
- Learners create the following Delphi programs. Learners should be able to run the application.
- Learners can read the Take note boxes for guidance.

UNIT 3.6

Errors

Explain to learners the different types of errors, why they are caused and how to fix them. Discuss the steps and read the Take note boxes. After each activity check that learners are confident with the steps and information.

Guided activity 3.6

Guide learners to work through both program snippets and answer the following questions.

3.6.1 Snippet 1

3.6.2 The surname gets overwritten by itself as sName holds the surname after step 4.

LINE	COMPONENT NAME	VARIABLE NAME	VARIABLE VALUE
1	edtName.Text	sName	First name
2	edtSurname.Text	sSurname	Surname
3		sPlaceholder	First name
4		sName	Surname
5		sSurname	Surname

Activity 3.6 Memorandum

- The coded solutions can be found in the 03 - Error 1, 03 - Error 2 and 03 - Error 3 folders.
- Program 1:

ERROR	EXPLANATION OF ERROR	TYPE OF ERROR	CORRECT CODE STATEMENT
Misspelt variable name	The variable name for the first name has been incorrectly spelt on line 1 of the code and as a result is not recognised.	Syntax error	sFirstName := edtFirstName.Text;
Misspelt component name	edtSurname has been incorrectly spelt on line 2 of the code and as a result is not recognised.	Syntax error	sSurname := edtSurname.Text;
Incorrect property of label used	A label does not have a value property – it should be caption.	Syntax error	lblOutput.Caption := sFirstName[1] + ' ' + sSurname + ', ' + IntToStr(iAge) + ' years old.';

- Program 2:

ERROR	EXPLANATION OF ERROR	TYPE OF ERROR	CORRECT CODE STATEMENT
Incorrect type conversion	The user is asked to enter a value correct to one decimal. The StrToInt command is used and will not be able to take a decimal value as a parameter. The program will crash when it tries to read the value from the edit box.	Runtime error	rPercent := StrToFloat(edtPercentage.Text);

- Program 3:

ERROR	EXPLANATION OF ERROR	TYPE OF ERROR	CORRECT CODE STATEMENT
Incorrect order of statements	The program will produce the incorrect inititials because the variable are being accessed in the incorrect order	Logic error	lblDisplay.Caption := 'Initials: ' + sFirstName[1] + sSecondName[1] + sSurname[1];

- Discuss the Chapter Overview, learners can tick each of the aspects that they understand.
- Explain any concepts that learners query.

CONSOLIDATION Chapter 3: Variables

1. Variables in a computer program are similar to 'boxes' where information can be kept, maintained and referred to.
2. In Delphi the naming conventions are:
   - all variable and component names must be unique
   - names may not contain spaces
   - names may not start with a number, but they can contain a number
   - names may not contain any special characters (like exclamation marks) except for underscores (_).

   Here are some naming conventions used for variables:
   - variable names should describe the data they will contain. For example: variable name: Amount for a variable that will hold monetary data
   - names should use CamelCase. This means the first word or letter is in lowercase, and each word afterwards starts with an uppercase letter, for example, rAmountPaid
   - variable names should start with a single letter prefix describing the data type the variable will hold.
3. An integer can contain any positive or negative number without a decimal point. Integers can be used in numerical calculations. A real number is a positive or negative decimal number. An integer can be represented as a real number, but a real number cannot be represented as an integer.
4. Syntax refers to the form and structure of the programming language, which defines how the symbols and keywords must be combined to format a statement. A runtime error occurs when the program is running. A logic error occurs when there are errors in the logic of the program. The program compiles and runs correctly but produces the incorrect results.
5. A variable name serves as a unique identifier for the variable and gives and gives an indication which value it holds and what data type that value is.
6. A variable is a symbolic name for (or reference to) a value stored in memory. Every variable has a name, a type, a value and a location:
   - Name: The name is Symbolic and is how the programmer 'accesses' the variable. Every variable must have a unique name.
   - Type: The type represents what 'kind' of data is stored within the variable.
   - Value: The value represents the contents of the variable. It can change over time. When a new value is assigned to a variable, the existing value is replaced by the new value.
   - Location: The memory cell where the value is kept.
7. Data is often read from a component as a String data type and then must be converted to an Integer or Real number in order to be used in calculations. The reverse is also true: the answer to a calculation is either an Integer or Real number value that needs to be converted into a String in order to be displayed on an output component.

8. Study the following code:
   Identify the errors in the code. Briefly describe each error and correct the error using the following table:

DECLARATION ERROR	BRIEFLY DESCRIBE THE ERROR	CORRECT DECLARATION ERROR
cGender := 'Female';	cGender is of the char data type and can only store a single character.	cGender := 'F';
iAge := 15	Missing semicolon at the end of the statement.	iAge := 15;
rHeight := 1.66 m;	rHeight is of the Real data type and can only store real number values and not text such as the measrurement unit added in here.	rHeight := 1.66;
iAge := rHeight;	You cannot assign a Real number to an integer and rHeight would be storing a value in Real format.	iAge := 15; rHeight := 1.67;
bSACitizen := Yes;	bSACitizen is of the data type Boolean that can only hold the values True or False.	bSACitizen := True;

9. a. String
   b. REal
   c. Char
   d. Caption can only hold a String value. The FloatToStr function should be used instead of StrToFloat.
   e. rClassAvg:= StrToFloat(edtClassAverage.text); It will convert the text value read from the edit box into a decimal (real) number value.
   f. iPosition := StrToInt(spdPlace.Value); The value property of a spin edit already returns an integer value and so the StrToInt function would have an error as it requires a string parameter.
   g. Copy and complete the table to show the value that is saved in each of the variables when the program is executed.

The completed table is given below:

VARIABLE NAME	DATA TYPE	CONTAINS
sSurname	String	Tlou
sSubject	String	I.T.
cInitial	Char	J
rClassAverage	Real	81.6
iPosition	Integer	1

10. The coded solution can be found in the 03 - Favourite TV programs folder.
11. The coded solution can be found in the 03 - Email Check folder.

TERM 1

CHAPTER 4

SOLVING BASIC MATHEMATICAL PROBLEMS USING DELPHI

CHAPTER OVERVIEW	
Unit 3.1	Basic operators
Unit 3.2	Formatting numbers
Unit 3.3	Mathematical functions
Unit 3.4	Variable scope

The following learning outcomes are covered by this chapter:

- identify, describe and apply different mathematical operators
- use the correct order of operations to solve mathematical problemsassign values to variables
- explain and apply mathematical functions such as random, round and square root
- create Delphi programs to solve basic mathematical problems
- apply basic algorithms in programs
- use planning tools to plan solutions to problems before implementation in Delphi
- explain the difference between local and global variables and use them appropriately.

GRADE: 10	DATE:	TEACHING TIME: 16 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • keyword – a word with a predefined meaning in a programming language. You cannot use keywords as variable names. It is for this reason that each new variable has to be declared before use	

INTRODUCTION

In this chapter, learners will be taught how to solve basic mathematical problems using Delphi.

They will also be taught how to use planning tools to assist you when making your applications.

UNIT 4.1

Basic operators

The last chapter looked at syntax and this chapter looks at the mathematical operators. Discuss the six basic operators used for calculations in Delphi and read the Take note boxes. After each activity check that learners are confident with the steps and information.

Activity 4.1 Memorandum

4.1.1 Valid
4.1.2 Valid
4.1.3 Valid
4.1.4 Valid
4.1.5 Not valid – can only use integer values with the DIV operator
4.1.6 Valid
4.1.7 Valid
4.1.8 Valid
4.1.9 Valid
4.1.10 Valid
4.1.11 Not valid – can only use integer values with the MOD operator

Create a class discussion about the rules used for calculations that they discovered while completing the activity. Read through the rules and explain the examples.

Example 3.1

Work together with the learners to evaluate the expression.

Activity 4.2 Memorandum

4.2.1 (12 + 4 * 4) DIV 2
= (12 + 16) DIV 2
= 28 DIV 2
= 14

4.2.2 12 + 4 * 4 DIV 2
= 12 + 16 DIV 2
= 12 + 8
= 20

4.2.3 10 - 4 / 2* 6 + 3
= 10 – 2 * 6 + 3
= 10 – 12 + 3
= -2 + 3
= 1

4.2.4 8 * 4 - 17 / 2 + 3
= 32 – 8.5 + 3
= 23.5 + 3
= 26.5

4.2.4 8 * 4 - 17 / 2 + 3
= 32 – 8.5 + 3
= 23.5 + 3
= 26.5

4.2.5 4 * (6/2 + 3)
= 4 * (3 + 3)
= 4 * 6
= 24

4.2.6 4 * 6 / 2/4 + 3
= 24 / 2 / 4 + 3
= 12 / 4 + 3
= 3 + 3
= 6

4.2.7 17 DIV 2 * (4 * 5 +(10 – 1)) * 2.3
= 17 DIV 2 * (4 * 5 + 9) * 2.3
= 17 DIV 2 * (20 + 9) * 2.3
= 17 DIV 2 * 29 * 2.3
= 8 * 29 * 2.3
= 232 + 2.3
= 533.6

4.2.8 23 MOD 3 * (13 DIV 2 - 5)
= 23 MOD 3 * (6 - 5)
= 23 MOD 3 * 1
= 2 * 1
= 2

4.2.9 69 MOD (3 + 5) + 1.1 * 4.7
= 69 MOD 8 + 1.1 * 4.7
= 5 + 1.1 * 4.7
= 5 + 5.17
= 10.17

4.2.10 (32 MOD 7) * (26 DIV 8)
= 4 * (26 DIV 8)
= 4 * 3
= 12

Example 4.2

Work together with the learners to use mathematical calculations to solve the problem.

Example 4.3

Work together with the learners to use mathematical calculations to solve the problem.

Example 4.4

Work together with the learners to use mathematical calculations to solve the problem.

Activity 4.3 Memorandum

4.3.1

a. 7 + 2 – 9 × 1 = 0
b. 7 + (2 - 9) × 1 = 0
c. 13 + 12 / (5 - 1) = 16
d. (9 × 5 × 7) / 5 + 1 = 64
e. (12 × 5) × (3 + 2) / 3 = 100

4.3.2 The coded solution can be found in the 04 - Activity 4.3.2 folder

Activity 4.4 Memorandum

4.4.1

Line 1: Enter the length of the room
Line 2: Enter the width of the room
Line 3: Area = Length x Width
Line 4: Display area

4.4.2 a.

Line 1: Enter the length of the lounge
Line 2: Enter the width of the lounge
Line 3: AreaLounge = LengthLounge x WidthLounge
Line 4: Display area of lounge
Line 5: Enter the length of bedroom 2
Line 6: Enter the width of the bedroom 2
Line 7: AreaBedroom2 = LengthBedroom2 x WidthBedroom2
Line 8: Display area of bedroom 2
Line 9: TotalArea = AreaLounge + AreaBedroom2
Line 10: Display TotalArea

b.

INPUT	PROCESSING	OUTPUT
Enter the length of the lounge Enter the width of the lounge	AreaLounge = LengthLounge x WidthLounge	Display area of lounge
Enter the length of bedroom 2 Enter the width of the bedroom 2	AreaBedroom2 = LengthBedroom2 x WidthBedroom2	Display area of bedroom 2
	TotalArea = AreaLounge + AreaBedroom2	Display TotalArea

Activity 4.5 Memorandum

Learners use mathematical problems and prior knowledge to solve the problem.

LINE NUMBER	iLENGTH	iWIDTH	iAREA (LENGTH * WIDTH)	iPERIMETER (ADD ALL FOUR SIDES)	rHALFLINE	OUTPUT
1	Error					Error message
2			0			
3				Error		
4		45				
5					0	Error message
6						Error message
7						Error message
8						Error message

LINE NUMBER	WHAT THE CODE SHOULD DO	ERROR DESCRIPTION	CORRECT THE CODE
1	Write the value from the edit box to the length variable	Error message. Variables do not have properties	iLength := StrToInt(edtLength.text)
2	Calculate the area	Value = 0. length could not be stored and width not yet read.	Move line 4 between the current line 1 and 2.
3	Calculate the perimeter	Error message and incorrect formula to calculate the perimeter.	iPerimeter := (iLength*2) + (iWidth *2);
6	Convert the area to a String and display it on the label	Incorrect use of StrToInt, it should be IntToStr	lblArea.Caption := IntToStr(iArea)+ ' m';
8	Convert the half line value to a String and display it on the label	Incorrect use of IntToStr as rHalfLine is a Real number value, it should be FloatToStr	lblHalfLine.Caption:= FloatToStr(rHalfLine)+ ' m';

UNIT
4.2

Formatting numbers

Discuss how the FloatToStrF function formats real numbers by converting a floating point number (real number) into a displayable string based on a given format. Look at the various examples. After each activity check that learners are confident with the steps and information.

Example 4.5

- Learners follow the steps to format the output numbers and run the application to check it is valid.
- The coded solution can be found in the 04 - VAT Calculator folder.

Activity 4.6 Memorandum

Be stringent about the single quotation marks to show a string.

4.6.1 lblOutput.Caption := FloatToStrF(rValue, ffFixed, 3, 0);
4.6.2 lblOutput.Caption := FloatToStrF(rValue, ffFixed, 4, 2);
4.6.3 lblOutput.Caption := FloatToStrF(rValue, ffCurrency, 8, 2);

Activity 4.7 Memorandum

4.7.1 The coded solution can be found in the 04 - Gradient folder.
4.7.2 The coded solution can be found in the 04 - Scoring folder.
4.7.3 The coded solution can be found in the 04 - PreOrder Calculator folder.

UNIT 4.3

Mathematical functions

Delphi has pre-written programming code that performs frequently performed tasks. Revise the functions that the learners have used. Discuss further types of mathematical functions and how they work. After each activity check that learners are confident with the steps and information.

Guided activity 4.1

Allow learners to work independently for a few minutes then guide them through this activity.

4.1.1 rRoot := Sqrt(100);
4.1.2 iRandom := Random(10);
4.1.3 iValue := Round(13.45);
4.1.4 rSquare := Sqr(7.1);
4.1.5 rRandom := Random;
4.1.6 iValue := Round(1578.99);
4.1.7 iValue := Trunc(42.78);
4.1.8 iRandom := Random(6) + 1;

Activity 4.8 Memorandum

Place the following files in folders for the learners to use in the activity:

4.8.1 The coded solution can be found in the 04 - Hypotenuse folder.
4.8.2 The coded solution can be found in the 04 - Points Calculation folder.
4.8.3 The coded solution can be found in the 04 - Board Game folder.
4.8.4 The coded solution can be found in the 04 - SphereSurfaceAreaAndVolume folder.

Activity 4.9 Memorandum

The coded solution can be found in the 04 - Act 4.9 Error folder.

Activity 4.10 Memorandum

The coded solution can be found in the 04 - Intermediate Calculator folder.

Variable scope

Revise variables with learners, if necessary, skim through the previous notes. This chapter will be adding onto that knowledge. After each activity check that learners are confident with the steps and information before moving on.

Guided activity 4.2

- Place the Circle_p project in a folder for the learners to use in the activity.
- The coded solution can be found in the 04 - Circle folder.

Activity 4.11 Memorandum

4.11.1 The coded solution can be found in the 04 - Running Total folder.
4.11.2 The coded solution can be found in the 04 - Mathematical Operations folder.
4.11.3 The coded solution can be found in the 04 - IT Club Voting folder.

- Discuss the Chapter Overview, learners can tick each of the aspects that they understand.
- Explain any concepts that learners query.

1. DIV divides the first number by the second, then discards the remainder. MOD divides the first number by the second, then keeps only the remainder.
2. Variables declared in an event handler are only created in the computer's memory at the start of the event, and only exist as long as the event is being executed. These variables cease to exist once the event has terminated. We call these variables local variables, because they cannot be accessed from another event – that is, they have a local scope.
   If a variable needs to be accessed from more than one event handler, it must be declared outside of the event handlers in the VAR section at the top of the program. We say that these variables have global scope.
3. A trace table is to determine the values of variables throughout a program. It can thus be used to find errors in a program.
4. An argument is the value or values that are passed to the functions by being placed in the brackets after the function's name.
5. The random function is used to generate random numbers.
   The RANDOM function has two different syntaxes:
   - The RANDOM function without argument will generate a random decimal number from 0 to less than 1
   - In the RANDOM(Number) syntax the argument is type integer. It generates a random number from 0 to Number-1, that is, if the argument is 6, then it will generate a number from 0 to 5
6. The coded solution can be found in the 04 - RateOfLitresAndKilometres folder.
7. The coded solution can be found in the 04 - Excursion Transportation folder.
8. The coded solution can be found in the 04 - Instalment Calculation folder.
9. The coded solution can be found in the 04 - Sharing Tickets folder.
10. The coded solution can be found in the 04 - Distance Conversion folder.
11. The coded solution can be found in the 04 - Tile Cost folder.
12. The coded solution can be found in the 04 - Traffic Fines folder.
13. The coded solution can be found in the 04 - Parabola folder.
14. The coded solution can be found in the 04 - Can Volume folder.
15. The coded solution can be found in the 04 - Contestant Code folder.
16. The coded solution can be found in the 04 - Fibonacci Sequence folder.
17. The coded solution can be found in the 04 - Playing With Numbers folder.

TERM 2

CHAPTER 3

BASIC CONCEPTS OF HARDWARE

CHAPTER OVERVIEW	
Unit 3.1	Types of hardware
Unit 3.2	Output devices
Unit 3.3	Storage devices
Unit 3.4	Motherboard
Unit 3.5	Computer or smartphone

The following learning outcomes are covered by this chapter:

- describe the different types of hardware, their usage and where they are used
- describe the difference between memory and storage
- compare the hardware components of a computer and a smartphone.

GRADE: 10	DATE:	TEACHING TIME: 4 hours
Resources	Each learner should have access to: • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • exponentially – a specific way that a quantity may increase (more and more rapidly) over time • eraser pointer – a pointing device that looks like a joystick or pencil eraser head and sits between the G, H and B keys. When the eraser pointer is pushed in one direction, the cursor moves in the same direction • resistive touch screen – pressure sensitive touch screens that can be operated with any input device • capacitive touch screens – offer higher clarity for the visually impaired but cannot be operated using other input devices • infrared touch screens – can be operated by either human touch or stylus and have high clarity • surface acoustic wave (SAW) technology – technology that provides high clarity and durability and can be operated by either human touch or stylus • tactile device – a device that makes use of touch • carbon paper – thin paper coated with carbon or another pigmented substance, used for making a second impression of a document as it is being written or typed • electrostatic technology – uses stationary electric charges instead of electric currents • toner – a very fine, dry, black powder-type of ink • volatility – something unstable or changeable • reliability – the ability to consistently perform according to its specifications • durability – how long something can last • secondary storage device – holds data for the long term. Data stored on secondary storage devices can only be removed by deleting it • solid-state drive – a storage device that has no moving parts • simulations – a time saving technique to solve complex problems • rendering – an automatic process of generating an image from a 2D or 3D model	

INTRODUCTION

This chapter looks at the different hardware, where they are used and what they are used for. Read through the introductory text on page 63 of the Theory Book. Learners need to be able to imagine a spacecraft being powered by five computers as large as refrigerators, but each with only 1 MB of memory. They need to understand that each computer had to complete 750 000 instructions per second, and the top-end models sold for around R70 million. Today, an old smartphone such as an iPhone 6S can cost around R5 000, have 2 GB of memory and can perform 3 300 000 000 instructions per second (that is, 3.3 billion instructions per second). That means that an old, outdated smartphone is 14 000 times more affordable and 4 400 times faster than the fastest computer NASA used to put a man on the moon!

UNIT 3.1

Types of hardware

In this unit learners will learn about input devices. Input devices are devices that allows you to add data to a computer or interact directly with your computer. It may also allow you to save or transmit data from your computer to, for example, scanners and cameras.

