Teacher's Guide

INFORMATION TECHNOLOGY

11

basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

CAPS

MTN

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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 Teacher's Guide Grade 11
ISBN 978-1-928388-55-5

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INTRODUCTION TO INFORMATION TECHNOLOGY

Welcome to the *IT Grade 11 Teacher's Guide*. This book was developed to guide teachers and provide suggested answers that can be used when assessing learners throughout the year.

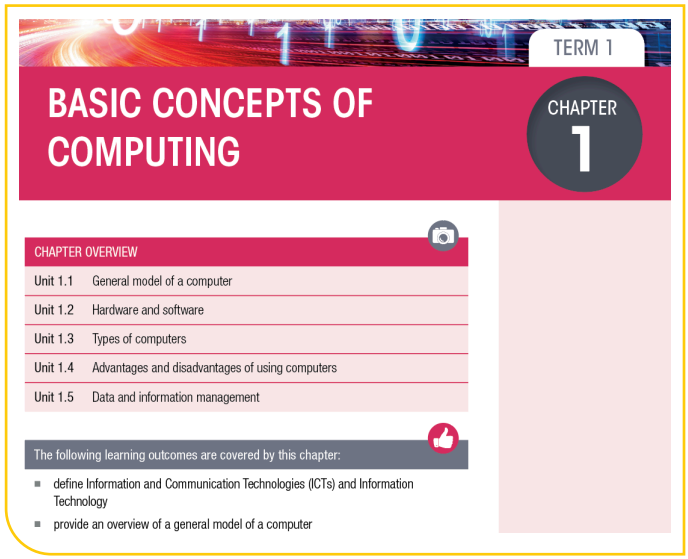
The *IT Grade 11 Theory Book* and the *IT Grade 11 Practical Book* provide learners with interesting, stimulating and challenging learning activities that have been carefully designed and developed so that there is a clear progression of knowledge and skills throughout the FET Phase. These books will make Information Technology an interesting, exciting and meaningful subject that learners will enjoy.

The *IT Grade 11 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

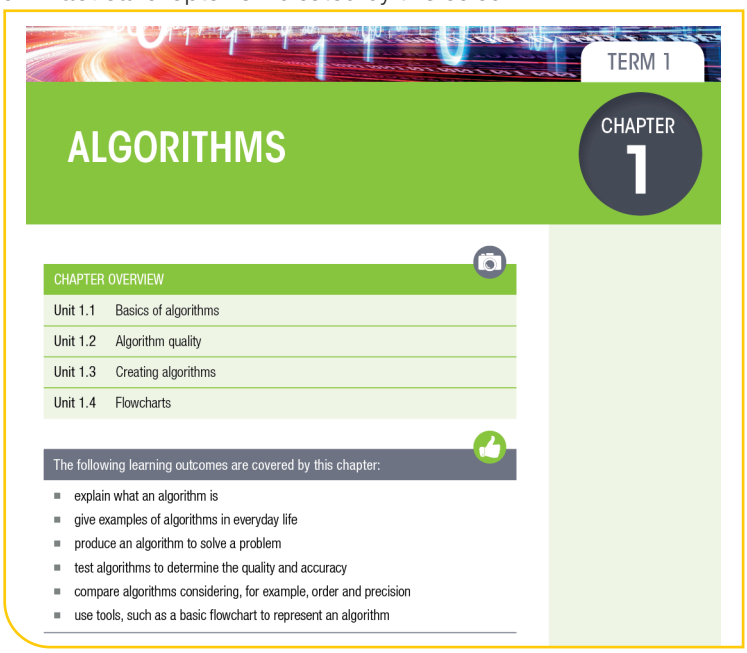
CHAPTER OVERVIEW

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

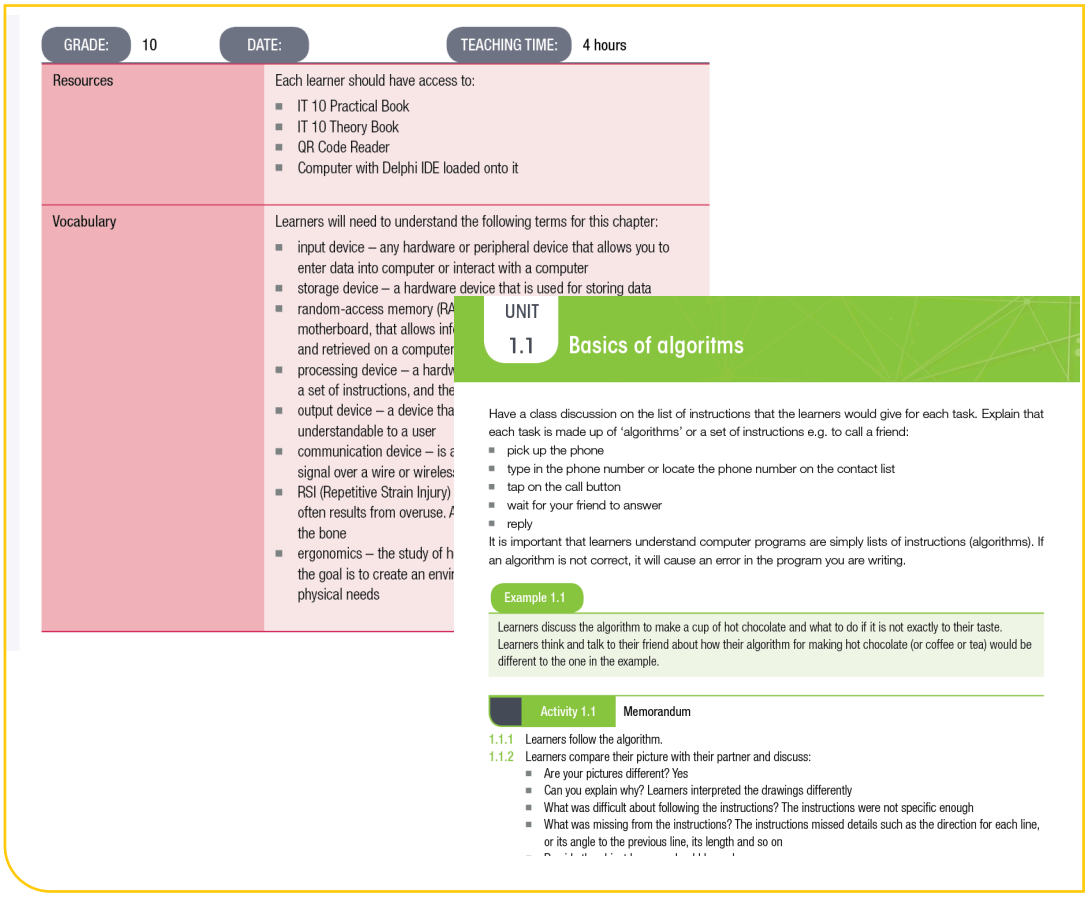
Unit 1.1 Basics of algorithms
Unit 1.2 Algorithm quality
Unit 1.3 Creating algorithms
Unit 1.4 Flowcharts

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.