As a class, read through the text on pages 64 to 68 of the Theory Book. Allow learners hands-on experience with different input devices you have available in your classroom. Once complete, ask learners to complete Activity 3.1 on page 69 of the Theory Book. Moderate their answers.

Activity 3.1 Memorandum

3.1.1 Input devices are any hardware devices allowing you to input data into a computer or interact with a computer.

3.1.2 On-screen or virtual keyboards: Displayed on a user's screen and used with gesture-controlled pointers or joysticks.
A touchscreen keyboard is easy to use, no extra peripherals are needed and software can alter the screen while it is being used, making it more flexible than a concept keyboard which as a permanent overlay.

3.1.3 Teacher discretion on the shortcut commands that learners, they need to support their answers.

3.1.4 Learners can provide any three advantages and three disadvantages.
Advantages:
- Ideal for desktop and laptop computers.
- Most computer users are familiar with them and require little training.
- Works well in conjunction with a keyboard for data entry.
- Usually supplied as part of a new computer system.

Disdvantages:
- They need a flat space close to a computer to operate.
- Older style mice, which have roller balls, can become clogged with grease and grime and lose their accuracy until cleaned.
- Excessive use can lead to health problems, such as, repetitive strain injury (RSI).
- If the battery wears out in a wireless mouse, it cannot be used until it has been replaced.

3.1.5 Head-mounted pointers: Controlled by switches to simulate the function of a mouse. These switches can be on hand or foot pads, or pedals or sensors that detect eye movement or facial expressions.
Gesture-recognition devices: Recognise hand gestures, head or eye movements, or read lips or sign language to input information into a computer.
Sip-and-puff devices: A switch that operates the computer when users breathe into (puf¬fing) or through (sipping) special tubes. Special software is used to interpret the sips and puffs and turn them into data the computer can use.
Mouse trackball: A stationary ball that can be spun in different directions to move the mouse. This allows users to move the mouse by making very small hand gestures.

3.1.6 Touchpads (or touch-sensitive pads) are small, square pads. By moving your ¬fingers across the touchpad, you can move the mouse pointer on the screen. Touch pads are useful to people who cannot hold a device such as a mouse in their hands but can press on the touchpad with a ¬ finger or an eraser pointer.

3.1.7 A pen input interactive pens, allow artists to create art as if they were using a pen and paper. Tablets are devices that can be used by people without hand function. This is done using a stylus or a splint that can be inserted into a vertical holder or strapped to the wrist.

3.1.8
a. Tablet, able to take pictures and connect to a network to upload to social media
b. Keyboard as it can be used to input the information
c. Head-mounted pointers, gesture-recognition devices, sip-and-puff devices, touchscreen, voice-recognition devices
d. Scanner
e. Interactive pen

3.1.9 Teacher discretion, learners need to support their answers and distinguish between input and output devices

3.1.10 Touch-sensitive pads, video input, scanners, capturing devices, data-collection devices, biometric input, card readers.

UNIT 3.2

Output devices

In this unit learners will be introduced to some output devices. Explain to them that an output device is any device that takes data stored on a computer and makes it available to a user. Output devices include things such as monitors, printers, projectors, speakers, etc.

Ask learners to work in small groups and assign one output device to each group. Each group must work through the text, and do a small presentation to the rest of the class, whereby they name their input device, explain what it is used for, explain how it is used, and explain its definining characteristics.

Allow the other groups to ask questions and give the group that is presenting guidance when needed. Once complete, ask learners to complete Activity 3.2 on page 74 of the Theory Book.

Activity 3.2 Memorandum

3.2.1 c - A tiny dot of colour on the monitor.

3.2.2 c - PPM

3.2.3 Evaluating the quality of speakers can be difficult. One measure we can use is the number of speakers. By having more than one speaker, you can accurately reproduce surround sound.

3.2.4 **a.** and **b.**

PRINTER	HOW DOES THE PRINTER WORK?	WHAT IS IT USED FOR?
Dot-matrix printer	These printers use a series of small pins to strike a ribbon coated with ink, causing the ink to transfer to the paper at the point of impact.	Used in banks and manufacturing businesses
Inkjet printer	An inkjet printer operates by painting an image using a spray of ink. This is done by hundreds of tiny nozzles that spray drops of ink directly onto the paper while moving across it.	Continuous printers usually used for commercial purposes; and on-demand printers used for smaller jobs
Laser printer	These printers use electrostatic technology. To start the process, the drum is given a positive electrical charge and while it rotates, the printer shines a narrow laser beam over its surface, drawing or projecting the letters and images to be printed as a pattern of electrical charges onto the surface of the drum. When the pattern is set, the drum is rolled in toner, which sticks to certain parts of the drum, that is, the image. When rolled over a piece of paper, this image is 'burned' into the paper with heat and pressure. When the printing is done, the electrical charge is removed from the drum and the excess toner is collected.	Used for mass production printing
Inktank printer	These printers have print heads built into the printer and use an integrated bulk ink system. This means that ink is supplied continuously to the print head from an ink tank within the printer itself. When the ink is finished, it can be refilled from an ink bottle.	Used for high volume printing

c. Factors to consider when looking for a printer are whether it is black and white and/or colour, how quickly it can print, and how much it costs to print a page. Dots per inch (DPI) measures how many dots a printer can print in one inch (or 2.54 cm). The higher the DPI, the more detailed the prints. Pages per minute (PPM) measures how many pages of black text a printer can print in a minute. The higher the PPM, the faster the printer can print.

3.2.5 a. speaker
b. printer
c. data projector

3.2.6 Laser printers are used for mass production printing because they are generally faster and more reliable but with worse quality prints. Or on-demand printers used for smaller jobs.

3.2.7 VGA is an analog video-only connection and HDMI is a digital video audio connection.

3.2.8

Closed-back headphones	It creates an isolated audio experience so that only you can hear the sounds you want to hear
In-ear headphones	Known for portability, versatility and convenience. They go a little more deeply into the ear to provide comfort, sound isolation, and sound accuracy
Bluetooth headphones	Offers wireless connectivity to various devices through radio transmitter technology (RF). They have a smaill computer chip inside of them that allow you to pair with the device you are playing music from.

3.2.9 An interactive whiteboard is both an input and output device because a person needs to input information for the interactive white board to output, by displaying, the information.

UNIT 3.3

Storage devices

Ask your learners to read page 76 and 77 ahead of the lesson. This unit describes the different storage devices, their uses and their functions. Instruct learners to draw a mindmap for the different types of storage devices, which they should be able to use to teach someone else. Once you are satisfied that all learners understand the work in this unit, ask them to complete Activity 3.3 on page 78.

Activity 3.3 Memorandum

3.3.1

TYPES OF STORAGE AND DEFINITION	USE	FUNCTION
Hard Disk Drive (Hdd) is a computer hard disk drive is a secondary storage device consisting of magnetic disks or platters that rotate at high speed.	Has huge storage space and are either internal (¬fixed), or external (portable)	To store data permanently by controlling the positioning, reading and writing of data onto the hard disk.
Portable (or external) hard drives are used outside of the computer case.	A lot easier to move around and they can quickly be connected to different computers. They are sensitive to rough handling.	To transfer large amounts of data or backing-up data outside of your computer.
Solid-state drives (or SSDs) are a type of storage device that do not have any moving parts. Instead, SSDs make use of special floating gate transistors to store data electronically.	Solid-state drives (SSDs) are generally many times faster than normal hard drives. Since SSDs have no moving parts, they are much quieter, more reliable and robust than HDDs.	They also generate less heat, thus increasing their life span, and uses less power than an HDD, which means they are more suitable for mobile devices.
Hybrid storage device is a storage device that combines an HDD with an SSD.	By doing this, the hybrid storage device can take advantage of the storage capacity of the HDD as well as the speed of the SSD.	Hybrid drives work by storing commonly used files that require high speeds (such as operating system files) on the faster SSD storage, while storing large, less commonly used files (such as media files) on the high capacity HDD.
Flash drives are very small, portable storage drives that store information using a similar method to SSD.	Flash drives connect to a USB port, which makes it easy to transfer data quickly between devices.	
SD/Memory cards (especially MicroSD cards) are tiny electronic storage devices.	Because of their small physical size, SD cards are often used in portable devices such as smartphones, tablets and cameras.	To provide storage capacity.
CDs (compact discs), DVDs (digital versatile disc) and Blu-ray discs are popular portable forms of storage that can be read using a dedicated CD, DVD or Blu-ray drive.	The advantage of writing data to CDs or DVDs is that the discs are affordable. These optical drives are also backwards compatible.	These discs store information optically, which means the information is stored using lights or electromagnetic waves.

3.3.2 a. True. Because of the differences in storage capacity, portability and speed, different storage devices are generally used for different reasons.

b. False. When evaluating any storage device, you must take its volatility into consideration. This determines if the device will lose the data when turned off.

c. True. An internal hard drive is the main storage device in computers due to its high speed, high storage capacity and low cost per storage space.

d. False. Flash drives are very small, portable storage drives that store information using a small SDD.

3.3.3 a HDD for the space

b. HDD better for storage

c. HDD as it keeps the data even when turned off

d. SDD improve the performance of certain programs

e. SDD cheaper

3.3.4 A hybrid storage device is a storage device that combines an HDD with an SSD. By doing this, the hybrid storage device can take advantage of the storage capacity of the HDD as well as the speed of the SSD.

3.3.5 Backwards compatible means that a newer optical drive (like a Blu-ray drive), can read all older optical forms (like CDs and DVDs). However, an older optical drive (like a CD drive) can only read CDs.

3.3.6 a. Flash drive for mobility

b. HDD has the storage

c. SDD to improve the performance of certain programs

3.3.7 a. External hard drive

b. SDD They generate less heat, thus increasing their life span, and uses less power

c. i. HDD for space

ii. SDD to improve performance of certain programs

iii. Memory card for mobility and it has space

UNIT 3.4

Motherboard

Refer learners to page 79 of the Theory Book. The unit starts off with an introduction to the motherboard and explains its functions. Allow learners to work hands-on with a motherboard and ask them if they can identify the different slots as shown in Figure 3.13.

Next ask them what they think a processing device is. Write their answers on the board, then compare it to the defintion in the Theory Book. Learners need to understand the differences between a CPU and a GPU, as well as their different roles in a computer system.

Learners will then be introduced to the concept of memory and will learn to differentiate between memory and storage. On page 80 of the Theory Book, these two concepts are clearly explained. Guide your learners to ensure their understanding.

Once complete, ask learners to complete Activity 3.4 on page 81 of the Theory Book. Moderate their work.

Activity 3.4 Memorandum

3.4.1 1G; 2C; 3A; 4B; 5I; 6E; 7D; 8H; 9F

3.4.2
- **a.** True. The function of the motherboard is to provide a place for other devices or interfaces to be installed.
- **b.** False. By adding multiple cores to a CPU, the processing power available to the computer can increase dramatically.
- **c.** False. All the arithmetic and logical operations are performed on the data that is available in the CPU and sent back to the main memory after processing is done.
- **d.** True. RAM provides space for your computer to read and write data to be accessed by the CPU.

3.4.3
- **a** Mouse – Input devices
- **b.** GPU – Processing device
- **c.** Monitor – Output devices
- **d.** Touchpad – Input devices
- **e.** Speakers – Output devices
- **f.** CPU – Processing device
- **g.** Keyboard – Input devices

3.4.4
- **a** Yes, it can use the CPU
- **b.** It is the processing unit
- **c.** It has more working memory and will be able to process data quicker.

3.4.5
- **a** Graphics processing unit
- **b.** It is responsible for creating and doing the calculations needed to display images on the screen.
- **c.** Graphics uses more processing power as it has more algorithms and data to process.
- **d.** **i.** GPU
  ii. CPU

3.4.6 The computer's main memory is the RAM. You can think of RAM as a workspace or workbench the computer uses to get work done. When you double-click on an app, or open a document or do almost anything on your computer, RAM gets used to store the code of the app and the data while the processor (CPU) is working on it. The storage unit i.e. HDD, SSD or Flash drive, by contrast, is the cupboard or storage shelf you might use to permanently store your tools, apps, data and completed work. So, when the task is complete and you click save in the app, the resulting output is stored permanently on the storage unit.

UNIT 3.5

Comparing a computer to a mobile device

Explain to learners that smartphones/tablets, etc. (mobile devices) are all types of computers that people carry with them. But how do these mobile devices compare to the modern computers? This unit compares mobile devices to desktop computers by looking at input devices, output devices, storage devices, processing devices, and connectivity options.

Begin this unit with learners comparing a computer to a mobile device on the board. Then work through the information and discuss the different comparison tables. Ask learners whether they think mobile devices will ever be able to replace computers.

Once complete, ask learners to complete Activity 3.5 on page 85 of the Theory Book.

Activity 3.5 Memorandum

3.5.1

	DESKTOP	MOBILE DEVICE
Input devices	• Keyboard is full size • Can includes mouse, touchpad, touchscreen, stylus • Cameras, microphone and biometric devices can be purchased as extra	• Small, touchscreen keyboard (USB On The Go (OTG) or Bluetooth) • Can include touchscreen, stylus • Cameras, microphone and biometric devices (only some models) are built-in
Processing devices	• CPU is built-in • GPU is built-in or can be purchased as extra • RAM is built-in	• CPU is built-in • GPU is built-in • RAM is built-in
Output devices	• Monitor is 19" – 34" • Speakers can be purchased as extra	• Monitor is 3" – 6" • Speakers are built-in
Storage devices	• Internal storage is large and built-in, HDD or SSD • External storage can be purchased as extra • CD/DVD can be purchased as extra or built-in	• Internal storage is very small built-in NAND chips • External storage can be purchased as extra • CD/DVD can be purchased as extra

3.5.2 Accept all reasonable answers. Learners need to support their answers.
Here is a sample answer:
A desktop computer and a mobile device have similar components and processing devices the differences can be found in the capacities of the components.

1. b - Computer hardware refers to the physical parts of a computer and related devices.
2. a - It allows you to interact directly with your computer.
3. c - Monitor, speaker, CPU
4. c - A storage device that consists of moving parts and stores data permanently.
5. d - On a desktop monitor.
6. b - CPU
7. c - It temporarily saves data, serving as the computer's working memory.
8. a - Motherboard
9. c - It measures how many dots a printer can print in one inch (or 2,54 cm).
10. a - People with hand injuries can use it without difficulty.
11. Indicate whether the following statements are TRUE or FALSE. Write 'true' or 'false' next to the question number. Correct the statement if it is FALSE. Change the word(s) in bold text to make the statement TRUE. You may not simply use the word 'NOT' to change the statement. NO mark will be awarded if only FALSE is written down.
    a. False. A person can type slower on the keyboard of a smartphone that on a desktop computer's keyboard.
    b. True. External storage can be purchased for both desktops and phones, although it is more affordable for desktops.
    c. False. Smartphone processors are considerably slower than desktop processors.
    d. False. Smartphones have a lesser variety of ports for different devices than computers.
12. a. Dual device can enter data into computer as well as we can output data from the computer to outside world.
    b. Touch screen monitor, interactive white board
13. An interactive whiteboard is both an input and output device because a person needs to input information for the interactive white board to output, by displaying, the information.
14. Touch screen - Entering commands by voice. Through variations in the device's touch sensor technology such as resistive touchscreens, capacitive touchscreens, infrared touchscreens and surface acoustic wave (SAW) technology
    Optical readers are devices that can read data from a physical object (such as, a QR code, barcode or a magnetic strip) into a computer.
    Microphones allow you to record sounds and interact with a computer using your voice.
15. a. How will you explain to Peter what FIVE of the important characteristics of a monitor are and how they affect the quality of the monitor?
    - Number of pixels: Each pixel can be seen as a tiny dot of colour on the monitor. Pixels put together creates the picture that we see on the monitor. The more pixels there are, the more detailed a picture can be. A good monitor is a full HD monitor with 1 920 pixels across the width of the monitor by 1 080 pixels across the height of the monitor.
    - Screen size: The size of a monitor is measured diagonally (that is, from the top left corner to the bottom right corner) and the size is given in inches.
    - Refresh rate: The refresh rate of a monitor determines how quickly the image on the monitor can be updated with the newest information. Most monitors have a refresh rate of 60 Hz.
    - Contrast ratio: A measure of the number of shades the monitor can show between its blackest black and brightest white. The higher the number of shades, the clearer and sharper the images will be, and the brighter and truer to life the colours will be.

- Aspect ratio: This is the basic shape of the screen based on the ratio of the width to the height measured in inches. For example, if a screen is 16 inches (40,6 cm) wide and 10 inches (25,4 cm) tall, the aspect ratio is 16:10.
- Brightness: Brightness is the perception of how intense or bright the light coming from a screen is. The brighter the light, the more power will be drawn from the computer.

b. Teacher discretion, learners need to support their answers; number of pixels and screen size

16. a. The size of a monitor is measured diagonally (that is, from the top left corner to the bottom right corner) and the size is given in inches.

b. Computer B: 24" Monitor, 1920 × 1080 Resolution

c. 3.6 GHz

d. GHz

e. Storage

17. Here is the completed table for categorising hardware:

HARDWARE	EXAMPLE OF TWO DEVICES
Input	Alternative keyboards, pointing devices, touch-sensitive pads, pen input, video input, scanners, capturing devices, data-collection devices, biometric input, card readers
Output	Display devices (LCD, LED), printers (inkjet, inktank, laser, 3-D), data projectors (VGA, HDMI), headphones
Storage	Hard drives (fixed and portable), USB flash drives, solid-state drives (SSD), memory cards, optical disks (DVD and Blu-ray drives)
Processing	General function of GPU, Motherboard, CPU and RAM

18. a. Data-collection device can obtain data directly from a location where an event or transaction takes place obtain a lot of data directly from a location where an event or transaction takes place, store it and be used later.

b. Which input devices could you use to capture the following information:

i. camera

ii. microphone

iii. camera

c. There is a limited number of options available when using a touchscreen. Ergonomically it is not suited for entering large amounts of data. The screen can get damaged and dirty due to constant touching. Touchscreens for computers are more expensive than standard computer screens.

BASIC CONCEPTS OF SOFTWARE

CHAPTER 4

CHAPTER OVERVIEW

The following learning outcomes are covered by this chapter:

- define system software
- identify the different types of operating systems
- describe the role of different types of system software.

GRADE: 10	DATE:	TEACHING TIME: 4 hours
Resources	Each learner should have access to: • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • GUI (or graphical user interface) – a visual way in which users can interact with a computer (including windows, buttons, menus, images and text) • stand-alone operating system – the ability to consistently perform according to its specifications • proprietary software – the ability to consistently perform according to its specifications • shareware – how long something can last • freeware – a device that makes use of touch • open-source software – thin paper coated with carbon or another pigmented substance, used for making a second impression of a document as it is being written or typed • network or server operating system – uses stationary electric charges instead of electric currents • embedded operating system – a very fine, dry, black powder-type of ink	

INTRODUCTION

In 1975, Bill gates and Paul Allen, two young computer programmers, wanted to get a programming language, BASIC, to work on what was then the best computer, the Altair 8800. At the time, programs for the Altair had to be written manually turning certain switches on or off. By creating an interpreter of the BASIC language, people would be able to create programs on the Altair 8800 by writing it using a keyboard. The interpreter would then convert the program written in BASIC to a machine language that the Altair could understand, which allowed the Altair to follw the instructions from the program. Bill Gates and Paul Allen continued working on their BASIC interpreters, allowing them to communicate with different types of hardware. This eventually became MS-DOS, one of the first successful operating systems developed for home computers.

To use MS-DOS, computer users had to learn how to navigate their computer using text commands and a keyboard. Whereas previous programs had to be developed for a specific computer, MS-DOS worked on different computers with different types of hardware. It also managed a lot of the hard work, such as storing files, managing memory and allowing the different hardware components to work together.

However, by 1990 Microsoft realised that most computer users do not want to learn hundreds of text commands to manage their computers. Microsoft then developed Windows 1.0, Windows 2.0 and eventually Windows 3.0 and Windows 3.1. These operating systems introduced many features still used in Microsoft Windows today, including icons for applications, a file manager, and double clicking on a file to open it.

In this chapter learners will be taught about system software and operating systems such as Microsoft Windows. They will learn what their different functions are and how they help users operate their computer.

UNIT 4.1

System software concepts

Explain to learners that system software is the specific type of software that manages a computer. Much like a traffic officer on a busy intersection, the system software manages the flow of data and information on a computer. It does this in several important ways, including:

- translating the instructions from the software to a language the hardware can understand
- sending these instructions to the correct hardware
- receiving information from the hardware (such as button presses on a keyboard) and sending it to the software
- allowing different applications to speak to each other
- making sure all the hardware and software on your computer are in a good condition.

Explain to learners that the most important type of system software is the operating system, which fulfils many of the tasks of system software on its own. The operating system is the system software that controls the hardware, provides a user interface for users to interact with, and manages the resources of the computer.

Work through the concepts on page 90 of the Learner's Book. Once complete, ask learners to complete Activity 4.1 on page 91 of the Theory Book.

Activity 4.1 Memorandum

4.1.1 Input devices are any hardware devices allowing you to input data into a computer or interact with a computer.

Hardware management	Managing the interaction between hardware and software, as well as the different hardware devices.
Graphics User Interface (GUI) management	Provides and manages the user interface that interacts with graphics and visual content on a computing device.
I/O management	Managing the signals received from an input device and sending the correct signals to an output device.
Process management	Managing the applications and the resources used by applications (Apps) on a computing device.
File management	Managing the storage of ¬ files and folders on your storage device.
Memory management	Managing the data stored on a computing device's memory and once the processing is complete, this function tends to free up some space.
Disk management	Used to manage the drives installed in a computer e.g. partition drives, format drives, assign drive letters.
Storage management	Processes used to improve the performance of data storage resources.

4.1.2 Teacher discretion, so you can see how recent a file or change was made

4.1.3 Observe learners as they independently complete the tasks, using a checklist if necessary.

UNIT 4.2

Types of operating systems

Explain to your learners that there are three main types of operating systems:

- **stand-alone operating systems** – this is the most commonly used operating systems, such as Microsoft Windows, MacOS, Adroid and Ubuntu. These operating systems can work directly on computers or mobile devices to ensure that the tasks of an operating systems are completed. Almost all home computers, office computers and mobile devices use stand-alone operating systems.
- **network operating systems** – this is an operating system that is not designed to be used on their own, but rather to help other computers on a network. Any computer connecting to the same network could then gain access to the internet, send emails, store files, authenticate their products or use certain software. Network operating systems form the backbone of the world's largest network: the internet. Practically all websites are hosted on a network operating system. This is because the computers hosting these websites are not meant to be used on their own, but rather, the services (or website) they provide are meant to be used by other computers. In 2017 computers used as network servers consumed roughly 3% of all the electricity generated in the world. Researchers are worried that this could become as much as 20% of the world's electricity by the year 2025.
- **embedded operating systems** – this operating system is designed to be used on a single device for a very specific purchase. Open-source operating systems such as Android and Linux are the most popular embedded operating systems, since companies who need an embedded operating system can start with the source code of Android and Linux and simply modify it to suit their purpose.

Work through the concepts on page 92 of the Learner's Book. Once complete, ask learners to complete Activity 4.2.

Activity 4.2 Memorandum

4.2.1

a. A network operating system helps computers work together on a network.

b. A stand-alone operating system is an operating system that is designed to be used on its own.

c. Embedded operating systems is designed to be used on a single device with a very speci¬fic purpose.

4.2.2

OPERATING SYSTEM	DESCRIPTION OF THE SYSTEM	EXAMPLE
Stand-alone operating systems	Function directly on computers to ensure that the tasks of an operating system are completed	Microsoft Windows, Linux, iOS and Android.
Network operating systems	Designed to help computers work together on a network	Windows Server, Red Hat Enterprise, Ubuntu Server and UNIX
Embedded operating systems	Designed for a specific purpose and used to make life easier	GPS, Smart TV

UNIT 4.3

Utilities and drivers

Explain to learners that most operating systems include several different utilities and drivers. These are small programs that help users to maintain their computers.

On page 93 of the Theory Book, we have listed some of the commonly used utilities. Work through these with your learners instruct them on how to open the device manager in order to explore the different devices on their computers.

On page 94 of the Theory Book, we have explained why drivers are important and how learners can install new drivers on their systems. If possible, provide a new driver that each learner will need to install on their systems. First demonstrate how to install a device driver before letting learners install the driver on their system. Be available to help any learners who may struggle.

Also explain the difference between an automatic driver installation and a manual driver installation. Show learners how they can search for a specific driver on the internet.

Once complete, instruct learners to complete Activity 4.3 on page 95 of the Theory Book.

Activity 4.3 Memorandum

4.3.1 Designed to help analyse, configure, optimise or maintain a computer

4.3.2
a. Antivirus
b. Device manager
c. Disk cleaner
d. Backup software
e. System

4.3.3 A device driver is software that contains a set of instructions that command a computer's operating system on how to communicate with the hardware so that it can function properly.

4.3.4 Device drivers allow communication between the operating system and all the devices

4.3.5 Learners need to illustrate the following steps.

- **Automatic driver installation**
  The operating system locates the correct driver for the identi¬fied device in its driver database. Then it installs them automatically, allowing the computer to communicate with the new device without having to reboot the computer.
- **Manual driver installation**
  If a driver is not available from the operating system, a manual installation is required. A manual installation is usually done in Windows via the device manager or the ¬ le set-up. This can be found on the hardware's accompanying DVD or downloaded from the manufacturer's website. The DVD will include the driver for that hardware, and it will allow it to function and communicate with the operating system.

1. c – all of the above.
2. b – a utility programme
3. a – a stand-alone operating system
4. a – HDD
5. c – Both A and B.
6. c – explain to your operating system how to communicate with the software device and make it function properly.
7. a – Stand-alone systems
8. a – Process management system
9. 1.F, 2.D, 3.E, 4.G, 5.H, 6.C, 7.A, 8.B
10. a. False. The file manager makes sure that files are stored correctly.
    b. True. File managers allow users to manage files that are stored on their computers.
    c. False. Stand-alone operating systems form the backbone of the internet.
    d. True. RAM is responsible for keeping information that the computer is currently using.
11. Device drivers allow communication between the operating system and all the devices.
12. a. i. Computer 1
        ii. It has 1 TB HDD, the HDD stores more data
        iii. The operating system manages the data stored on a computing device's memory and once the processing is complete, this function tends to free up some space.
    b. Random-access memory (or RAM), is physical hardware that temporarily saves data. It serves as the computer's 'working' memory. Solid-state drives (or SSDs) are a type of storage device that, unlike hard drives, do not have any moving parts. HDD main function is to store data permanently by controlling the positioning, reading and writing of data onto the hard disk.
    c. Device drivers allow communication between the operating system and all the devices
    d. A system software is a specific type of software that manages a computing device.
    e. i. Stand-alone operating system
        ii. An operating system is software that manages hardware, software and other applications on a computing device.
        iii. Antivirus, backup software, device manager, disk cleaner, file manager, system monitor
    f. i. Computer 1
        ii. Norton antivirus standard

NETWORKS

CHAPTER 5

CHAPTER OVERVIEW

The following learning outcomes are covered by this chapter:

- describe a network
- describe reasons for using networks
- identify advantages and disadvantages of networks
- list the essential basic network components
- provide an overview of different communication media (wired/wireless)
- describe different types of networks
- differentiate between client-server and peer-to-peer networks
- explain the reasons for logging into a network and connecting to a server.

GRADE: 10	DATE:	TEACHING TIME: 2 hours
Resources	Each learner should have access to: • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • local area networks (LANs) – a computer network that covers a small area like a home, office or building. The network usually has a limited number of computers on it (between 2 and 25), although there is no absolute limit • wide area networks (WANs) – a network that covers a large area. This could include all the people in a suburb or city, but it is most often used to refer to the internet, the world's largest WAN • LAN party – describes a get together of individuals and their computers. To play network games with other individuals • access control – any system designed to prevent and restrict access to specific users	

INTRODUCTION

The internet is one of the most powerful inventions humans have ever come up with, and it all started with the letters LO...

On 29 October 1969, once computer was successfully linked via a network to another computer for the first time. The first message sent over this network was supposed to be the word LOGIN, but the system crashed after the first two letters, so only the L and O were sent.

While sending two out of five letters may not sound like an important event, by 1975 this computer-to-computer link was known as ARPANET and plans were already in place to connect it to other, similar networks around the world. A proposal from 1974 called this network of networks the ***internet***.

Twenty years after the word internet was first used, it carried 1% of the world's telecommunications. But by 2007 – just 14 years later – the internet carried 97% of all telecommunications in the world.

UNIT 5.1

Uses of networks

Explain to learners that network can be used in homes, schools and businesses. The reasons for using networks include sharing resources, connecting people, organising information and accessing entertainment.

On page 100 - 101 of the Theory Book, we have listed the uses of networks. Assign one use to five different groups and ask them to do some research, either around school or on the internet about how their particular use is being implemented. Explain to them that each group will report back on their findings. They can use a video presentation or a poster with photographs or drawings of their findings.

Extension

What is cloud computing

One interesting way in which software or hardware can be shared on a network is called cloud computing. With cloud computing, people can pay money to use online services.

Ask learners to work in pairs to find out which services are available via cloud computing. They should submit a two-page report on their findings, explaining what the service is, how much it costs, whether it is worthwhile investing in and if they think it is a viable service.

Learners must hand in their reports to you for assessment.

Ask learners to complete Activity 5.1 on page 102 of the Theory Book.

Activity 5.1 Memorandum

5.1.1 1-D, 2-E, 3-B, 4-A, 5-G 6-H, 7-F, 8-C

5.1.2 Teacher discretion, learners can include the following:

Advantages

- allows people to be more productive.
- connects individuals to friends, family and colleagues who are located in a different region, province or even country.
- increases opportunities for self-improvement by providing access to knowledge and information.

Disadvantages

- can expose you to online crimes such as, identity and credit card theft; and scams such as, email phishing.
- can expose you to cyberbullying and abuse (especially on social media platforms).
- can be addictive and waste large amounts of time.

5.1.3 **a.** Teacher discretion, must relate to the case study. Here are some examples that learners could include:

- allows people to be more productive.
- connects individuals to friends, family and colleagues who are located in a different region, province or even country.
- increases opportunities for self-improvement by providing access to knowledge and information.

b. **i.** Increased productivity

ii. Communication

iii. Leisure

c. Sharing resources, centralisation of data, transfer of files, increased productivity

d. Teacher discretion, learners can include a recent example of a project that they worked on.

5.1.4 **a. – c.** A network will be beneficial because it will allow the schools to collaborate more easily; share files, thereby preventing work from being duplicated; share resources and information; quickly find answers to the schools' questions by centralising useful information.

UNIT 5.2

Components of a network

Explain to your learners that in order to set up a network, there are certain components you will need. On page 104 of the Theory Book we have highlighted these components. Learners will benefit from working hands-on with the different components, so allow them to identify, inspect and work with each one.

Explain the difference between a wired and wireless network. Ask: 'Do you think the school runs on a wired or wireless network? Why do you say so?'

Work through the table on page 105 of the Theory Book with your learners. This table compares different communications media.

Extension

Wired or wireless?

Ask learners to work in groups and build a model of a three-bedroomed house. They then need to decide whether they will connect the house using a wired or wireless network.

They need to consider the following:

- what equipment they would use
- the speed they network would need in order to work optimally
- how many computers or devices they would connect to the network
- how many wireless adapters or network cables they would need.

Learners must hand in their models for moderation.

Ask learners to complete Activity 5.2 on page 106 of the Theory Book.

Activity 5.2 Memorandum

5.2.1

- Nodes (printers, servers, workstations (PC's or laptops), computing devices)
- Network Interface Controller (NIC) (wire and wireless)
- Communication media (wired and wireless), this refers to the physical channel through which data is sent and received.
- Network Operating System (NOS), a specialised operating system that allows additional security and settings.

5.2.2 A wired network is a network that uses a physical media to transfer data between two or more nodes. A wireless network is a network that uses non-physical components to transfer data between two or more nodes.

5.2.3

a. Radio waves
b. Fibre optic
c. UTP
d. IR technology

UNIT 5.3

Types of networks and client-sever and peer-to-peer networks

In this last unit of Chapter 5, learners will be taught about the different types of networks. These include:

- Personal Area Network (PAN)
- Home Area Network (HAN)
- Local Area Network (LAN)
- Wide Area Network (WAN)
- Client-server network
- Peer-to-peer network.

Work through these concepts with your learners, looking at the differences, similarities and reasons for using a particular type of network.

Once complete, ask learners to complete Activity 5.3 on page 111 of the Theory Book.

Activity 5.3 Memorandum

5.3.1 A local area network (or LAN) is a computer network that covers a larger area like an office or a bigger premises. These computers can be connected to the network using either a wired or wireless connection media. Once connected, the computers on the network can share resources, information, transfer files and communicate with each other via email or web-based instant messaging channels.

5.3.2 A wide area network is a network that covers a very large area – that could include all the people in a suburb, city or country. A personal area network (or PAN) is a computer network that only covers a very small area.

5.3.3 In a peer-to-peer network, each computer on the network connects directly to the network and to the other computers on the network. However, each computer has its own security.

5.3.4 Peer-to-peer networks share files and resources.

5.3.5 This type of network requires one or more servers to manage a client-server network. These servers ensure that authorised users have access to the correct resources.

5.3.6 Teacher discretion as there are a few advantages and disadvantages.

Advantage: Once connected, the computers on the network can share resources, information, transfer files and communicate with each other via email or web-based instant messaging channels.

Disadvantage: The network LANs usually have a limited number of computers connected to them and they are private.

5.3.7 A local area network (or LAN) is a computer network that covers a larger area like an office or a bigger building. A wide area network is a network that covers a very large area – that could include all the people in a suburb, city or country.

5.3.8 WANs are not private

5.3.9

a. Peer-to-peer network; peers on this network are visible to each other and can share files and resources with each other.

b. Client-server network; it ensures that authorised users have access to certain resources when logging on to a network.

c. Peer-to-peer network; peers on this network are visible to each other and can share files and resources with each other.

d. Client-server network; it ensures that authorised users have access to certain resources when logging on to a network.

1. A computer network refers to a group of two or more computing devices that are connected by a communication medium allowing the computers to communicate electronically.
2. Teacher discretion, answers must be supported.
   Communication, accessing resources, centralisation of data, transfer of files, increased productivity, leisure
3. Answers are subjective, can include:
   - allows people to share resources and expensive devices.
   - connects individuals to friends, family and colleagues who are located in a different region, province or even country.
   - increases opportunities for self-improvement by providing access to knowledge and information.
4. a. Illustrate and label the network connections and components.
   b. A wired network is a network that uses a physical media to transfer data between two or more nodes. A wireless network is a network that uses non-physical components to transfer data between two or more nodes.
5.

DEFINITION	COST	ACCESSIBILITY	COVERAGE	SECURITY
UTP uses electricity to move the signals from a sender to a receiver.	The most popular type of cabling because of the material used to set it up is relatively cheap.	Relatively simple to install, with minimal equipment and technical expertise.	It can only connect devices up to 100 metres.	Prone to electrical wave interference and has was security.
Fibre optic: uses light to move the signal from the sender to a receiver.	The material (a transmitter, cable and a receiver) used and the installation is expensive.	Difficult to install due to equipment and technical expertise.	Fibre optic covers long distances.	Immune to electromagnetic interferences and it carries a low security risk.
Radio waves: uses radio waves.	Relatively cheap to install and minimal expertise required to set up.	Relatively simple to install, with minimal equipment and technical expertise.	Can cover very short to very long distances depending on the device used.	Prone to interference and security risks are influenced by the device used.
Infrared technology	No cost involved	Allows computers and other electronic devices to communicate via short-range light signals.	Limited to very short distances.	Carries a low security risk.

6. Client-server network requires one or more servers to manage a client-server network. In a peer-to-peer network, each computer on the network connects directly to the network and to the other computers on the network.
7. Accessing resources, centralisation of data, transfer of files, increased productivity

8. a. Teacher discretion, must relate to the case study
   - i. Accessing resources, centralisation of data, transfer of files, increased productivity
   - ii. The school can act as server and manage the security
   - iii. Visibility and connectivity to a shared network, competitors can gain insight to how their business works

   b.
   - i. It should be kept away from electrical waves because it might interrupt connectivity. It also cannot connect devices beyond a certain distance.
   - ii. Light
   - iv. Fibre optic covers longer distances, it is resistant to electromagnetic interferences, and it carries a low security risk.

   c.
   - i. Nodes (printers, servers, workstations (PC's or laptops), computing devices)
     Network Interface Controller (NIC) (wire and wireless)
     Communication media (wired and wireless)
     Network Operating System (NOS).
   - ii. Advantages of wireless: easy installation, network planning, location, mobility, price
     Disadvantages: Easily hacked, slower, needs radio frequency
     Advantages of a wired network: easy to set-up, reliable connection, faster, security is better
     Disadvantages: lack of mobility, only connect to one device, cables can be easily damaged, expanding network can be costly

TERM 2

CHAPTER 6

ELECTRONIC COMMUNICATION

CHAPTER OVERVIEW	
Unit 6.1	Electronic communication tools
Unit 6.2	Email as a form of communication
Unit 6.3	Social implications

The following learning outcomes are covered by this chapter:

- describe electronic communication
- describe the applications/tools that facilitate e-communication
- use email as a form of e-communications
- explain the social issues pertaining to ergonomics, green computing issues and health issues
- explain the social issues pertaining to e-communication.

GRADE: 10	DATE:	TEACHING TIME: 4 hours
Resources	Each learner should have access to: • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • social network – a network of individuals, like friends, acquaintances, and coworkers who are connected by interpersonal relationships • green computing – the environmentally responsible and eco-friendly use of computers and their resources	

INTRODUCTION

More than 100 years ago during the first world war, an army lawyer from the United States, called Edwin McNeil, was stationed in France for a period of two years. During that time he exchanged more than 100 letters with his wife. While the two spoke about everything in their day-to-day lives, one of the most frequent topics was about the problems Major McNeil experienced with mail. Mail from his wife often took months to reach him, and two and a half months after reaching France, McNeil had still not received books he needed in order to do his work.

In our modern world, a situation such as Major McNeil's is almost impossible to imagine. No matter where people travel today, they can make video call, send Snapchat messsages, and leave voice notes for their loved ones. For many people these days, one of the most exciting parts of travelling is the ability to share their experiences and photos with friends and family across the world using social networks.

Where Major McNeil was resigned to waiting more than tow months for a letter... then only to realise that many of the letters from his wife had been lost in the post... we get frustrated when a WhatsApp message does not go through immediatel, or we get nervous when our message is marked as read and we have not received a reply in 10 minutes!

Thanks to computers and the internet, there are thousands of different ways to communicate today, from uploading videos on YouTube, to posting a 140-character tweet on Twitter. How we experience communication today is vastly different to how people experienced communication 100 or even 20 years ago.

UNIT 6.1

Electronic communication tools

In this unit learners are taught about some of the different electronic communication tools that are available for us to use. They are given an overview of the following:

- email
- web browsers
- file transfer protocol (FTP)
- instant messaging
- chat rooms
- voice over internet protocol (VoIP)
- video calls
- blogs
- vlogs
- webinars

Work through each type of electronic communication and allow learners to find different examples of each one. They can do this in pairs or in small groups (depending on the size of your class).

As a chance for learners to showcase what they have learnt, you can suggest they create a class blog, vlog or online chatroom. You can decide what topics they need to discuss, or perhaps you can suggest that they use it as a platform to help one another with the practical part of this course. However, you need to supervise their efforts closely to ensure no bullying or inappropriate content is shared.