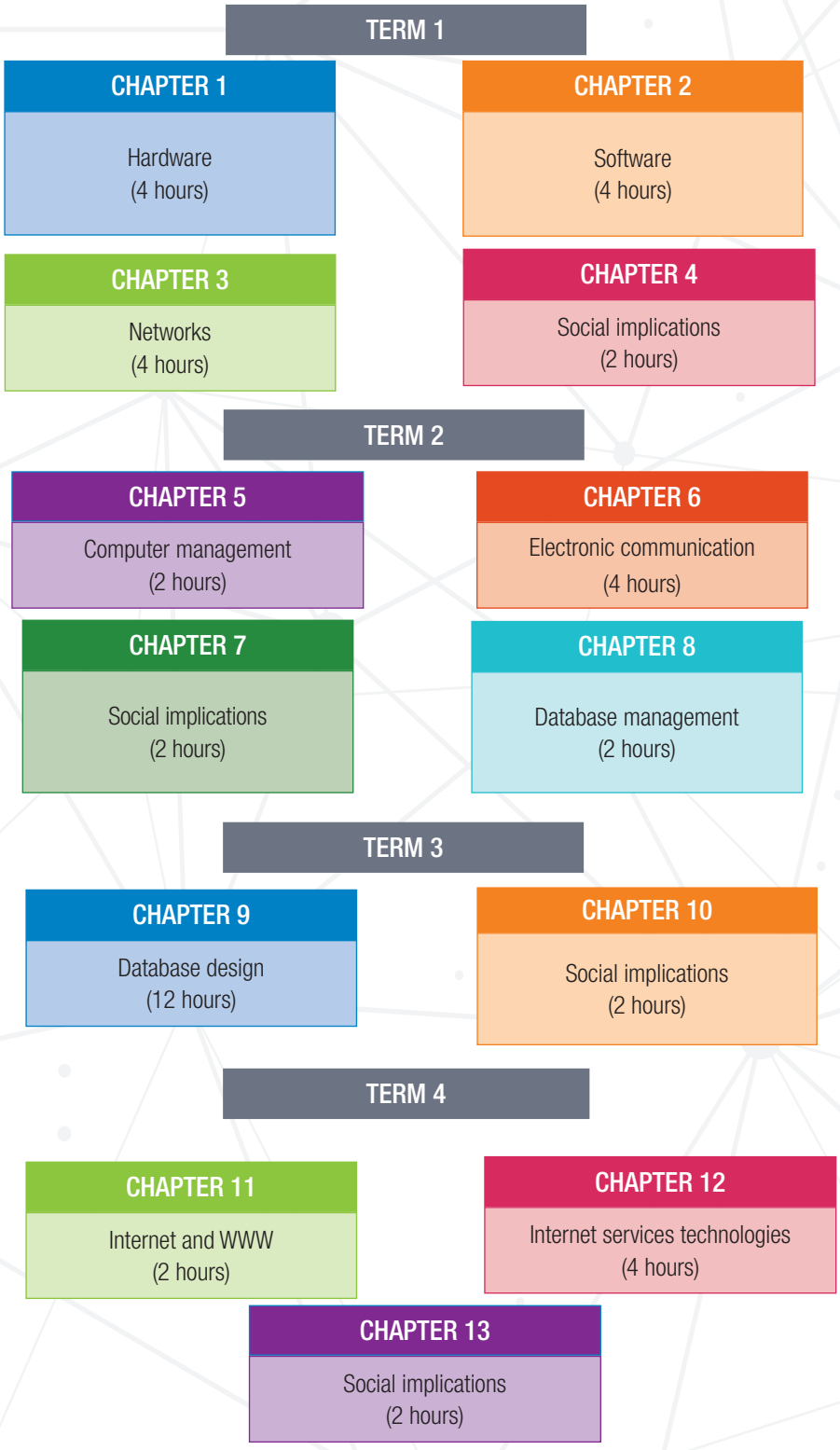
Example 1.1

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)



ANNUAL TEACHING PLAN - OVERVIEW OF TERMS (PRACTICAL)

TERM 1

CHAPTER 1
Errors, debugging and mathematical methods
(8 hours)

CHAPTER 2
Nested loops
(4 hours)

TERM 2

CHAPTER 3
Arrays
(12 hours)

CHAPTER 4
String and date manipulation
(6 hours)

TERM 3

CHAPTER 5
Text files
(10 hours)

CHAPTER 6
User-defined methods
(10 hours)

TERM 4

CHAPTER 7
User interfaces
(6 hours)

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

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

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

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	Activity		
		Unit 8.2 Formatting strings	Activity		
		Unit 8.3 Scrolling through a string	Activity		
		Unit 8.4 Manipulating strings	Activity		
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	Activity		
9	PRACTICAL CHAPTER 9: PAT preparation	Unit 9.1 Tools and techniques to create a software solution to a problem	Activity		
		Unit 9.2 A problem-solving approach	Activity		
		Unit 9.3 Analysing user interfaces	Activity		

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.