Once you have covered the work in this unit, ask learners to complete Activity 6.1 on page 117 of the Theory Book.

Activity 6.1 Memorandum

6.1.1 1-D, 2-F, 3-A, 4-E, 5-B, 6-G, 7-H

6.1.2

a Knowing how much data you have and when would be cheaper to call

b. Voice over internet protocol

c. The quality of VoIP calls depends on your internet connection. Users need to have the same application.

d. Three ways in which email can be used are:

- sending out marketing communication to potential clients
- communicating within and / or between businesses
- sending messages to many different people simultaneously.

e. File transfer protocol (FTP) is a standard network set of rules used to transfer computer files and directories between a client and the server on a computer network.

f. This means that one can surf the net for free at night, can go on the Internet without paying. It depends if this is what your grandfather enjoys doing.

g. No, depends if fibre optics have been installed in the area.

UNIT 6.2

Email as a form of communication

Remind learners that email was one of the first forms of internet communication. In Unit 6.1 they learnt about the different ways in which email can be used. These included keeping in touch with friends and family, sending marketing messages to potential clients, communicating within a business and sending message to many different people.

In this unit, learners will be about the components of an email address, different email accounts, parts of an email and how an email works. Work through the content with your learners, and if they have not already done so, allow them to set up their own email address. Guide them through this.

Extension

Crashing a network with emails

In 2018, a student at a university accidentally sent an email to every student, lecturer and employee of his university. The incredible number of emails sent and received at one instant almost crashed the university's network.

However, the real problem started when recipients of the email started replying to the email and, instead of replying only to the sender, sent their response to everybody who received the email as well.

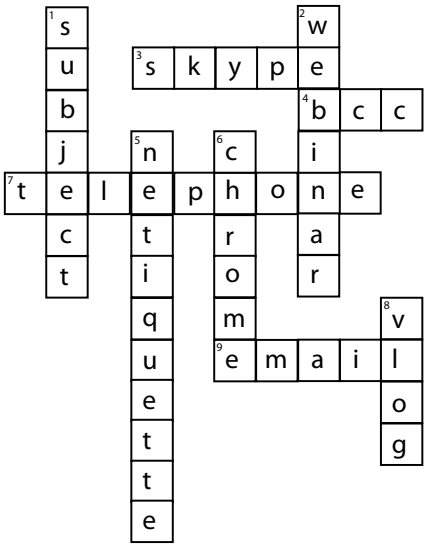
Because of these emails being sent to thousands of people multiple times, the university's email server crashed, and all messages linked to the email had to be blocked before the server could come back online.

Ask learners to work in groups to talk about why they think this could have happened. How can a big institution like a university avoid this sort of situation from occuring?

Ask learners to complete Activity 6.2 on page 124 of the Theory Book..

Activity 6.2 Memorandum

6.2.1



6.2.2 a. Internet service provider, data plan

b. Advantages and disadvantages of the two types of email accounts:

SERVICE PROVIDER	ADVANTAGES	DISADVANTAGES
ISP	• The main advantage of having an ISP email account is the support that you get when something goes wrong	• An ISP provides a mailbox to end-users as part of their paid services. When using an ISP, your emails will be on the ISP servers. This means that you will have to connect to the ISP mail server to download your emails. If anything happens to these servers, there is no way you can get your emails until the problem is fixed. • If you have the wrong incoming or outgoing password, you will not be able to receive or send emails. • ISPs charge for their services. • Should you move or change your ISP, you will most probably have to get a new email address. • It may also have a limited amount of storage space for your emails and attachments
Web-based	• Does not charge for their services. • Webmail refers to any email service that you can reach through a web browser. It also means you can check for emails on any computer with a web browser installed, whether you are at home, at work or on holiday. • You can also keep the same email address, even if you change your ISP	• One of the main disadvantages is that it will send advertisements to your inbox to help cover their costs. Some services such as Gmail will look for keywords in your email messages and show you relevant advertisements.

c.

- Show people on the internet the same respect you would show to them in real life.
- Do not say things to people you would not say to them in real life.
- Do not post things on the internet that you would not want your mother or future boss to see.
- Things posted on the internet often last forever. This means that things you post as a teenager or young adult can negatively affect the rest of your life.
- Make sure your messages are clearly written and easy to understand.
- When joining an existing conversation, speak about subjects relevant to the topic.
- Try to make useful contributions and help people out on the internet.
- If you need help from the internet, do not expect other people to do all the work for you. Do as much work as you can before asking your question.
- See if there are existing conversations about your topic before starting new conversations.
- Do not spam people! Do not post the same advertisement repeatedly.

6.2.3 Install an antivirus.

UNIT 6.3

Social implications

In this last unit of Chapter 6, learners will learn about the health issues relating to the use of computers, ergonomics, and how the use of computers affects the environment. Explain the term, ergonomics to your learners. Ergonomics is the study of the way hums work with the goal of increasing productivity, comfort and safety. When we talk about computer ergonomics, we focus specifically on the way in which people use computers, and how this can be improved to make people more comfortable and reduce discomfort and injuries.

Ask learners what they think green computing is. Write down their ideas on the blackboard. Ask them to think about the effect that the use of computers are having on the environment and how they think they can reduce the negative effects – especially since the ICT industry is set to keep growing. Once complete, Instruct learners to complete Activity 6.3 on page 127 of the Theory Book.

Activity 6.3 Memorandum

6.3.1 1-F, 2-C, 3-AI, 4-AI, 5-E, 6-G, 7-J, 8-D

6.3.2 Teacher discretion, can include:

- Sit up straight with your back perpendicular to the ground.
- Your forearms should be at the same height as your mouse and keyboard.
- Your feet should be placed firmly on the ground or on a footrest.
- The back of your chair, height of your chair and height of your armrest should be adjusted to support your body in this position.
- Your monitor should be positioned at eye level and roughly 50_cm away from you. You may need to place something under your monitor to increase its height.
- Your monitor should be tilted upwards to reduce glare.
- You should stand-up and take regular breaks while using the computer.
- Sitting incorrectly, computer placed incorrectly, working continuously, glare of the screen should be reduced

6.3.3 **a.** Ergonomics is the study or science of how humans interact with man-made objects and then creating products to increase productivity, reduce discomfort and reduce injuries.

b. Through incorrect posture

c. The glare and strain on the eyes

d. Here are suggested answers:

- Sit up straight with your back perpendicular to the ground.
- Your forearms should be at the same height as your mouse and keyboard.
- Your feet should be placed firmly on the ground or on a footrest.
- The back of your chair, height of your chair and height of your armrest should be adjusted to support your body in this position.
- Your monitor should be positioned at eye level and roughly 50_cm away from you. You may need to place something under your monitor to increase its height.
- Your monitor should be tilted upwards to reduce glare.
- You should stand-up and take regular breaks while using the computer.

e. Teacher discretion, it could help with correct posture alignment

6.3.4 **a.** To reduce the environmental impact of the daily use of computers

b. Waste materials are non-biodegradable, high power devices affect the environment

c. You can conserve energy by:

- Using biodegradable materials
- Using low-power devices (LED screen, Solid-State Drives (SSD))
- Using a power management function on your computing device

6.3.5 Teacher discretion, the old mobile phone can be donated or disposed of correctly. One can check the packaging of the new mobile phone that it is 'green'

1. a. i – Allows you to see the person you are speaking to
   b. ii – Vlog
   c. iii – File transfer protocol
   d. ii – Email is more formal than messages
2. a. True. A **web browser** like Chrome or Firefox is designed to open and view websites.
   b. False. **Netiquette** is having good manners when communicating on the internet.
   c. False. **Webinar** is also used when lessons are presented over the Internet.
   d. False. A **blog** is a website where one person (or a small group of people) write regular articles about topics they are interested in.
   e. True. The first step to communicating electronically is to make sure you have an account with the online service provider you would like to use.
3. a. The quality of VoIP calls depends on your internet connection. Users need to have the same application.
   b. Offers real time text transmission, convenient, can be accessed wirelessly
   c. Chat rooms are tools that allow you to join a group online and then exchange messages (or chat) in that group. It is an e-communication tool as it is online
   d. Teacher discretion; information, activities
   e. i. An online network of individuals connected by interpersonal relationships, Facebook
      ii. Teacher discretion; communication, leisure
   f. i. Cc: (Carbon copy) - for recipients you are sending a copy to and you want everyone to see this
      Bcc: (Blind Carbon copy) - Put the email address here if you are sending your recipient(s) a copy and you do not want the other recipients to see that you sent it to this contact.
      ii. Learners' answers can include any of the following:
      - Show people on the internet the same respect you would show to them in real life.
      - Do not say things to people you would not say to them in real life.
      - Do not post things on the internet that you would not want your mother or future boss to see.
      - Things posted on the internet often last forever. This means that things you post as a teenager or young adult can negatively affect the rest of your life.
      - Make sure your messages are clearly written and easy to understand.
      - If you need help from the internet, do not expect other people to do all the work for you. Do as much work as you can before asking your question.
      - See if there are existing conversations about your topic before starting new conversations.
   g. Blogs (short for web logs) is an online platform that allows text and picture content to be created and shared with other people.
   h. A webinar is similar to a seminar, but it is hosted online. Webinars are usually used to deliver lectures, presentations or workshops to a group of people over the internet.
   i. Three other uses email has are:
      - sending out marketing communication to potential clients
      - communicating within and / or between businesses
      - sending messages to many different people simultaneously.
4. a. Teacher discretion
   b. Skype, the quality of VoIP calls depends on your internet connection.
   c. By downloading an antivirus
   d. Unwanted mail
   e. Mining big data, purchasing his email address or hacking
5. a. Teacher discretion as answer is subjective.
   b. It places a strain on the network
   c. Install wireless network and Cloud for storage

SOLVING BASIC MATHEMATICAL PROBLEMS USING DELPHI

CHAPTER 5

CHAPTER OVERVIEW

The following learning outcomes are covered by this chapter:

- implement decision making in algorithms, flowcharts and code
- explain what a condition is
- use Boolean operators to create conditions
- use complex conditions in decision making.

GRADE: 10	DATE:	TEACHING TIME: 20 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • keyword – a word with a predefined meaning in a programming language. You cannot use keywords as variable names. It is for this reason that each new variable has to be declared before use	

INTRODUCTION

In this chapter, learners will be taught about the decision-making process used in Delphi.

These processes will include:

- Boolean expressions
- IF-THEN statements
- IF-THEN-ELSE statements
- Nested-IF statements
- CASE statements

They will also be taught how Boolean operators can be used with these structures to create more complex conditional statements.

UNIT 6.1

Basic operators

This chapter looks at the decision-making processes used in Delphi and builds on prior knowledge. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 6.1

Guide the learners through the example to determine whether a number is odd or even.

Activity 6.1 Memorandum

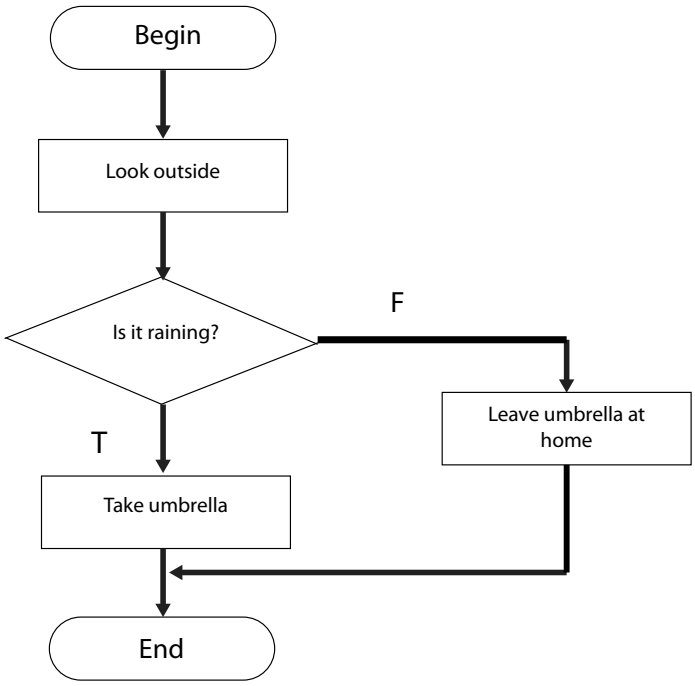
Learners work independently on the activity.

6.6.1 a.

Algorithm

6. Look outside
2. If raining then
8. Take umbrella
8. else
6. Leave umbrella at home

Flowchart

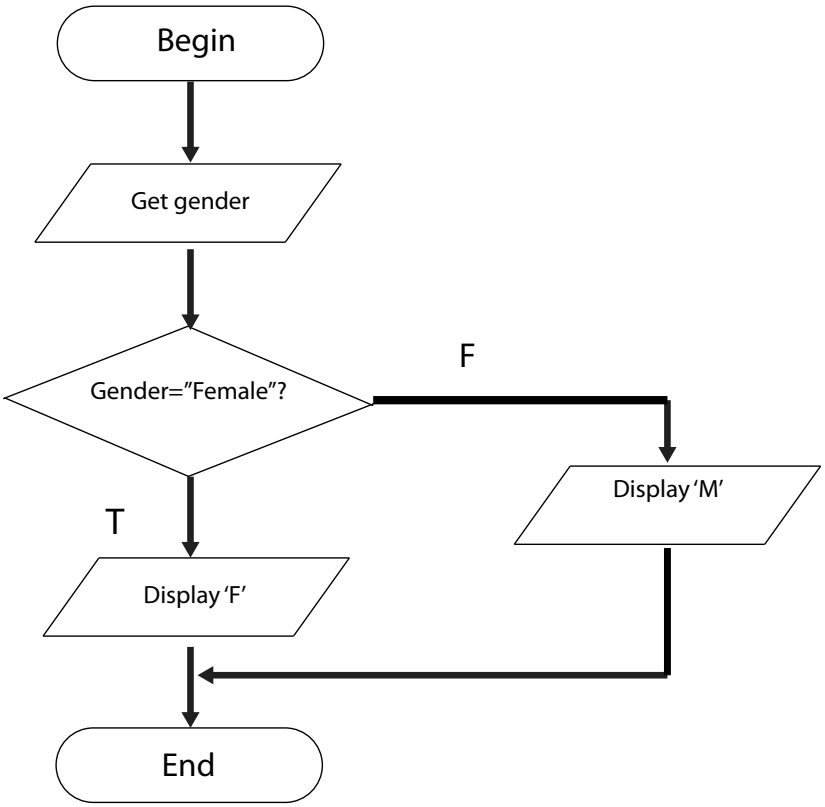


b.

Algorithm

6. Get gender
2. If gender = 'Female' then
8. Display 'F'
8. else
6. Display 'M'

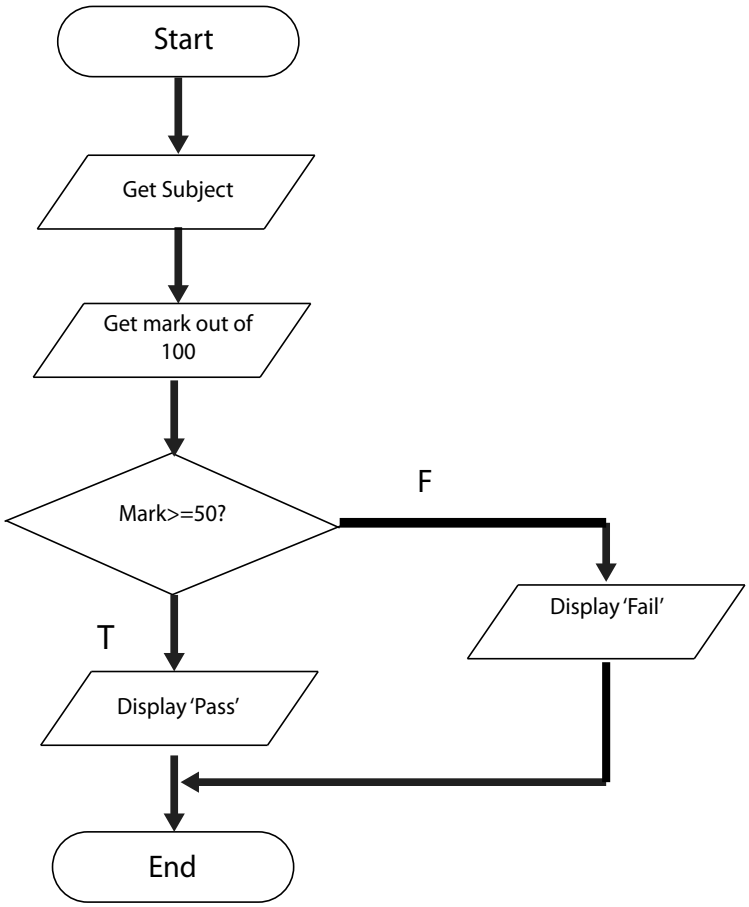
Flowchart



6.6.2

LINE NUMBER	NUMBER	REMAINDER	REMAINDER = 0?	REMAINDER = 1?	OUTPUT
1	6				
2		0			
3			Yes		
4					Is even
5				No	
6					-

6.6.3 Flowchart



Boolean expressions and the IF-THEN statement

This chapter will build on prior knowledge of the Boolean expression and variables. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 6.2 - 6.4

Guide the learners through the simple Boolean expressions.

Activity 6.2 Memorandum

EXAMPLE	RESULT	MOTIVATION
iA > 2	False	iA contains 2, 2 is not > 2
iA = iB	True	Both contain 2, 2 = 2
iA >= 2	True	iA contains 2 and is thus equal to 2
iA + iB = 0	False	7 + 7 = 14 not 0
iA div 2 = iA mod 2	False	iA div 2 = 1; iA mod 2 = 0
sWord1 <> cWord2	True	'Joly' is not the same as 'A'
sWord1 > cWord2	True	'J' comes after 'A' in the ASCII table
cWord2 = 'A'	True	cWord2 contains 'A'

Example 6.5

Guide the learners through the example to determine points. The coded solution can be found in the 05 - Bonus Points folder.

Activity 6.3 Memorandum

6.8.1 Yes. The 1000 points are awarded irrespective of any other points or conditions so it does not matter where in the algorithm they are awarded.

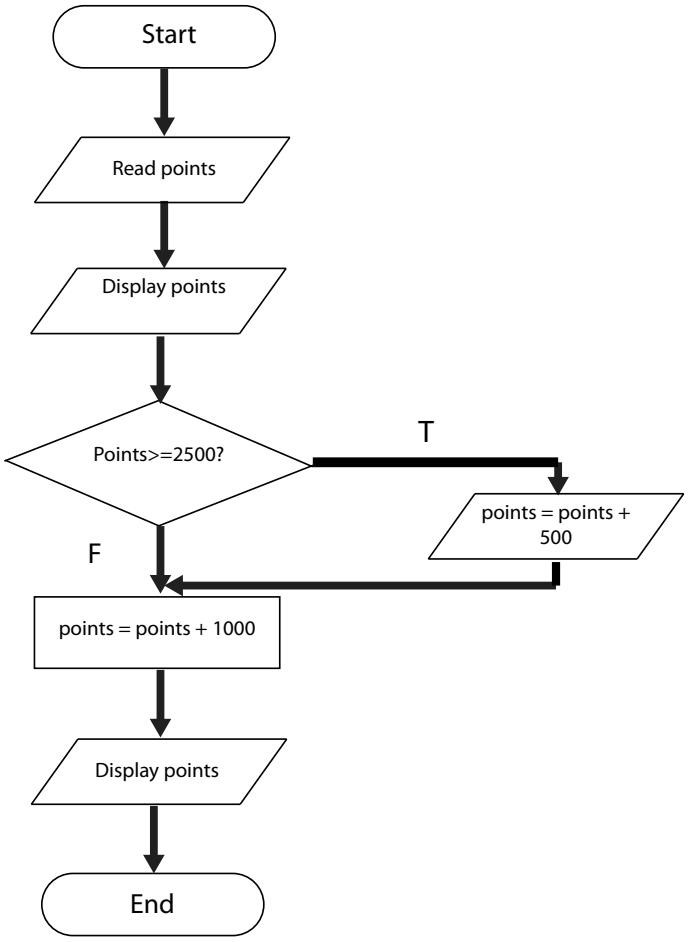
6.8.2 Each customer will automatically receive 500 points instead of 1000, and those with more than 2500 points will receive a 1000 bonus points instead of 500.

6.8.3

BOX NUMBER	POINTS	POINTS > 2500?	OUTPUT
1	3000		
4	4000		
2		True	
3	4500		
5			4500

BOX NUMBER	POINTS	POINTS > 2500?	OUTPUT
1	1200		
2		False	
4	1700		
5			1700

6.8.4



Activity 6.4 Memorandum

6.8.1 if sValue = 'Karabo' then
sName := 'John';

6.8.2 if iRemainder = 0 then
sEvenOrOdd := 'Even';

6.8.3 if iInput <> 10 then
iValue := iValue * 2;

6.8.4 if bGender = True then
sGender := 'Female';

6.8.5 if iTotal >= 100 then
iTotal := iTotal + 10;

Example 6.6

Guide the learners through the example.

Activity 6.5 Memorandum

6.6.1 The coded solution can be found in the 05 - Stars Promo folder.

6.6.2 The coded solution can be found in the 05 - Guess a Number folder.

Example 6.7

Guide the learners through the example to create a group of RadioButtons.

Guided activity 6.1

Guide the learners through the example. The coded solution can be found in the 05 - Select Gender folder.

It is important to read through and discuss the Take note box as it explains the next Activity.

Activity 6.6 Memorandum

Learners work independently to check their knowledge and level of understanding.

6.6.1 The coded solution can be found in the 05 - Library Discount folder.

6.6.2 The coded solution can be found in the 05 - Practise Arithmetic folder.

UNIT 6.3

Boolean operators

This unit will build further on Boolean expressions to provide logical operators. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Activity 6.7 Memorandum

Learners work independently to check their knowledge and level of understanding.

6.8.1 a. (B > 0) AND (B <5)
= True AND False
= False

b. (C < D) OR (Letter = 's')
= True OR False
= True

c. (B mod 2 = 0) AND NOT (Test)
= True AND NOT(True)
= True AND False
= False

d. Test AND (Letter = 'S')
= True AND True
= True

6.8.2 a. Valid
(rValReal = 0) OR (iValInt < 100)
= True OR True
= True (Depends on the values of rValReal and iValInt)

b. Invalid
(rValReal > 0) AND (rValReal < 100)

c. Valid
NOT(bTest)
= False (Assuming bTest = True)

d. Invalid
sString = '50.1'

e. Invalid
Test OR NOT (cCharacter =' J')

6.8.3

a. True AND True = True

b. True OR False = True

c. False OR NOT False
= False OR True
= True

d. True OR False OR False = True

e. (True OR False) AND True
= True AND True
= True

f. NOT (False OR True) AND True
= NOT True AND True
= False AND True
= False

6.8.3 *continued*

g. (5 > 4) AND ('3' = 3)
= True AND False
= False

h. (Sqrt(16) = 4) OR (15 < 10 + 5)
= (4 = 4) OR (15 < 15)
= True OR False
= True

i. NOT ('Hello' = 'hello') AND (4 >= Round(8.5))
= NOT False AND (4 >= 4)
= True AND True
= True

Guided activity 6.2

Guide the learners through the Activity to generate three random numbers and determine the largest of three numbers. The coded solution can be found in the 05 - Largest Number folder.

Activity 6.8 Memorandum

6.8.1 The coded solution can be found in the 05 - IT Awards folder.

SPECIAL AWARD	OUTPUT	BOOLEAN EXPRESSION
Gold medal	Congratulations! You won a gold medal!	((rMarkP >= 90) and (rMarkT >= 80))OR((rMarkP >= 80) and (rMarkT >= 90)) For example, marks entered: Practical mark = 92, theory mark = 86.
Silver medal	Congratulations! You won a silver medal!	(rMarkP >= 80) and (rMarkT >= 80) For example, marks entered: Practical mark = 81, theory mark = 82.
Bronze medal	Congratulations! You won a bronze medal!	(rMarkP >= 80) AND (rMarkT >= 70) For example, marks entered: Practical mark = 81, theory mark = 78.
Other	Keep on trying!	(Not(rMarkP >= 80)) OR (Not(rMarkT >= 70)) For example, marks entered: Practical mark = 77, theory mark = 66.

6.8.2 The coded solution can be found in the 05 - Dice Guess folder.

6.8.3 The coded solution can be found in the 05 - BMI Calculator folder.

Guided activity 6.3

Guide the learners through the activity. The coded solution can be found in the 05 - Sport Points folder.

Activity 6.9 Memorandum

The coded solution can be found in the 05 - Sport Points folder.

Example 6.12

Guide the learners through the ShowMessage example.

Example 6.13

Guide the learners through the ShowMessage example.

Guided activity 6.4

Guide the learners through the activity. The coded solution can be found in the 05 - I Can Guess folder.

Activity 6.10 Memorandum

The coded solution can be found in the 05 - I Can Guess folder.

UNIT 6.4

IF-THEN-ELSE statement

This unit will build on Boolean expression. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 6.14

Guide the learners through the example.

Example 6.15

Guide the learners through the example.

Guided activity 6.5

The coded solution can be found in the 05 – Olympiad folder.

Activity 6.11 Memorandum

Learners work independently to check their knowledge and level of understanding.

6.16.1 The coded solution can be found in the 05 - Test Numbers folder.
6.16.2 The coded solution can be found in the 05 - Student Information folder.
6.16.3 The coded solution can be found in the 05 - School Bag folder.
6.16.4 The coded solution can be found in the 05 – Scoring folder.

Activity 6.12 Memorandum

Learners work independently to create a program to check their knowledge and level of understanding. The coded solution can be found in the 05 - Largest and Smallest folder.

UNIT 6.5

Nested IF-THEN statements

This unit will build on Boolean expression. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 6.16

Guide the learners through the Nested-IF Example.

Guided activity 6.7

Guide the learners through the Activity. The coded solution can be found in the 05 - Smallest of Three folder.

Activity 6.13 Memorandum

Learners work independently with number games to check their knowledge and level of understanding. The coded solution can be found in the 05 - Number Game folder.

Activity 6.14 Memorandum

Learners work independently to check their knowledge and level of understanding. The coded solution can be found in the 05 - Prefer Cooldrink folder.

UNIT 6.6

CASE statements

This chapter will look at another type of decision-making structure in Delphi. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Guided activity 6.8

Guide the learners through the activity to use decision-making structures. The coded solution can be found in the 05 - Cooldrink Selector folder.

Example 6.17

Guide the learners through the example on percentage to symbol converter. The coded solution can be found in the 05 - Grade to Symbol Convertor folder.

Activity 6.15 Memorandum

Learners work independently to write a program to check their knowledge and level of understanding. The coded solution can be found in the 05 - Convert Length folder.

Activity 6.16 Memorandum

Learners work independently to create an interface of an application to check their knowledge and level of understanding. The coded solution can be found in the 05 - Garden Service folder.

- Discuss the Chapter Overview, learners can tick each of the aspects that they understand.
- Explain any concepts that learners query.

1.
   a. (iQuarters > 0)
      Valid
   b. (1 <= iQuarters <= 10)
      Invalid
      If (1 <= iQuarters) AND (iQuarters <= 10) then
   c. iQuarters = 10 AND sName = 'Rametswe';
      Invalid
      If (iQuarters = 10) AND (sName = 'Rametswe') then
   d. (iQuaters = '10') OR (sName = '1');
      Invalid
      If (iQuaters = 10) OR (sName = '1') then
2.
   a. The coded solution can be found in the 05 - Test Grade folder.
   b. The coded solution can be found in the 05 - Newspaper Delivery folder.
   c. The coded solution can be found in the 05 - Rock Paper Scissors folder.
3. The coded solution can be found in the 05 – BlackJack folder.
4. Optional activity. The coded solution can be found in the 05 - Tic Tac Toe folder.

TERM 2

CHAPTER 6

VALIDATING DATA

CHAPTER OVERVIEW	
Unit 6.1	String comparison
Unit 6.2	Validating data
Unit 6.3	IN operator

The following learning outcomes are covered by this chapter:

- calculate the length of a string
- compare two strings based on their single character ASCII values
- check (validate) the information that users enter into a program before processing it
- use the IN operator.

GRADE: 10	DATE:	TEACHING TIME: 4 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • keyword – a word with a predefined meaning in a programming language. You cannot use keywords as variable names. It is for this reason that each new variable has to be declared before use	

INTRODUCTION

In this chapter, learners will be taught about string comparisons. They will also be taught how to determine if one string is larger or smaller than another string, how to validate data and how to nd a value in a list of values.

UNIT 6.1

String comparison

Discuss string comparisons, learners can provide everyday examples. These comparisons allow you to improve your application by building decisions into your application. Each character has an ASCII value, discuss the table with the learners. Delphi compares two strings character by character, starting with the first character of each string using ASCII values. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 6.1

Guide the learners through the example.

Guided activity 6.1

Guide the learners through the activity on string comparisons.

1. '1000'
2. '999'
3. 'Ben'
4. 'Benjamin'
5. 'm'
6. 'Patience'
7. 'Peter'

Example 6.2

Work through the example on Smartphone login page. The coded solution can be found in the 06 - Smartphone Login folder.

Guided activity 6.2

Work through the activity with the learners on relational comparisons. The coded solution can be found in the 06 - Relational Comparisons folder.

Activity 6.1 Memorandum

Learners work independently to make changes to a login screen to check their knowledge and level of understanding. The coded solution can be found in the 06 - Smartphone Login folder.

UNIT 6.2

Validating data

Revise validating data with learners as they learnt it in the Practical chapter. Expand on their knowledge with the different types and implementation of input validation. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Guided activity 6.3

Guide the learners through the activity on input validation. The coded solution can be found in the 06 - Input Validation folder.

Guided activity 6.4

Guide the learners through the activity on intermediate calculator validation. The coded solution can be found in the 06 - Intermediate Calculator folder.

Activity 6.2 Memorandum

Learners work independently to check their knowledge and level of understanding.

6.2.1 a. An option for the interface design be found in the coded solution that can be found in the 06 - Gym Registration folder.

b. The answers for the IPO table may differ from the example given below as the learners will come up with different options for the input validation.

INPUT	PROCESSING	OUTPUT
Select gender	Check that an option has been selected on the radio button group	'Please select a gender
First name	Check that the field is not empty, if empty set the focus on the edit box	'Please enter a first name'
Surname	Check that the field is not empty, if empty set the focus on the edit box	'Please enter a surname'
ID Number	Check that the ID number has 13 characters	'Please enter a valid SA ID Number'
Email address	Check that the field is not empty, if empty set the focus on the edit box	'Please enter an email address'
Cellphone number	Check that the cellphone number is 10 characters long	'Please enter a valid cellphone number'
Address	Check that the field is not empty, if empty set the focus on the edit box	'Please enter an address'
Weight	Check that the weight entered is within a realistic range (not less than 1 nor greater than 200)	'Please enter a valid weight in kg'
Height	Check that the height entered is within a realistic range (not less than 1 nor greater than 2)	'Please enter a valid height in m'

c. The coded solution can be found in the 06 - Gym Registration folder.

6.2.2 The answers given will depend on the program chosen by the learner.

UNIT 6.3

IN operators

You can test if an element is included in a set of values using the IN operator. The test returns TRUE if the element is found in the set of values; otherwise the test returns FALSE. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 6.3

Guide the learners through the example on validation. The coded solution can be found in the 06 - Birthday Validation folder.

Activity 6.3 Memorandum

Learners work independently to check their knowledge and level of understanding on statements.

6.3.1 if cLetter IN ['A'..'Z','a'..'z'] then…
6.3.2 if cCharacter IN ['!','@','#','$','%','^','&','?'] then…
6.3.3 if iNum IN [0..50] then…
6.3.4 if cLetter IN ['A'..'F'] then…
6.3.5 if iNum IN [7, 12, 25] then…
6.3.6 if 'c' IN ['a', 'c', 'e', 'g'] then…

Activity 6.4 Memorandum

Learners work independently to check their knowledge and level of understanding to write an application with data validation techniques.

6.4.1

INPUT	POSSIBLE ERROR	DATA VALIDATION TECHNIQUE
1. Name and surname	May not be left empty	Test for length of string. Error message: 'Please enter a value'
	No space between name and surname	Test for presence of space in the string. Error message: 'Please ensure that both a name and surname have been entered and that there is a space between the two'
2. Date of application	Incorrect date	Check that the date is the same as today's date. Error message: 'Please enter today's date'
	Date in incorrect format	Check that the date is in the yyyy/mm/dd format. Error message: 'Please enter date in the yyyy/mm/dd format'
3. Number of items	Not and integer value	Check that the number is an integer. Error message: 'Please enter an integer with no decimals'
	Not in the range 10 to 25	Check that the number is >= 10 and <= 25. Error message: 'Please enter a number in the range 10 to 25'
4. Maximum amount	Not a real value	Check that the number is a real number. Error message: 'Please enter a real number value'

6.4.1 *continued*

INPUT	POSSIBLE ERROR	DATA VALIDATION TECHNIQUE
	Value exceeds R500	Check that the value is not greater than 500 (<= 500). Error message: 'The value may not exceed R500'
	Value less than 0	Check that the value is not smaller than 0 (< 0). Error message: 'The value may not be less than 0'
5. Age	Not an integer value	Check that the age is an integer. Error message: 'Please enter an integer with no decimals'
	Applicant younger than 18	Check that age >= 18. Error message: 'Must be 18 or older'

6.4.2 The coded solution can be found in the 06 - Favourites Music folder.

Activity 6.5 Memorandum

Learners work independently to check their knowledge and level of understanding to work with an application. The coded solution can be found in the 06 - Register Account folder.

- Discuss the Chapter Overview, learners can tick each of the aspects that they understand.
- Explain any concepts that learners query.

1.
   a. Text
   b. =
2. Delphi compares two strings character by character, starting with the ¬ first character of each string using ASCII values as follows:
   - Read the first character of string1 and store it in char1
   - Read the first character of string2 and store it in char2
   - Compare char1 and char2
     - If char1 > char2, then string1 > string2
     - If char1 < char2, then string1 < string2
     - If char1 = char2, then store the next character from each string in char1 and char2
   - Repeat Step 3 until you find out that one string is larger than another or until reach the last character of both strings.
     If you reach the last character without ¬finding that one string is larger than another, then the two strings are equal.
3.
   a. Both errors were caused by a user error. Explain the user actions that led to these errors.
   b. Suggest validation techniques that you could apply to prevent this error in future.
4. Validation prevents common errors from occurring and it ensures that the information entered is correct before it is used.
5. Check that a number has been entered.
   a. Check that the number is 10 characters long.
   b. if length of sCellNumber = 0 then
      Display 'Please enter a cellphone number'
      If length of sCellNumber NOT 10 then
      Display 'Please ensure that the cellphone number is exactly 10 characters long'
6. Range validation could be used where there is an age limit – for example the age of a high school learner would be in the range 14 to 19.
7. Valid data is not always correct as validation only checks that the data entered is reasonable, but is cannot check that the data is factually correct.
   For example: when entering a high school learner's age, validation can check that it is in the correct range, but it cannot check whether the value is the learner's correct age.
8. The coded solution can be found in the 06 - Talent Show folder.
9. The coded solution can be found in the 06 - Secure ID folder.

TERM 3

CHAPTER 7

COMPUTER MANAGEMENT

CHAPTER OVERVIEW

Unit 7.1 Computer management tasks

The following learning outcomes are covered by this chapter:

- describe computer management and its maintenance
- list and describe different computer management tasks and the utilities used.

GRADE: 10	DATE:	TEACHING TIME: 4 hours
Resources	Each learner should have access to: • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • disk drive – a disk drive is a technology that enables the reading, writing, deleting and modifying of data on a computer storage disk • properties – a section of Microsoft Windows for editing operating system settings, including hardware settings, connectivity, user profiles, security settings, and the computer name	

INTRODUCTION

To keep a computer running smoothly, the user needs to manage and maintain it. Computer management is a process in which a user manages, monitors and optimises their computer so that it best serves their needs. This may include improving the security, performance and reliability of the computer.

In this chapter learners will be taught about important tasks they can do to make sure their computer stays fast, reliable and secure.

These are:

- freeing storage space
- compressing files and folders
- managing the desktop
- updating software
- backing-up files
- scanning for viruses and malware
- checking the hard disks
- freeing up storage space.

Even though there is no exact amount of space needed to ensure that a computer runs smoothly, between 10 GB and 20 GB should be enough free space for a desktop or notebook, while 500 MB should be enough space for a mobile device.

UNIT 7.1

Computer management tasks

Explain to your learners that computer management is the process of managing, monitoring and optimising a computer system for performance, availability, security and any other requirements. It includes both manual and automated processes in the operation of a computer.

In this unit learners will be introduced to various computer management tasks. These include managing their desktops, managing files and folders, general housekeeping tasks, and systems settings and properties. As far as possible, learners need hands on experience with each of the tasks that are taught in the Theory Book. Provide opportunities for learners to work in pairs and on their own to complete these management tasks.

Once you have gone through the content in this unit, ask learners to complete Activity 7.1 on page 136 of the Theory Book. Moderate their work.

Activity 7.1 Memorandum

7.1.1 The root of the tree is not at the bottom but at the top, and hanging from the root there will be the drives, folders, subfolders, and files. The folders linked to the specific drives are the root folders. Any subfolders and files found in the folder appear in the next row. This pattern continues until the final row only contains files. All files in a hierarchical tree are known as leaves because they are found at the bottom of the tree, without any rows below them. The highest level of the tree structure of a drive is the root directory. The root directory of the main drive is usually named the C: drive, written as C:\.

7.1.2 Teacher discretion, needs to be logical and look like a tree.

7.1.3 Folders are used to organise a computer's files so that it can be found easier, as discussed previously, a folder will contain subfolders and then files.

7.1.4 Search

7.1.5
- **a.** Windows setting
- **b.** Accounts
- **c.** System
- **d.** Time and language
- **e.** Apps
- **f.** Update and security
- **g.** System

7.1.6
- **a.** Teacher discretion: Control panel, properties, Windows setting / Regional setting, language setting, properties
- **b.** Regional settings: Your Microsoft Windows regional settings will influence how your date/time, numeric and currency data types appear when you apply formatting options.
  Language settings: To access your language settings, click Language, then Region.
  Properties are the settings of an object on a computer.
- **c.** Properties as it changes the settings of an object on a computer.

7.1.7 The four housekeeping activities that are necessary to keep your computer working efficiently are:

1. **Disk-clean-up**
   - Disk clean-up is a computer maintenance utility designed to free up storage space on a computing device. It safely identifies and removes temporary files that are no longer needed in order to free up storage.
2. **Scheduling and updating**
   - You can use a task scheduler to create and manage common tasks that your computer will carry out automatically at a time you specify, for example, you can schedule your computer to run a software update or make a backup at a specific time.
3. **Archive and backing-up**
   - Archiving is the process of moving data that is no longer actively used to a separate storage device for long-term retention, however, this data is not duplicated. Archived data consists of old data that remains important and is retained for future reference.
   - Creating a backup is the process of making copies/duplicates of data, then storing it on a different device in a different geographical location. You are then able to retrieve the data in the event of the data on your PC being lost or destroyed.
4. **Compression and decompression**
   - File compression is process that makes use of advanced algorithms and mathematical formulae to decrease the amount of disc space used by big files.
   - Decompressing a file is a method used to extract the compressed file back to its original form and size using the same algorithms or mathematical formulae.