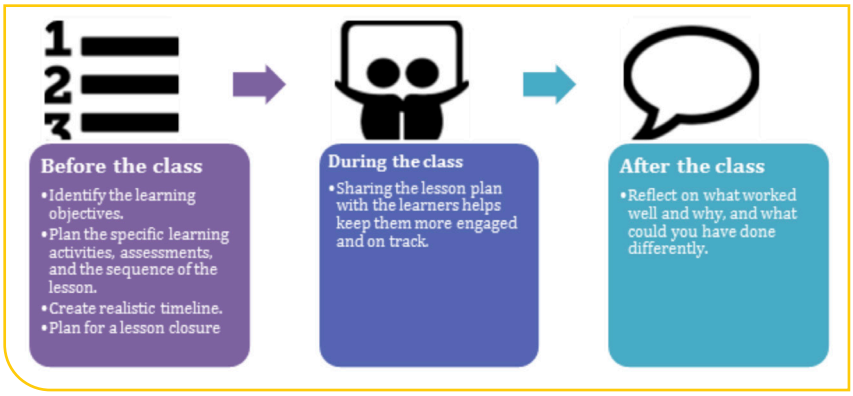
PLANNING

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 11 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

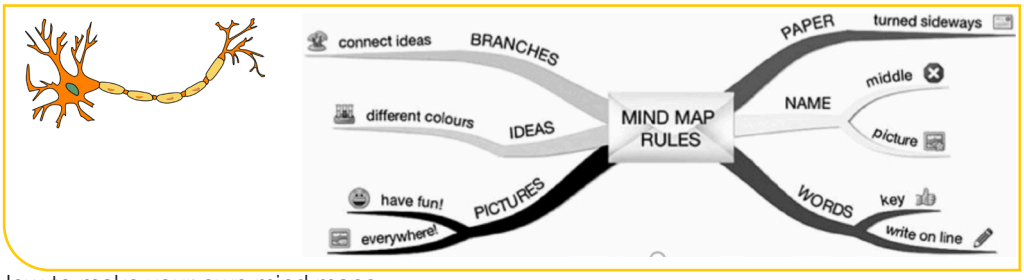
A mnemonic code is a useful technique for learning information that is difficult to remember. This is an example of a word mnemonic using the word BALANCE where each letter of the word stands for something else:

- 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.

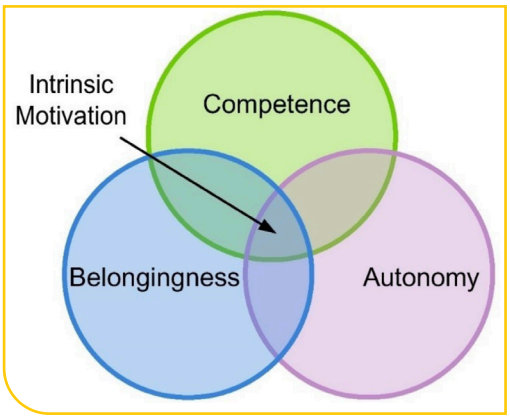
Following are the principles of gameful learning:

- 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.

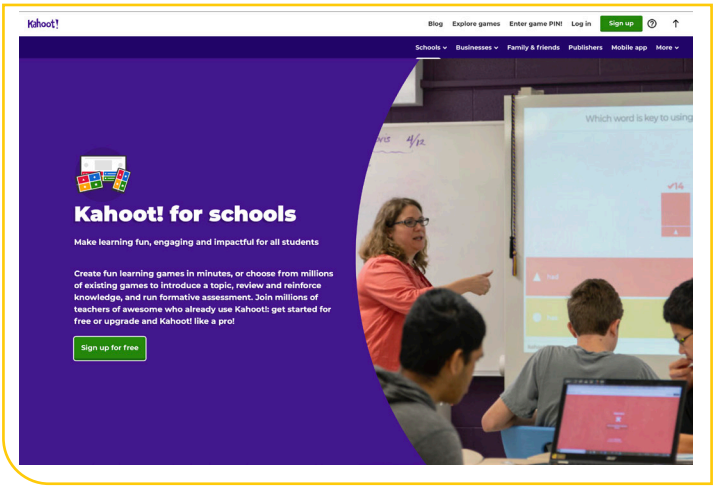
GENERAL TIPS, LINKS AND IDEAS

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:

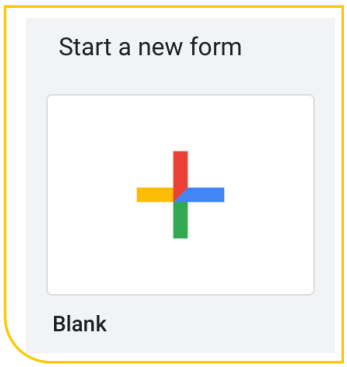
- Learners getting instant feedback to the answers.
- Teachers getting a full report on the performance of the learner.
  Link: forms.google.com

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

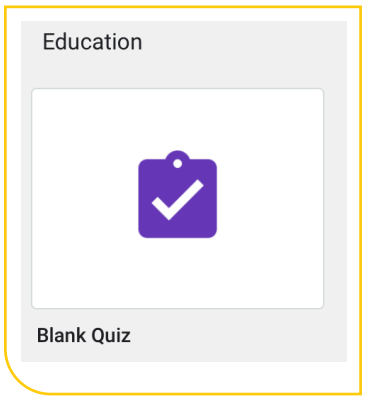
To create a new quiz:

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.

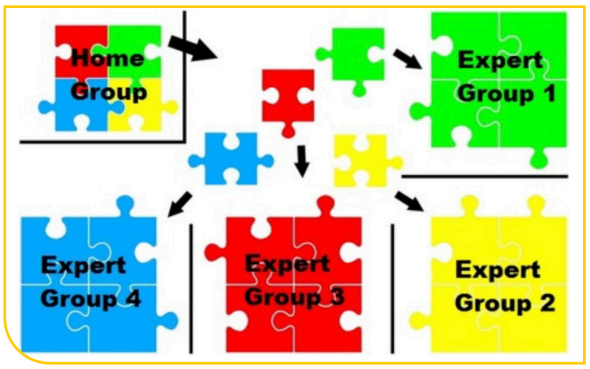


PUZZLEMAKER

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.

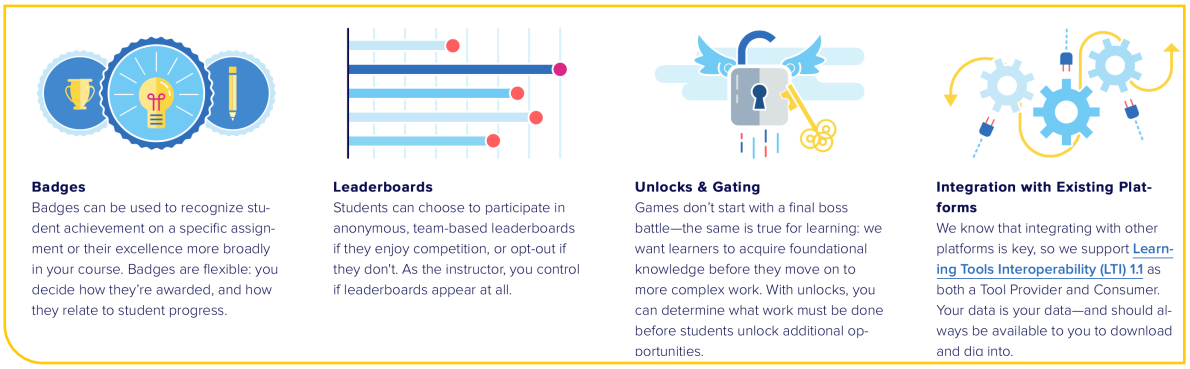
Afterwards, learners must complete a post-assessment questionnaire.

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.