1. c – Search
2. a – It is large.
3. b – Pre-installed software
4. b – Updating the program / c – Defragmenting the hard drive
5. a – Using Windows Backup
6. a – He needs to install its drivers manually.
7. d – Move the files to external storage.
8. a. False. The disk clean-up tool can be used to delete files scheduled.
   b. True. Defragmentation is when the parts of a program are not stored next to each other.
   c. False. Compression can be used to reduce the size of a file.
   d. False. Adware is usually installed on your computer when you do a manual installation.
   e. True. Uninstalling an application removes it and its files from your computer.
9. 1-M, 2-D, 3-N, 4-E, 5-A, 6-B, 7-C, 8-F, 9-I, 10-K
10. An antivirus
11. Settings – Update and security – Windows security - Firewall and network protection - Activate
12. Flash drive, memory card, HDD
13. a. Teacher discretion; file management system
    b. Compression, archiving, backup, clean-up
    c. Install a firewall, an antivirus and control of Spyware
    d. Weekly, best practice and so no data is lost
    e. Files are not stored in one piece, but are broken up into segments of a specific size. When the disk starts running out of space, the parts of a file cannot be stored next to each other on the hard disk. Instead they are stored wherever there is a space available. When you want to open the file, it will take time to read the bits of the file from the fragmented locations on the hard disk.
    f. Display – Scale and layout
    g. An antivirus is more comprehensive, it is a software programme that is designed to prevent, search, detect and remove malicious software (Malware) from your computing device.

THE INTERNET AND WORLD WIDE WEB

CHAPTER 8

CHAPTER OVERVIEW

The following learning outcomes are covered by this chapter:

- describe and give an overview of the internet
- explain what is needed to connect to the internet
- describe and give an overview of the World Wide Web
- describe and explain social issues with the internet
- understand the functions of browsing and searching.

GRADE: 10	DATE:	TEACHING TIME: 8 hours

Resources	Each learner should have access to: • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher
Vocabulary	Learners will need to understand the following terms for this chapter: • browsing – a computer network that covers a small area like a home, office or building. The network usually has a limited number of computers on it (between 2 and 25), although there is no absolute limit • world wide web (www) – a network that covers a large area. This could include all the people in a suburb or city, but it is most often used to refer to the internet, the world's largest WAN • internet protocol (IP) – describes a get together of individuals and their computers. To play network games with other individuals • domain – any system designed to prevent and restrict access to specific users • URL – any system designed to prevent and restrict access to specific users • https – any system designed to prevent and restrict access to specific users • browse – any system designed to prevent and restrict access to specific users • privacy – any system designed to prevent and restrict access to specific users

INTRODUCTION

In this chapter we will look at questions such as:

- What is the internet?
- What can you do on the internet?
- How do you connect to the internet?
- How do you explore the internet?
- What are good websites to visit?
- How do you know if a website is a good website?

The world wide web (or www) is the part of the internet where websites such as Facebook and Google can be found. When you open a web browser such as Google Chrome, you can access any of the 650 million websites found on the world wide web. However, learners should not confuse the internet and the world wide web. The internet is the network connecting computers all over the world, while the world wide web is simply the internet service where websites are hosted.

In 2018, there were more than 23 billion devices connected to the internet. That is almost 3 internet connected devices per person! By the year 2020, this number is expected to increase to 50 billion devices.

UNIT 8.1

The internet and World Wide Web

In this first unit of Chapter 8, learners are introduced to the concepts of IP addresses, domain names, URLs, ISPs and web addresses. Work through this unit with your learners, making sure that all learners are at the same level of understanding before moving on to the next section. Guide the learners through the example to understand the different parts of a URL on page 142 of the Theory Book.

Allow learners to visit a predetermined list of websites that you have chosen, and ask them to identify the different things that they have learnt about. Be available to assist any learners who may be struggling.

Once you are happy that learners are adept in finding their way around the world wide web, ask them to complete Activity 8.1 on page 142 of the Theory Book.

Activity 8.1 Memorandum

8.1.1 The internet is the world's largest WAN and is made up of various nodes that connects via communication media all over the world. This allows all nodes to connect and communicate with one another. It also allows for various services, such as the world wide web and email to be hosted over or work on the internet.

8.1.2 Teacher discretion as answer is subjective; research, planning a trip

8.1.3 The number of the IP address is your computer's unique address within that network

8.1.4 No, devices are different, every computing device that is connected to the internet receives a unique address

8.1.5 To be easily located for network

8.1.6 A domain is a unique name that may be linked to an IP address. A domain name is the part of a network that identifies itself as belonging to a particular person or company, for example, the SABC, SARS, and so on.

8.1.7

	DSL/FIBRE	3G, 4G & LTE/WI-MAX, WI-FI
Computer	Any node	Any node
Channel	Active telephone line Active DSL enabled on the telephone line/ Active fibre connection	Wireless, so no physical channel is needed
Communication device	Router plus an ONT (optical network terminal) for a fibre connection	A mobile router

8.1.8

a. Domain name, extension, geographic domain

b. Events and programs happening on the 03 August 2019 at the New York Library

c. Yes, https indicates that it is safe

8.1.9

https://	www.	iol.	-	co.za	/sport/cricket/proteas
Hypertext transfer protocol	World Wide Web	Domain name	Extension	Geographic domain	File path

Browsing and searching

Begin this lesson by asking learners if they know what are browser is. Explain to them that they probably use a browser on a daily basis – but that a browser is an application specifically to access and display webpages, including the webpage's content such as text, images and videos.

On page 143 of the Theory Book, we have listed five of the most popular web browsers. Most learners should have used one of these. On page 146 learners will be taught how to optimally use a search engine such as Google. Allow them to play around and search for a predetermind list of things that you have selected. Learners will also be taught about the World Wide Web Consortium (W3C).

Once complete, instruct learners to complete Activity 8.2 on page 146 of the Theory Book.

Activity 8.2 Memorandum

8.2.1 a – Mozilla Firefox
8.2.2 c – search engine
8.2.3 b – Google Chrome
8.2.4 b – False
8.2.5 A browser is an application designed specifically to access and display webpages, including the webpage's content such as text, images and videos.
8.2.6 Once you have made a Google Search, click on the Images, News, Videos or Maps button to search for those items.
8.2.7 Another Window opens
8.2.8 Change the Browse Settings
8.2.9 Place it in single speech marks. The example is subjective e.g. 'learn guitar'
8.2.10 Enter your topic in the Search bar and press Enter
8.2.11 Teacher discretion, the below are examples.
- a. i. Conservation and the fastest animals on earth
  ii. PC games and new games for 2019
  iii. Science and top ten deadliest natural disasters
- b. i. https://www.conservationinstitute.org/10-of-the-worlds-largest-spiders/ https://guinnessworldrecords.com/world-records/largest-spider
  ii. https://www.thetoptens.com/south-african-rappers/ https://wikisouthafrica.co.za/best-rappers-in-south-africa/
  iii. https://futureoflife.org/background/benefits-risks-of-artificial-intelligence/ https://www.britannica.com/technology/artificial-intelligence

8.2.12 Suggestion is to time the learners to complete this question.
- a. Free-Tailed Bat
- b. March 10, 1876
- c. Jeff Bezos by creating e-commerce
- d. "Gone with the Wind" (1939)
- e. 101
- f. PewDiePie
- g. Despacito
- h. 3,776.24 m
- i. 4.5 million in Johannesburg
- j. The Beatles -- 178 million units

8.2.13 Teacher discretion, answers need to be supported
- a. Different websites and opinions, different data mining techniques
- b. Outdated
- c. Passing the news on verbally or by courier

UNIT 8.3

Social issues

In this unit learners will be taught about the different types of security threats of using the internet and the world wide web. They will also learn how to protect themselves when browsing the internet and opening emails. Table 8.1 on page 148 of the Theory Book lists the most common threaths, their description and how users can protect themselves against these threats. Allow learners to work in small groups of four or five and assign one threat (depending on the size of your classroom) per group. Each group must then present their threat to the rest of the class, using examples which they should research and find.

Next learners will learn about etiquette for emails. Allow them to write an email to you and assess their work to check understanding of the concepts taught. Once complete, instruct learners to complete Activity 8.3 on page 151 of the Theory Book.

Activity 8.3 Memorandum

8.3.1 a – True. A virus is any program that infects a user's computer and acts in a way that will harm the user without the user's knowledge.

b. False. Pharming attacks create an official-looking website that requests sensitive information.

c. False. With email spoofing, the attacker forges the address from which the email is sent to pretend that the email is sent from a different person.

d. True. Ransomware is a particularly malicious virus that locks all a user's files and encrypts data on the computer.

e. False. Spam is a type of virus that creates unwanted advertisements all over a user's computer.

f. False. Hoaxes refers to irrelevant, unsolicited emails sent over the internet, typically to many users.

8.3.2 1-C, 2-A, 3-B, 4-G, 5-E, 6-D, 7-F

8.3.8 Teacher discretion for the order

- Use a secure password
- Pay careful attention to the websites and links you open
- Do not share your sensitive information unnecessarily
- Do not open suspicious emails
- Do not download suspicious programs or attachments
- Keep your antivirus application up to date
- Use two-factor authentication whenever possible

8.3.9 **a.** With email spoofing, the attacker forges the address from which the email is sent to pretend that the email is sent from a different person. For example, the attacker might send emails to your friends and family with an urgent request for money while providing their own banking details. By forging the email address, this email will look as if you sent it.

Phishing attacks try to obtain sensitive information (such as usernames, passwords and banking details) by sending emails to users that look like of¬ficial emails. This is often used with email spoo¬fing to convince victims that the email is from a legitimate source.

b. Celebrities could have prevented these attacks by:

- using a secure password
- paying careful attention to the websites and links you open
- not sharing their sensitive information unnecessarily
- not opening suspicious emails
- not downloading suspicious programs or attachments
- keeping their antivirus application up to date
- using two-factor authentication whenever possible.

c. **i.** Use two-factor authentication

ii. Teacher discretion

iii. Teacher discretion

d. Hacker would need access to a second device to have gained access to the password.

1. a – The world's largest wide area network.
2. b – It is the unique web address of a webpage.
3. b – An ISP primarily provides a connection to the internet as its main service.
4. c – A computer, an active fibre connection and an ONT device and a router
5. b – Mozilla Firefox, Google Chrome, Google, Microsoft Edge, Microsoft internet Explorer
6. c – Searching for results that exactly match your query.
7. b – Email spoofing
8. d – All three of the above
9. 1-D, 2-H, 3-J, 4-C, 5-A, 6-B, 7-G, 8-E, 9-F
11. Google and Facebook
12. Google Chrome and Bing
13. Websites that you have saved for future access
14. a. The World Wide Web Consortium (shortened to W3C) is the organisation that is responsible for setting standards for the world wide web.
    b. Today, most restaurants understand the importance of having a business website that provides users with information on the restaurant, its menu, its specials and any opening or closing times. For example, the website of the popular South African restaurant, Mugg & Bean, can be found at https://themugg.com/.
    Based on this information, answer the following questions.
    c. Domain name, extension, geographic domain
    d. HTTPS is secure against online attacks
    e. So, your personal information stays personal
    f. i. Hoaxes are false reports deliberately changed to look like they are true.
    With email spoofing, the attacker forges the address from which the email is sent to pretend that the email is sent from a different person.
    Phishing attacks try to obtain sensitive information by sending emails to users that look like official emails.
    Pharming attacks create an official-looking website that requests sensitive information
    ii. Two-step authentication
    iii. Yes, it can install a virus that compromises your computer when you link on the link
15. a. No, unless the upgrade is by another company
    b. Fibre connection
    c. Ethernet cables
    d. Wiring system outside
16. a . To provide a data plan to gain online access
    b. By providing connectivity and hardware
17. Enrichment activity – this activity is optional.
    Working together with at least one but preferably two classmates, you need to do research on internet options available to you, before presenting your findings to the class. To do this, decide what speed internet and how much data you would need if you shared the internet with each other.
    a. Do research on different internet packages that can satisfy your requirements. Each group member should analyse at least one internet package.

b. For each package, you should answer the following questions:
- **i.** What is the internet speed?
- **ii.** What is the data cap?
- **iii.** Are there any terms and conditions you should be aware of?
- **iv.** Is the required hardware included in the package?
- **v.** Is the package a long-term contract or a month-to-month deal?
- **vi.** What is the cost of the package?
- **vii.** Are there any additional costs you will also need to pay (such as a telephone line rental)?

c. Once you have two to three viable options, decide what the best internet package will be.

d. Present the packages you investigated, your selected package and the reasons for your choice to the rest of the class. Teacher discretion

TERM 3

CHAPTER 7

REPITITION

CHAPTER OVERVIEW	
Unit 7.1	Using the ListBox and ComboBox components
Unit 7.2	Repetition Concepts
Unit 7.3	FOR ... DO loop
Unit 7.4	Looping with components
Unit 7.5	Using the InputBox
Unit 7.6	REPEAT ... UNTIL loop
Unit 7.7	WHILE ... DO loop
Unit 7.8	Applying loop structures
Unit 7.9	Initialising variables using the OnShow event
Unit 7.10	Timers

The following learning outcomes are covered by this chapter:

- create and use a ListBox
- explain and apply FOR loops in your programming
- explain and apply WHILE loops in your programming
- explain and apply REPEAT loops in your programming
- initialise variables using the OnShow event
- apply loops with different components
- use the timer component to create code that runs when a timer event triggers.

GRADE: 10	DATE:	TEACHING TIME: 20 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • loops – loops repeat certain lines of code until a specific condition is met • readable – you can access the value • writable – you can add information to a value.	

INTRODUCTION

Learners have been taught to read in data in a variable. By now they should be able to:

- initialise the running total
- read a value
- update running total with this value
- read a value
- update running total with this value
- repeat until all values are read and added to the running total.

In this chapter they will be taught how to use looping constructs in Delphi. These will allow them to write a set of repetitive tasks once to achieve the same purpose.

UNIT 7.1

Using the ListBox and ComboBox components

In Delphi, you can use looping constructs that allows you to write a set of repetitive tasks once to achieve the same purpose. This chapter will teach you how to create programming loops with ListBox and ComboBox. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 7.1

Guide the learners through the examples on ListBox.

Example 7.2

Guide the learners through the examples on ListBox.

Example 7.3

Guide the learners through the examples on ListBox.

Activity 7.1 Memorandum

Learners work independently to check their knowledge and level of understanding on ListBox. The coded solution can be found in the 07 – Movies folder.

Activity 7.2 Memorandum

Learners work independently to check their knowledge and level of understanding on ListBox and ComboBox. The coded solution can be found in the 07 – Subjects folder.

Repetition concepts

This unit explains the other uses for looping constructs. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 7.4

Guide the learners through the example to write an algorithm to find the sum of five integer values input by the user and display the sum of these values.

Activity 7.3 Memorandum

Learners work independently to check their knowledge and level of understanding on loops.

BOX NUMBER	C	C <= 10	STREE	P	P <= 3	STEM	OUTPUT
1	1						
2		True					
3			X				
4							X
5	2						
2		True					
3			XX				
4							XX
5	3						
2		True					
3			XXX				
4							XXX
5	4						
2		True					
3			XXXX				
4							XXXX
5	5						
2		True					
3			XXXXX				
4							XXXXX
5	6						

BOX NUMBER	C	C <= 10	STREE	P	P <= 3	STEM	OUTPUT
2		True					
3			XXXXXX				
4							XXXXXX
5	7						
2		True					
3			XXXXXXX				
4							XXXXXXX
5	8						
2		True					
3			XXXXXXXX				
4							XXXXXXXX
5	9						
2		True					
3			XXXXXXXXX				
4							XXXXXXXXX
5	10						
2		True					
3			XXXXXXXXXX				
4							XXXXXXXXXX
5	11						
2		False					
6	12			1	True		
7						X	
8							X
9				2			
6					True		
7						X	
8							X
9				3			

Activity 7.3 *...continued*

BOX NUMBER	C	C <= 10	STREE	P	P <= 3	STEM	OUTPUT
6					True		
7						X	
8							X
6				4			
7					False		

UNIT 7.3

FOR...DO loops

This unit explains the FOR loop. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Activity 7.4 Memorandum

Learners work independently to check their knowledge and level of understanding on loops. The coded solution can be found in the 07 - For Loop folder.

Explanation of test values:

START VALUE	END VALUE	LAST "CURRENT VALUE"	NUMBER OF ITERATIONS	QUESTION / EXPLANATION
-5	10	10	16	Why 16? Starts with and includes -5, ends with 10 and includes 10.
50	70	70	21	Starts with and includes 50, ends with 70 and includes 70.
1024	2024	2024	1	Loop iterates once before it does the check for the end condition
10	4	–	–	Loop does not start as the end condition cannot be met – 4 is smaller than 10.
-30	-10	-10	21	Loop is able to run as -10 is larger than -30

Activity 7.5 Memorandum

Learners work independently to check their knowledge and level of understanding on loops. The coded solution can be found in the 07 - For Loop Letters folder.

Activity 7.6 Memorandum

Learners work independently to adapt a program and check their knowledge and level of understanding on loops. The coded solution can be found in the 07 - For Loop Decrement folder.

Activity 7.7 Memorandum

Learners work independently to check their knowledge and level of understanding on loops.

7.7.1
```
for iCount := 1 to 5 do
begin
ShowMessage('Hello, Loop!');
end;
```

7.7.2
```
for iCount := 1 to 10 do
begin
ShowMessage(IntToStr(iCount));
end;
```

7.7.3
```
for iCount := 1 to 12 do
begin
iMultiple := iCount * 5;
ShowMessage(IntToStr(iMultiple));
end;
```

7.7.4 A loop that calculates the sum of the first 1000 numbers and displays the total once the loop has completed.

```
iSum := 0;
for iCount := 1 to 1000 do
begin
iSum := iSum + iCount;
end;
ShowMessage('Total = ' + IntToStr(iSum));
```

Activity 7.8 Memorandum

Learners work independently to check their knowledge and level of understanding on loops.

7.8.1
```
for iCount := 0 to 10 do
begin
ShowMessage(IntToStr(iCount));
end;
```

7.8.2
```
for iCount := 1 to 100 do
begin
ShowMessage(FloatToStr(SQRT(iCount)));
end;
```

7.8.3
```
I := 0;
for iCount := 1 to 50 do
begin
i := i + 2;
end;
```

Activity 7.9 Memorandum

Learners work independently to check their knowledge and level of understanding on loops.

7.9.1
```
Get the number
Set iCount = 1
For iCount <= iNum
If iNum MOD iCount = 0
Add iCount to list of factors
Increase iCount by 1
End for
Display list of factors
```

7.9.2 The coded solution can be found in the 07 - Factorials Solution folder.

Example 7.5

Guide the learners through the example to improve factor finder using algorithms.

Activity 7.10 Memorandum

Learners work independently to improve their Fibonacci sequence program. The coded solution can be found in the 07 - Fibonacci Solution folder.

UNIT

7.4

Looping with components

This unit adds onto learner's knowledge about ListBoxes, ComboBoxes and RadioButtons. Revise these concepts first, learners can provide examples. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Guided Activity 7.1

Guide the learners through the activity on retrieving information from a ListBox. The coded solution can be found in the 07 - List Box Sum folder.

Activity 7.11 Memorandum

Learners work independently to improve their Fibonacci sequence program.

7.11.1. The coded solution can be found in the 07 - List Box Sum Improved folder.
7.11.2. The coded solution can be found in the 07 – Scoring folder.

UNIT 7.5

Using the InputBox

Another function you can use to get data input is the InputBox function. The InputBox function displays an input dialog box that a user can use to enter a string, double or integer in when the program is executed. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information

Example 7.6

Guide the learners through the example on InputBox function.

Example 7.7

Guide the learners through the example on using the InputBox to read numbers.