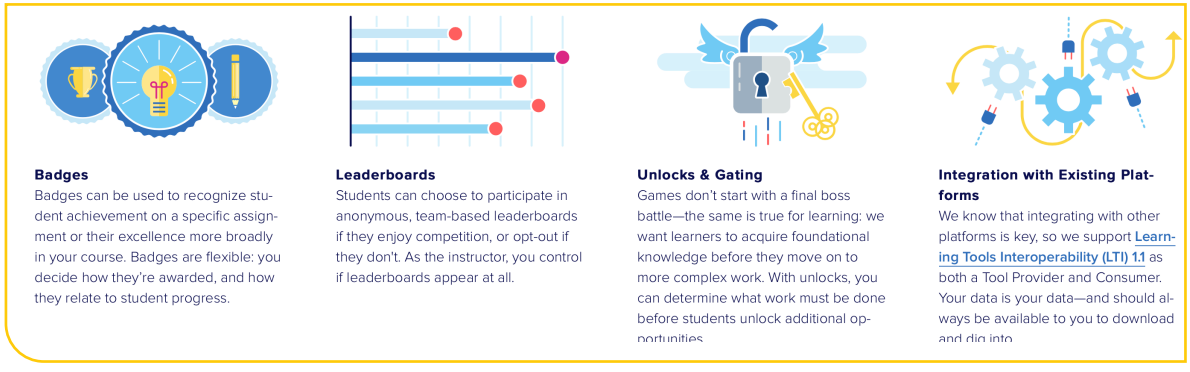


Badges
Badges can be used to recognize student achievement on a specific assignment or their excellence more broadly in your course. Badges are flexible: you decide how they're awarded, and how they relate to student progress.

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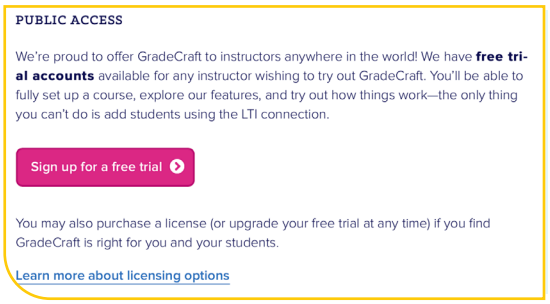
Link: https://www.gradecraft.com/

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

HARDWARE

CHAPTER 1

CHAPTER OVERVIEW	
Unit 1.1	Motherboard
Unit 1.2	Purpose and role of cache memory and caching
Unit 1.3	Memory as part of a computer system
Unit 1.4	Computer performance

The following learning outcomes are covered by this chapter:

- describe the motherboard
- describe the purpose and role of the motherboard
- describe the purpose and role of components that form part of the motherboard
- describe the purpose and role of expansion cards
- explain how data is transferred between computer components
- describe caching and web caching
- describe memory as part of a computer system

GRADE: 10	DATE:	TEACHING TIME: 4 hours
Resources	Each learner should have access to: • IT 11 Practical Book • IT 11 Theory Book • QR Code Reader	
Vocabulary	Learners will need to understand the following terms for this chapter: • CPU – the processing unit responsible for processing general instructions • GPU – the part of a computer responsible for processing the instructions that create a picture on the screen • bus – a communication system transferring data between components inside a computer, or between computers • world wide web – refers to the millions of websites that are hosted on the internet	

INTRODUCTION

In Grade 10 learners were introduced to several different input-, processing-, output-, and storage devices. In this chapter their knowledge of hardware will be extended as they learn more about the component connecting these devices – the motherboard. They will learn about computer memory, including RAM and ROM, in greater detail, and will be introduced to new and interesting concepts to expand their knowledge of computers and computer programming.

Activity 1.1 Memorandum

1.1.1 Here are the answers to the crossword puzzle:

Down:

1. Hardwared
4. Router
5. HDMI
6. CPU

Across:

2. Display
3. Memory
7. Mouse

UNIT 1.1

Motherboard

Read the scenario on page 3 of the Theory Book. Ask learners what they think the motherboard would be in this scenario. In the human body, the spinal cord is responsible for connecting all limbs and sending signals from one body part to another. Explain that in a similar way, a computer's motherboard is responsible for connecting all the hardware devices and sending signals from one device to the next. So, you could say that the spinal cord in the human body and the motherboard of a computer serve the same purpose. .

In this unit learners are introduced to the motherboard. They will learn about the purpose, role and components of a motherboard. Work through the table given in the textbook on pages 4 to 8 and discuss the different slots found on the motherboard. If possilbe, allow learners to work with the physical components.

Activity 1.2 Memorandum

1.2.1
- a. E
- b. E
- c. A
- d. B
- e. D
- f. B
- g. C
- h. E

1.2.2
- 1. I
- 2. H
- 3. A
- 4. E
- 5. C
- 6. B
- 7. G
- 8. H
- 9. D
- 10. D

1.2.3
- i. The BIOS is the first set of instructions that run every time a computer is started up.
- ii. POST (Power On Self Test), when POST is complete the bios then attempts to load the operating system through a program known as a bootstrap loader, which is designed to locate any available operating system; if a legitimate OS is found, it is loaded into the memory. The BIOS can play a role in computer security. The BIOS is the first software to take control of your computer when you turn it on.
- iii. The BIOS is stored on your computer's ROM (Read only memory).

UNIT 1.2

Purpose and role of cache memory and caching

Before you begin this unit, ask learners to think about what they think cache memory and caching refer to. Note down their ideas on the blackboard.

Explain to your learners that caching refers to a small, temporary form of storage that is created in a fast form of memory so that the data can be accessed more quickly. Read through the different forms of caching on page 11 of the Theory Book and explain any new terminology to your learners.

Case Study

Read the Case study on page 11 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.

UNIT 1.3

Memory as part of a computer system

In this unit learners are introduced to the different types of memory and their uses. Work through the discussions about the different types of memory on pages 12 - 14 of the Theory Book with your learners. Make sure they understand how memory can be classified and are able to explain the purpose of each type of memory. Next, ask learners to work in small groups and assign one type of meomory to each group. The groups can re-read the information information on pages 12 - 14 before they present their type of memory 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. True
b. True
c. False
d. True
e. True
f. True
g. True
h. False

1.3.2 a. 3.9 GB
b. The basic purpose of cache memory is to store program instructions that are frequently re-referenced by software during operation.
c. The more cache there is, the more data can be stored closer to the CPU. Cache memory is beneficial because: Cache memory holds frequently used instructions/data which the processor may require next and it is faster access memory than RAM, since it is on the same chip as the processor.

1.3.3 The magnetic interference from the magnet interrupted the processing unit of the computer.

1.3.4 a. RAM (Random-Access Memory) is the short term memory of the computer which can store and retrieve active programs and data at very high speeds.
ROM (Read-only memory) stores the motherboards operating software, called the BIOS.
b. Yes, it is true, you can connect to your computer and set windows to use it as virtual memory.
c. WIFI Card, Ethernet Card, Sound Card.
d. The Cache memory is located near or on the motherboard and most motherboards wont support upgrading the CPU hence not being able to upgrade the CPU.

UNIT 1.4

Computer performance

So far learners have been taught about how a computer's motherboard and the different slots and components thta can be connected to the motherboard. They have also looked at the different types of memory and their purposes.

Ask your learners to think about how they can use this knowledge to make sure they buy or build a computer that would best suite their needs. Write the ideas on the board. Refer your learners to Table 1.3 on page 16 of the Theory Book. This table summarises the different hardware devices, their purpose and performance factors.

Allow learners some time to read through the information then refer back to what is written on the board. Ask them to identify anything they want to change. Once complete, learners may complete Activity 1.4.