Activity 7.12 Memorandum

Learners work independently on InputBox to show they grasp the concept.

a. Label: 'Chips'
   Prompt string: 'How many do you Require?'
   Default value: '2'
b. A default value is used to help save user input. It is the most likely value that the user will type in.
c. ' '
d. In Line 2:
   Why is it necessary for the data conversion? An input box returns a String value and cResponse is a char data type and so conversion is necessary.
   What is the purpose of [1] at the end of the line? To isolate the single character at position 1 in the string.
   Explain what will happen if the [1] is changed to [2]. You will isolate and extract the second character in the string.
   What type will the variable cResponse be declared as? Char. It is storing a single character.
   The coded solution can be found in the 07 - UIF Payments folder

Activity 7.13 Memorandum

Learners work independently to check their knowledge and level of understanding on InputBox. The coded solution can be found in the 07 - UIF Payments folder.

Activity 7.14 Memorandum

Learners work independently to check their knowledge and level of understanding on InputBox. The coded solution can be found in the 07 - Mark Statistics folder.

UNIT 7.6

REPEAT...UNTIL loop

Another type of loop is REPEAT…UNTIL loop. This unit explores the features and functions of this loop. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 7.8

Guide the learners through the example on REPEAT…UNTIL loop function.

Example 7.9

Guide the learners through the example using the compound interest calculator. The coded solution can be found in the 07 - Compound Interest folder.

Example 7.10

Guide the learners through the example on the Lowest Common Multiple.

Activity 7.15 Memorandum

Learners work independently to check their knowledge and level of understanding on REPEAT-UNTIL loop. The coded solution can be found in the 07 - Even Numbers folder.

Activity 7.16 Memorandum

Learners work independently to check their knowledge and level of understanding on REPEAT-UNTIL loop. The coded solution can be found in the 07 - Multiplication Tables folder.

UNIT 7.7

WHILE...DO loop

The next two types are the WHILE … DO loops. This unit explores the programming advantages of a WHILE-loop. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 7.11

Guide the learners through the example on the WHILE … DO loops function.

Example 7.12

Guide the learners through the example on loops.

Activity 7.17 Memorandum

Learners work independently to check their knowledge and level of understanding on the WHILE-loop. The coded solution can be found in the 07 - While-Loop Counter folder.

Guided Activity 7.2

Guide learners through the activity on using loops for dice roller. The coded solution can be found in the 07 - Dice Roller folder.

Activity 7.18 Memorandum

Learners work independently to check their knowledge and level of understanding on loops. The coded solution can be found in the 07 - Prime Numbers folder.

Activity 7.19 Memorandum

Learners work independently to continue working in the program they created in Activity 7.16 on loops. The coded solution can be found in the 07 - Multiplication Tables Improved folder.

Activity 7.20 Memorandum

Learners can work in pairs to build a pyramid following the guidelines. The coded solution can be found in the 07 - Pyramid folder.

Activity 7.21 Memorandum

Learners work independently to open and improve the program used in Activity 4.7.3. The coded solution can be found in the 07 - Healthy Meal folder.

UNIT

7.8

Apply loop structures

This unit looks at loops in the Greatest Common Denominator.

Example 7.13

Guide the learners through the example on loops in the Greatest Common Denominator. The coded solution can be found in the 07 – GCD folder.

UNIT 7.9

Initialising variables using the OnShow event

This unit looks at revising the declaration and use of local and global variables. Discuss the examples as they will help with the activity.

Activity 7.22 Memorandum

Learners work independently to open and improve the Consolidation Activity no. 17, Numbers_p, that you worked on in Chapter 4. The coded solution can be found in 07 - Playing with numbers folder.

UNIT 7.10

Timers

This unit looks at adding a timer component to loops and the properties. Discuss the examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 7.14

Guide the learners through the example on the timer component. The coded solution can be found in the 07 - Bouncy Ball folder. This version works in older versions of the Delphi IDE. A version written for the newer Delphi IDE can be found in the 07 - Bouncy Ball Alternative folder.

Guided Activity 7.3

Guide the learners through the activity on the timer component. The coded solution can be found in the 07 - Bouncy Ball folder. This version works in older versions of the Delphi IDE. A version written for the newer Delphi IDE can be found in the 07 - Bouncy Ball Alternative folder.

Example 7.15

Guide the learners through the example on the timer component using a jumping dino. The coded solution can be found in the 07 - Jumping Dino folder. This version works in older versions of the Delphi IDE. A version written for the newer Delphi IDE can be found in the 007 - Dino Jump Alternative folder.

Activity 7.23 Memorandum

Learners work independently to open and improve the timer component in a jumping dino.

The coded solution can be found in the 07 - Jumping Dino folder. This version works in older versions of the Delphi IDE. A version written for the newer Delphi IDE can be found in the 007 - Dino Jump Alternative folder.

- Discuss the Chapter Overview, learners can tick each of the aspects that they understand.
- Explain any concepts that learners query.

1. Here is the completed table to describe the different loop constructs and their differences.

CONSTRUCT	DESCRIPTION	START	END
Repeat	It is an ICT loop Post-test loop – condition tested at the end of the loop The loop executes while the condition is false and exits the loop when the condition is false The loop executes at least once	Executes the instructions in the body of the loop, and executes while the condition is false	Exits the loop when the condition is true
While	It is an I-T-C loop Pre-test loop – condition tested at the beginning of the loop The loop executes while the condition is true and exits the loop when the condition is false The loop may not execute at all	Checks condition, then the loop executes while the condition is true	Exits the loop when the condition is false
For	Loop with ordinal values. The number of repetitions is known up front (I-T-C).	Loop controller set to start value	When the counter reaches the stop value

2. Here is the syntax for each loop construct:

REPEAT	WHILE	FOR

Repeat
// one or more instruction(s)
Until (condition=true);
	WHILE (condition = True) do
	BEGIN
	// one or more instruction(s)
	END // Test Condition again
		FOR iCount ←Minimum to Maximum do
		BEGIN
		// 1 or more instruction(s)
		END // NEXT iCount called

3. A timer always runs at the same speed. The interval of the time can be set to control the speed of the execution of code.
4. User-controlled loops are loops such as the repeat, until and the while-loop where the user enters a value that controls how many repetitions will occur.
5.
   a. A 11
   b. None
   c. 1
6.
   a. The integer iNum ends with a value of 98 - True
   b. The while-loop iterates endless - False
   c. The while-loop never executes - False
   d. iNum may not be changed inside the loop.

1.
   a. The loop never executes – False
   b. This loop will execute at least once - True
   c. The loop produces even numbers - True
   d. Numbers between 50 and 150 will be produced - true
   e. This is an endless loop - False
2. Go back to example 7.10. Complete the trace table if the two numbers 6 and 15 were exchanged.

LINE #	iNUM1	iNUM2	iLCM	(iLCM MOD iNUM2)	= 0?	COMMENT
4	6	15	0			
6			6			
7				(6 MOD 15) → 6	False	Keep iterating
6			12			
7				(12 MOD 15) → 12	False	Keep iterating
6			18			
7				(18 MOD 15) → 3	False	Keep iterating
6			24			
7				(24 MOD 15) → 9	False	Keep iterating
6			30			
7				(30 MOD 15) → 0	True	

3. The coded solution can be found in 07 - Reverse String folder.
4. The coded solution can be found in 07 - Error Solution folder.
5. The coded solution can be found in 07 - Vowels Count folder.
6. The coded solution can be found in 07 - Currency Converter folder.
7. The coded solution can be found in 07 – Moving Soccer Ball folder.
8. The coded solution can be found in 07 – Library folder.
9. The coded solution can be found in 07 - Mark Data A folder.
10. The coded solution can be found in 07 - Mark Data B folder.

CHAPTER 8

STRING MANIPULATION

CHAPTER OVERVIEW	
Unit 8.1	Combining strings and determining the length of a string
Unit 8.2	Formatting characters
Unit 8.3	Scrolling through a string
Unit 8.4	Manipulating strings

The following learning outcomes are covered by this chapter:

- explain the concept of string manipulation
- scroll through a string
- search for a character in a string.
- change a string
- build a string.

GRADE: 10	DATE:	TEACHING TIME: 10 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • loops – loops repeat certain lines of code until a specific condition is met • readable – you can access the value • writable – you can add information to a value.	

INTRODUCTION

In this chapter learners will be taught how multiple small strings can be combined into a single large string, or one string can be broken into multiple smaller strings. They will learn how to find the position of one character inside a string and replace all the characters of one type with another. They will also learn how to delete text from strings and insert text into strings.

UNIT 8.1

Combining strings and determining the length of a string

In this unit learners will use their knowledge and experience on strings to combine and display an output. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 8.1

Guide the learners through the example on how to correctly display a string.

Example 8.2

Guide the learners through the example on how to correctly display a string.

Example 8.3

Guide the learners through the example to create a program with the use of strings. The coded solution can be found in the 08 - Best Birthday Card folder.

Guided Activity 8.1

Guide the learners through the activity using the advanced calculator. The coded solution can be found in the 08 - Advanced Calculator folder.

Guided Activity 8.2

Guide the learners through the activity using the advanced calculator.

For enrichment

Learners can complete the activity for experience in creating an executable file for an advanced calculator projectusing the advanced calculator.

Activity 8.1 Memorandum

Learners work independently to show their understanding. The coded solution can be found in the 08 - Practise Strings folder.

UNIT

8.2

Formatting characters

In this unit learners will use their knowledge and experience to format strings using characters. Discuss the Take note boxes and examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Guided Activity 8.3

Guide the learners through the activity to create a report card. The coded solution can be found in the 08 - Report Card folder.

Activity 8.2 Memorandum

Learners work independently to open Booking_p project from the 08 - Booking folder and follow the steps to complete the app. The coded solution can be found in the 08 – Booking folder.

UNIT 8.3

Scrolling through a string

In this unit learners will learn about the declaration of string variables. Discuss the examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Example 8.4

Guide the learners through the example.

Guided Activity 8.4

Guide the learners through the activity. The coded solution can be found in the 08 - Extracting Characters folder.

Activity 8.3 Memorandum

Learners work independently to show their understanding of strings.

8.8.1

shoutOut[4]
shoutOut[6]
shoutOut[9]
shoutOut[12]
shoutOut[14]
shoutOut[19]
shoutOut[22]
shoutOut[25]

b.

¡ shoutOut [3] = 'L'
¡ shoutOut [7] = ' '

c. 27

8.8.2 a. FOR loop

8.8.3

LINE	GREETING	J	J <= 5	OUTPUT
1	Hello			
2				' '
3		1	True	
4				H-
3		2	True	
4				H-e-
3		3	True	
4				H-e-l-
3		4	True	
4				H-e-l-l-

Activity 8.3 *...continued*

LINE	GREETING	J	J <= 5	OUTPUT
3		5	True	
4				H-e-l-l-o-
3		6	False	

8.8.4

a. shoutOut[n + 2] = 'c'
b. shoutOut[n – 6] = ' '
c. shoutOut[n × 2] = 'n'
d. shoutOut[n DIV 2] = 'n'
e. shoutOut[n + 3 × m] = ' '
f. shoutOut[n × 3] = no such character

8.8.5 a.

DATA	POS1	POS2	LINE[ ]+ LINE[ ]…
Name	1	4	line[1]+line[2]+line[3]+line[4]
Age group	6	10	line[6]+line[7]+line[8]+line[9]+line[10]
Race distance	12	13	line[12]+line[13]
Time	15	19	line[15]+line[16]+line[17]+line[18]+line[19]

b. dataItem ← line + line[index]
c. line[5], line[11], line[14]

Activity 8.4 Memorandum

8.8.1

a.
```
oldWord ← get word
reverseWord ← ' '
For index ← length of oldWord downTo 1
        reverseWord ← reverseWord + oldWord[index]
end For
Display reverseWord
```

b.
```
originalString ← get string
newString ← ' '
iMidPoint ← Length of originalString DIV 2
For index ← 1 to iMidPoint
        newString ← newString + originalString [index * 2]
end For
Display newString
```

Activity 8.4 *...continued*

c. Assume the string entered was 'house':
Trace table for 1a:

LINE	OLDWORD	REVERSEWORD	INDEX	INDEX >= 1?	OUTPUT
1	house				
2		' '			
3			5	True	
2		e			
3			4	True	
2		es			
3			3	True	
2		esu			
3			2	True	
2		esuo			
3			1	True	
2		esuoh			
3			0	False	
					esuoh

Trace table for 1b:

LINE	ORIGINAL STRING	NEW STRING	iMIDPOINT	INDEX	INDEX * 2	INDEX <= iMIDPOINT?	OUTPUT
1	house						
2		' '					
3			2			True	
4				1		True	
5		o			2		
4				2		True	
5		os			4		
4				3		False	
6							os

8.8.2

a.
```
sWord ← 'Hello';
iLength := Length(sWord);
spaces ← '';
for index ← 1 to Length of sWord
        Display spaces + sWord[index]
        spaces← spaces + ' ';
End for
```

b.
```
sWord ← 'Hello World';
spaces ← '';
fourSpaces ← '    ';
for index ← 1 to 5
        Display spaces + sWord[index] + fourSpaces + sWord[index + 6]
        spaces ← spaces + ' ';
end for
```

c. Trace table for 2a:

LINE	SWORD	ILENGTH	SPACES	INDEX	INDEX <= ILENGTH?	OUTPUT
1	'Hello'					
2		5				
3			''			
4				1	True	
5						H
6			' '			
4				2	True	
5						e
6			' '			
4				3	True	
5						l
6			' '			
4				4	True	
5						l
6			' '			
4				5	True	
5						o
6			' '			
4				6	False	

Trace table for 2b:

LINE	SWORD	SPACES	fourSpaces	INDEX	INDEX<=5?	OUTPUT
1	'Hello World'					
2		''				
3			' '			
4				1	True	
5						H W
6		' '				
4				2	True	
5						e o
6		' '				
4				3	True	
5						l r
6		' '				
4				4	True	
5						l l
6		' '				
4				5	True	
5						o d
6		' '				
				6	False	

8.8.3
```
For index = 1 to Length of text
Line = Line + Text[index]
  If index = width
    Display Line
    Line = ' '
  End If
End For
```

Example 8.5

Guide the learners through the example to write a program that will display the user input with each character followed by a hyphen.

Activity 8.5 Memorandum

Learners work independently to follow the activity steps. The coded solution can be found in the 08 - Character Access folder.

Activity 8.6 Memorandum

Learners work independently to create a Delphi project to implement their Rectangular text algorithm. The coded solution can be found in the 08 - Rectangular Text folder.

Guided Activity 8.5

Guide the learners through the activity to access individual characters.

8.6.1

a. sPhrase[1] = 'L'
b. sPhrase[5] = 'v'
c. sPhrase[12] = 'r'v
d. sName[3] = 'n'
e. sName[2] = u'

8.6.2 sName[2]
sName[5]
sPhrase[1]
sPhrase[4]
sPhrase[6]
sPhrase[10]
sPhrase[13]
sPhrase[16]

UNIT 8.4

Manipulating strings

In this unit learners will learn about how to manipulate strings. Discuss the examples as they will help with the activities. After each activity check that learners are confident with the steps and information.

Guided Activity 8.6

Guide the learners through the activity to find all occurrences of a character in a string. The coded solution can be found in the 08 - Find Character folder.

Activity 8.8 Memorandum

Learners work independently with strings to show their grasp of the concept and understanding.

8.8.1 Given:
sentence 'I love computer programming'
searchChar 'r'
count 0
index 1 to length(sentence)

a. Square bracket notation: variableName [position]
sentence[1] = 'I' in the example given

b. 'r' = sentence[index]
Note that IN cannot be used in this instance.

c. If 'r' = sentence[index] then

d. This option reads logically as follows: if 'r' is equal to the current character in sentence then … .

e. In the body of the IF statement, provide code to count the number of 'r' characters in the sentence.
If 'r' = sentence[index] then
numR := numR + 1;

f. The space ' '

g. If sentence[index] IN ['a', 'e', 'i', 'o', 'u', 'A', 'E', 'I', 'O', 'U'] then

h. If the character is NOT in the set of vowels then … .

i. If NOT (sentence[index] IN ['a', 'e', 'i', 'o', 'u', 'A', 'E', 'I', 'O', 'U']) then
numConsonants = numConsonants + 1;

8.8.2

LINE	LABEL	CH	I	I <= LENGTH (LABEL)	LABEL[I]	LABEL[I] = CH	OUTPUT
1	programming						
2		r					
3			1	True			
4					p	False	
3			2	True			
4					r	True	
5							r found in position 2

8.8.2 ...continued

LINE	LABEL	CH	I	I <= LENGTH (LABEL)	LABEL[I]	LABEL[I] = CH	OUTPUT
3			3	True			
4					o	False	
3			4	True			
4					g	False	
3			5	True			
4					r	True	
5							r found in position r
3			6	True			
4					a	False	
3			7	True			
4					m	False	
3			8	True			
4					m	False	
3			9	True			
4					i	False	
3			10	True			
4					n	False	
3			11	True			
4					g	False	
3			12	False			

8.8.3 a.

redOutput.Clear; Clears the text currently on the rich edit component
sIdNumber := edtIDNumber.Text; Reads the text currently displayed on the edit box and stores it in the sIDNumber variable
if StrToInt(idNumber[7]) >= 5 then Checks whether the seventh character in the ID number string is greater than or equal to 5

b. The seventh character in an ID number is 5 or more for a male and less than 5 for a female. The if statement checks the value of this seventh digit. If it is greater than or equal to 5, it displays the gender of the person as male, else (thus if it is less than 5) it displays the gender of the person as female.

c. Yes

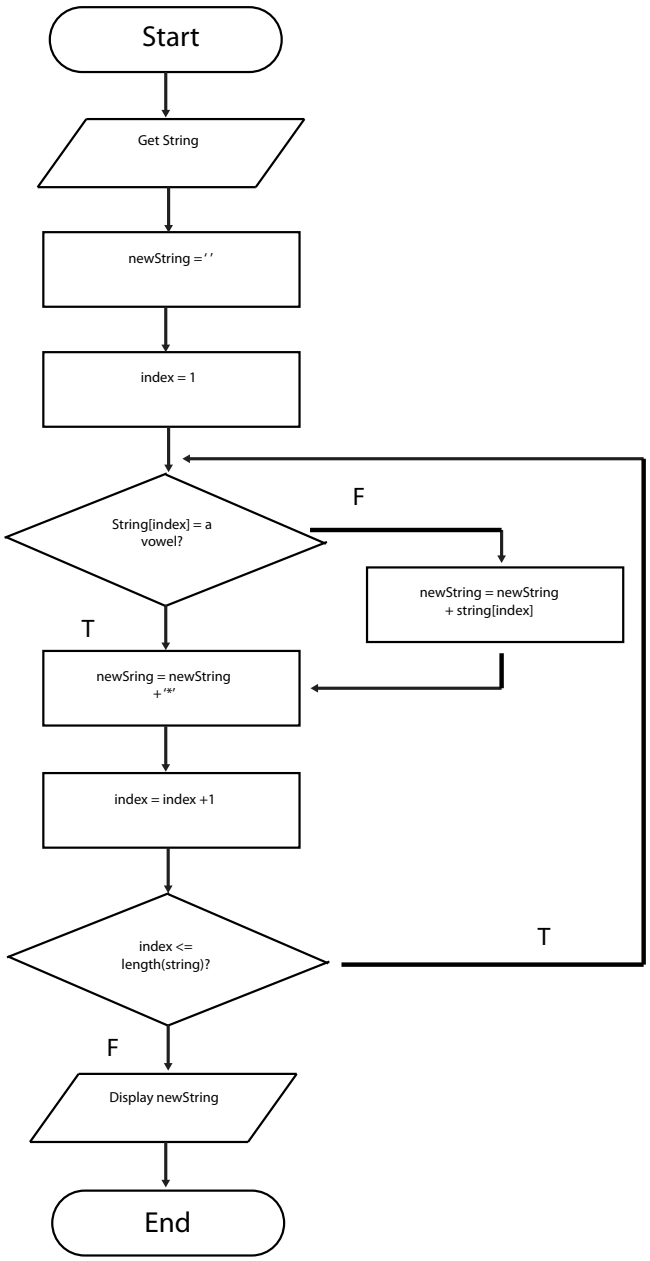
d. The characters from '5' to '9' have larger numeric values that those from '0' to '4' and so the comparison will also work without doing the conversion to integer.

Activity 8.9 Memorandum

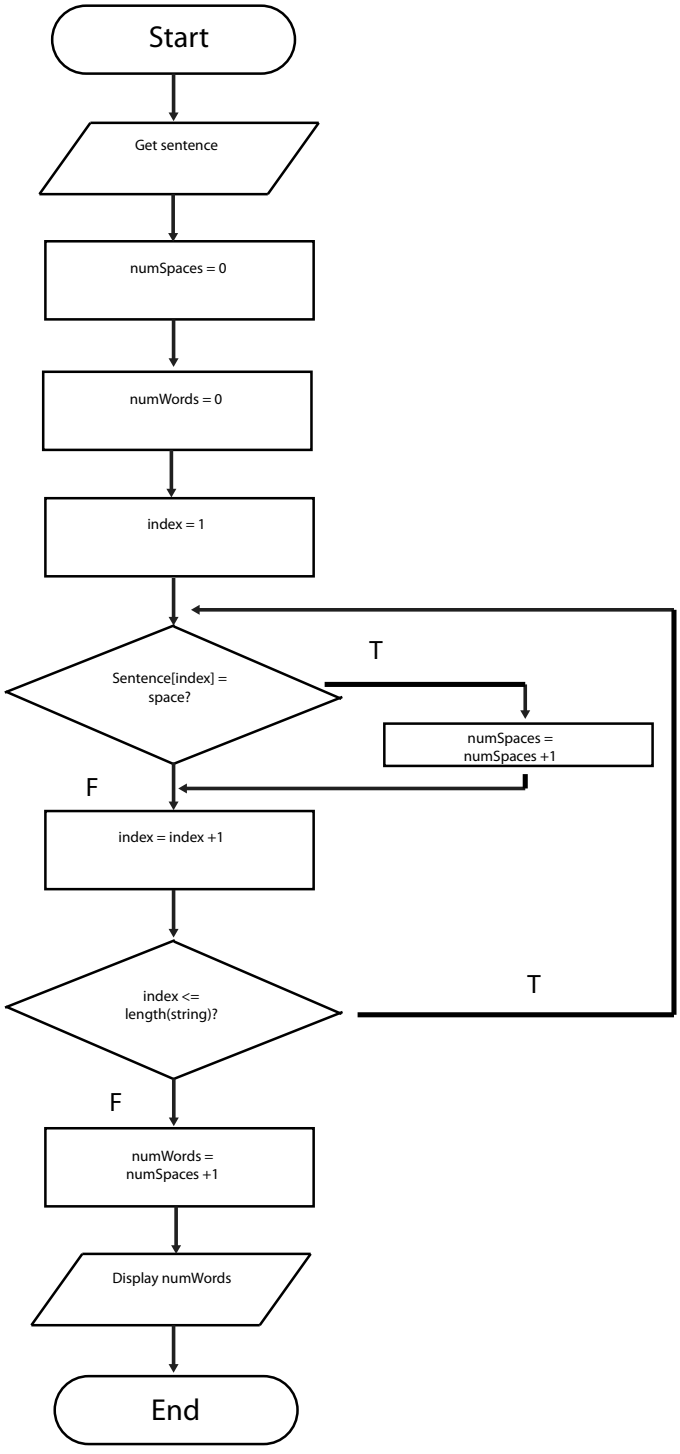
Learners work independently with algorithms and flowcharts to show their grasp of the concept and understanding.

8.9.1
```
sentence ← 'Count the vowels'
numVowels ← 0
For index ← 1 to Length of sentence
        If sentence[index] IN ['a', 'e', 'i', 'o', 'u', 'A', 'E', 'I', 'O', 'U'] then
        numVowels ← numVowels + 1
End If
End For
Display numVowels
```

8.9.2



8.9.3



8.9.4

```
Line[k] = '#'
Item := '';
Item := Item + Line[k];
```

Activity 8.9 *...continued*

8.9.5

LINE	SENTENCE	NUM VOWELS	INDEX	LENGTH OF SENTENCE	INDEX <= LENGTH OF SENTENCE?	SENTENCE [INDEX]	SENTENCE [INDEX] IN VOWELS?	OUTPUT
1	Count the vowels							
2		0						
3			1	16	True			
4						C	False	
3			2		True			
4						o	True	
5		1						
3			3		True			
4						u	True	
5		2						
3			4		True			
4						n	False	
3			5		True			
4						t	False	
3			6		True			
4						[space]	False	
3			7		True			
4						t	False	
3			8		True			
4						h	False	
3			9		True			
4						e	True	
5		3						
3			10		True			
4						[space]	False	
3			11		True			
4						v	False	
3			12		True			

8.9.5 ...continued

LINE	SENTENCE	NUM VOWELS	INDEX	LENGTH OF SENTENCE	INDEX <= LENGTH OF SENTENCE?	SENTENCE [INDEX]	SENTENCE [INDEX] IN VOWELS?	OUTPUT
4						o	True	
5		4						
3			13		True			
4						w	False	
3			14		True			
4						e	True	
5		5						
3			15		True			
4						l	False	
3			16		True			
4						s	False	
3			17		False			
6								5

LINE	STRING	NEW STRING	INDEX	LENGTH OF STRING	INDEX <= LENGTH OF STRING?	STRING [INDEX]	STRING [INDEX] IN VOWELS?	OUTPUT
1	mother							
2		‘ ‘						
3			1	6	True			
4						m	False	
5		m						
3			2		True			
4						o	True	
5		m*						
3			3		True			
4						t	False	
5		m*t						

Activity 8.9 *...continued*

LINE	STRING	NEW STRING	INDEX	LENGTH OF STRING	INDEX <= LENGTH OF STRING?	STRING [INDEX]	STRING [INDEX] IN VOWELS?	OUTPUT
3			4		True			
4						h	False	
5		m*th						
3			5		True			
4						e	True	
5		m*th*						
3			6		True			
4						r	False	
5		m*th*r						
3			7		False			m*th*r
6								

LINE	SENTENCE	NUM SPACES	NUM	INDEX	LENGTH OF	INDEX <= LENGTH OF SENTENCE?	SENTENCE AT [INDEX]		OUTPUT
1	Count the words								
2		0							
3			0						
4				1	15	True			
5							C	False	
4				2		True			
5							o	False	
4				3		True			
5							u	False	
4				4		True			
5							n	False	
4				5		True			
5							t	False	

Activity 8.9 *...continued*

LINE	SENTENCE	NUM SPACES	NUM	INDEX	LENGTH OF	INDEX <= LENGTH OF SENTENCE?	SENTENCE AT [INDEX]		OUTPUT
4				6		True			
5							[space]	True	
6		1							
4				7		True			
5							t	False	
4				8		True			
5							h	False	
4				9		True			
5							e	False	
4				10		True			
5							[space]	True	
6		2							
4				11	15	True			
5							w	False	
4				12		True			
5							o	False	
4				13		True			
5							r	False	
4				14		True			
5							d	False	
4				15		True			
5							s	False	
4				16		False			
7			3						
8									3

Activity 8.10 Memorandum

Learners can work independently to show their understanding. The coded solution can be found in the 08 - Search Characters folder.

Activity 8.11 Memorandum

Learners work independently on the project to show their understanding. The coded solution can be found in the 08 - Find Character Frequency folder.

Activity 8.12 Memorandum

Learners work independently on the Delphi program to show their grasp of the concept and understanding. The coded solution can be found in the 08 - Strong Password folder.

Example 8.7

Guide the learners through the example to delete a character at a specific position. The coded solution can be found in the 08 - Deleter and Inserter folder.

Activity 8.13 Memorandum

Learners work independently to create program following the steps. The coded solution can be found in the 08 - String Manipulation folder.

Activity 8.14 Memorandum

Learners work independently on algorithms and strings to show their grasp of the concept and understanding.

8.18.1 a.

```
Start = 3
End = 6
PlacesToMove = 4
  for k = End downto Start
     if(k + PlacesToMove) <= Length(sText) then
       sText[k+ PlacesToMove] = Text[k]
     end if
  end for
Display Text
```

b.

```
Start = 3
End = 6
PlacesToMove = 4
  for k = Start to End
    if (k - PlacesToMove) >= 1 then
      sText[k - PlacesToMove] = sText[k]
    end if
  end for
Display Text
```

Activity 8.14 *...continued*

8.18.2 Given the string:
Word 'characters'
Provide Delphi statements to do the following in order:

a. Word[8] := 'o';

b. setLength (Word, Length(Word) + 5);

c.
```
Word[10 + 5] = Word[10];
Word[9 + 5] = Word[9];
Word[8 + 5] = Word[8];
Word[7 + 5] = Word[7];
Word[6 + 5] = Word[6];
Word[5 + 5] = Word[5];
```

d.
```
for k = 10 downto 5 do
Word[k+ 5] = Word[k];
```

e. Given:
```
Word[5] := Text[1];
Word[6] := Text[2];
Word[7] := Text[3];
Word[8] := Text[4];
Word[9] := Text[5];
```

f.
```
for k:= 1 to 5 do
Word[k + 4] := Text[k];
```

8.18.3 Provide an algorithm to show how four characters are deleted from a 10-character string starting at position 2.
Househouse
hhouse

```
Start = 2
End = 2 + 4
  for k = End to 10 do
  Text[Start] := sText[k];
  Start := Start + 1;
End if
```

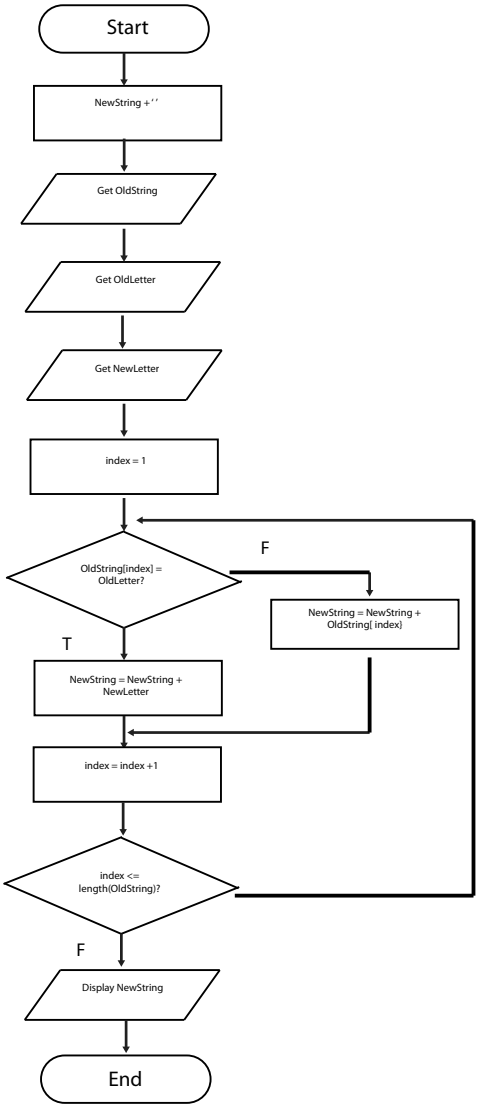
Activity 8.15 Memorandum

Learners work independently on the activity.

8.16.1 a.
```
Get OriginalString
Get position of character to replace
Get the new character
  For k = 1 to Length of OriginalString
      if k = position then
      NewString = NewString + NewCharacter
         else
         NewString:= NewString + OriginalString[k]
      End If
   End For
```

Activity 8.15 *...continued*

b. Here is the completed flowchart:



c. The coded solution can be found in the 08 - Replace Characters folder.

8.16.2 The coded solution can be found in the 08 - Move Characters Right folder.

8.16.3 The coded solution can be found in the 08 - Move Characters Left folder.

Activity 8.16 Memorandum

8.16.1 The coded solution can be found in the 08 - Word Game folder.

8.16.2 The coded solution can be found in the 08 - Noun Adjective Switch folder.

- Discuss the Chapter Overview, learners can tick each of the aspects that they understand.
- Explain any concepts that learners query.

1. Given the string: sText 'Creative people will bene¬ t most from changes in technology'
   a. True or false?
      i. True. Delphi code Length(sText) will have a value of 60.
      ii. False. Number of words in sText is equal to the number of spaces.
   b. Creative people
   c. Most becomes must
2.
   a. For k:=8 to 15
      sText[k] := '-';
   b. The programmer needs to be sure which characters are held in the new spaces otherwise unexpected results can occur.
3.

```
Get StartPosition
Get EndPosition
Get Sentence
Length = Length of Sentence
Places = EndPosition - StartPosition + 1
for k = EndPosition + 1 to Length
        Sentence[StartPosition] = Sentence[k]
        StartPosition = StartPosition + 1
        End For
SetLength(Sentence, Length - Places)
Display Sentence
```

4.

```
Get string
NewString = ' '
For k = 1 to Length of string
        If string[k] = '#;
        Display NewString
        NewString = ' '
        Else
        NewString = NewString + string[k]
        End if
End For
```

5.

LINE	SENTENCE	WORD1	WORD2	K	K <= LENGTH OF SENTENCE?	K MOD 2 = 0?	OUTPUT
1	password to enter secret						
2		' '					
3			' '				
4				1	True		
5						False	

LINE	SENTENCE	WORD1	WORD2	K	K <= LENGTH OF SENTENCE?	K MOD 2 = 0?	OUTPUT
7		p					
4				2	True		
5						True	
6			a				
4				3	True		
5						False	
7		s					
4				4	True		
5						True	
6			3				

Continue on with the trace table until the end of the sentence. The algorithm extracts all the odd-numbered letters and joins them together, as well as all the even-numbered letters and joins them together. It displays the odd-numbered string followed by the even-numbered string.The coded solution can be found in the 08 - Word Find Error folder.

2. The coded solution can be found in the 08 – Palindrome folder.
3. The coded solution can be found in the 08 - Advert Cost folder.
4. The coded solution can be found in the 08 – Excursion folder.
5. The coded solution can be found in the 08 - Name Value folder.
6. The coded solution can be found in the 08 - Pig Latin folder.
7. The coded solution can be found in the 08 - Scrolling Banners folder.

TERM 4

CHAPTER 9

INTERNET SERVICES

CHAPTER OVERVIEW

Unit 9.1 Overview of internet plug-ins and internet services technologies

The following learning outcomes are covered by this chapter:

- describe the different types of internet plug-ins
- explain the purpose of internet plug-ins
- describe the different internet services technologies.

GRADE: 10	DATE:	TEACHING TIME: 2 hours
Resources	Each learner should have access to: • IT 10 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • plug-in applications – a computer network that covers a small area like a home, office or building. The network usually has a limited number of computers on it (between 2 and 25), although there is no absolute limit • e-commerce – a network that covers a large area. This could include all the people in a suburb or city, but it is most often used to refer to the internet, the world's largest WAN • web design – describes a get together of individuals and their computers. To play network games with other individuals • HTML – any system designed to prevent and restrict access to specific users	

INTRODUCTION

Plug-in applications are extra applications that users can install inside software to increase its functionality. On the web, these applications can be installed on a web browser to add new functions to the web browser. In the past, tools such as Flash Player allowed web browsers to understand and interpret content created for the Adobe Flash platform. This included animations and videos. In fact, Flash Player was the default method of watching videos on YouTube until 2015 when YouTube made HTML5 the default for watching videos.

These plug-in applications, have to a large extent, either been incorporated directly into web browsers or have been replaced by HTML5-based web pages. This does not mean that there are no longer any plug-in applications available for browsers. However, these tools serve a different purpose today. In the past, these tools increased the functionality of websites and web browsers. Today, these applications generally change the behaviour of websites or web browsers to suit users better.

UNIT 9.1

Overview of internet plug-in applications

Explain to your learners that a plug-in is an element of a software program that can be added to provide support for specific features or functionality. Plug-ins are commonly used in internet browsers but also can be used in various other types of applications. In general, plug-ins are part of an array of software components known as add-ons. Programs may be changed by different kinds of add-ons in different ways.

In popular technologies, like internet browsers and audio/video applications, the ability to use plug-ins makes products more versatile and allows transparent and convenient customisation according to the user's desired features. Plug-ins can also enable easier software upgrades or patches or additions by project collaborators. Plug-ins can also be a strategy for dealing with complex software licensing.

One plug-in example is the range of customisable options common with browsers like Mozilla Firefox. Users can download individual plug-ins for this free Web browser tool to promote different results on devices.

Internet service technologies, however, refers to the technologies and programming languages used to develop the internet. This can refer specifically to website development and languages such as HTML and JavaScript, but allso more generally to any technology used on the internet, from networking technologies to e-commerce and communication technologies.

Work through the content of this unit, then ask learners to complete Activity 9.1 on page 157 of the Theory Book.

Activity 9.1 Memorandum

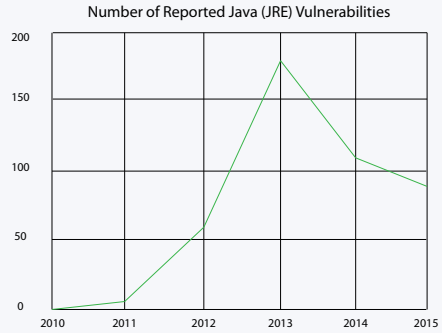
9.1.1 Internet services technologies cover a very broad range of technologies that is used for web development, web production, web-design, networking, and e-commerce. These technologies are also part of website maintenance, database management, and graphic design.

9.1.2 a. A plug-in is an additional application that you can install on to increase a software's functionality.

b. They were used with web browsers to understand interactive web pages and display videos and animations

Teacher discretion is advised for the following activity. Here are some sample answers.

1. No, it isn't worth it as it increases the security risks and makes your computer vulnerable to cyber attacks.



2. Not install or use plug-ins, rather install reputed apps
3. Yes, they can attach malware to the plug-in that installs on your computer with the plug-in, as a trojan horse.

TERM 4

CHAPTER 9

PAT PREPARATION

CHAPTER OVERVIEW	
Unit 9.1	Tools and techniques to create a software solution to a problem
Unit 9.2	A problem-solving approach
Unit 9.3	Analysing user interfaces

The following learning outcomes are covered by this chapter:

- explain what problem solving is
- understand how to approach a programming problem
- explain and apply problem-solving steps and techniques to a given problem
- use the correct problem-solving tools.
- understand how to use the correct tools, principles and techniques to do the PAT.

GRADE: 10	DATE:	TEACHING TIME: 12 hours
Resources	Each learner should have access to: • IT 10 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher	
Vocabulary	Learners will need to understand the following terms for this chapter: • loops – loops repeat certain lines of code until a specific condition is met • readable – you can access the value • writable – you can add information to a value.	

INTRODUCTION

In Grade 10 learners need to complete their Practical Assessment Task (PAT). The PAT is a software development project. The PAT is used to test their programming skills and understanding of the connections between the different content areas of solution development that you have been taught.

Learners need to demonstrate their knowledge and understanding of the software development life cycle through analysis, design, coding and testing. They also have to demonstrate the effective use of the software design tools and techniques, which they have been taught.

UNIT 9.1

Tools and techniques to create a software solution to a problem

Explain to learners the importance of PAT, it is the final end-of-year examination for IT. And counts 25% of the learner's final mark for IT. PAT gives learners the chance to demonstrate their programming skills and understanding of the connections between the different content areas of solution development.
Revise the tools and techniques used to create a simple user interface and add onto this knowledge with further components. Discuss the Take note box and examples as they will help with understanding.

Example 9.1

Guide the learners through the example to create a text editor. The coded solution can be found in the 09 - Text Editor folder.

- Discuss the problem-solving steps, learners can provide examples from the past activities.

Analysing user interfaces

- Guide the learners through the steps and examples to analyse an existing interface.
- Discuss the Chapter Overview, learners can tick each of the aspects that they understand.
- Explain any concepts that learners query.