Activity 1.4 Memorandum

1.4.1 a. B b. D
c. A d. D
e. C

1.4.2 1. D 2. B
3. E 4. C
5. A

1.4.3 a. C b. D
c. B

1.4.4 a. True b. True
c. False. The speed of the CPU is a direct measurement of how many instructions it can complete per second.
d. True
e. False. Data that the computer is using, is temporarily stored by the cache and RAM.
f. True g. True
h. False. Your computer (or CPU's) cache is a faster form of memory, used to send and store all the information the CPU needs.
i. False. Storage speed is important when opening a program or a large data file.
j. False, The storage speed is important.
k. True
l. False. Network speed also affects the computer's performance. If the time to download a video is longer than the video time, the video will stutter if you try to play it on YouTube.
m. True n. True
o. True

1.4.5 a. the speed and architecture of its processor or CPU, how much random access memory (RAM) it has, its graphics system, and its internal hard drive speed and capacity
b. The processor's cache is the onboard memory, used to store information so the processor can access it quickly. The more cache your CPU has, the more data it can store and the faster it can run processes
c. RAM memory is the temporary, volatile memory in your PC. Unlike stored memory, RAM works only when the PC is turned on. The operating system relies heavily on RAM for smoothly running tasks. Not having enough RAM for the processes you're trying to run can tellingly cause your computer to slow down.

1.4.6 **a.** the speed and architecture of its processor or CPU, how much random access memory (RAM) it has, its graphics system, and its internal hard drive speed and capacity

b. It will slow your computer's processing power down dramatically

c. Any three of the following:

- When opening a program or opening a large data file, at which point all the data needs to be transferred from your storage device to your RAM.
- When loading your operating system, since all your operating system's data and processes need to be loaded into your RAM.
- Installing large applications on a storage device, since the new files need to be created on the storage device.
- When storing large amounts of data on a storage device (such as saving a large video to hard drive).
- When transferring data between two storage devices (such as copying files from one drive to another).

1.4.7 **a.** The overloading or overclocking of the CPU

b. - Not having enough RAM
- The computer space has reached maximum capacity.
- The computer's hardware being obsolete.

c. She can update her computers hardware as well as gain access to faster network speeds.

1 a. A
b. D
c. A
d. A
e. A
f. C
g. A
h. D
i. A

2. a. True
b. False, the RAM is the short-term memory
c. False, the path connecting different components on a Motherboard is called a bus.
d. False, Flash dries use the same technology as SSD's but usually have a smaller capacity and are designed to be a portable form of storage.
e. True.

3. – Provides physical structure for other hardware
– Provides power to the hardware.

4. An HDMI port is a connective slot in which you can plug in a high-resolution screen or projector.

5. They can be used to transmit digital video between devices, they an also be used to transmit audio signals between devices (high-definition sound, Ultra HD video signals).

6. Busses are used to connect different components on a motherboard. It is used by simply inputting another component such as a Wi-Fi card to the motherboard.

7. a. i. Modular design means that rather being made from a single component, it is built from several components (or modules).
ii. – Parts can easily be replaced.
– It is more versatile allowing you to design your computer as you see fit.
b. i. Random Access Memory
ii. RAM is temporary memory used to store data that the computer is currently still using.
iii. – Runs applications in the background.
– Stores instructions the computer is busy with
– Stores instructions the computer might need next.
iv. A module.
c. i. Caching is storing data so the future requests for that data can be served faster.
ii. Software caching and Hardware caching
iii. Hardware and Software

SOFTWARE

CHAPTER 2

CHAPTER OVERVIEW	
Unit 2.1	Types of operating systems
Unit 2.2	Compilers and interpreters
Unit 2.3	Overview of processing techniques
Unit 2.4	Virtual machines and virtualisation

The following learning outcomes are covered by this chapter:

- describe the various types of operating systems in terms of cost, size, hardware
- needed and platform
- explain what language compilers and interpreters are
- describe and compare three different processing techniques: multi-tasking,
- multi-threading and multi-processing
- give the purpose and examples of virtual machines
- describe virtualisation.

GRADE: 11 DATE: TEACHING TIME: 4 hours

Resources	Each learner should have access to: • IT 11 Practical Book • IT 11 Theory Book • QR Code Reader
Vocabulary	Learners will need to understand the following terms for this chapter: • virtualisation: – refers to the act of creating a virtual (rather than actual) version of something • utilities – small programs which help users to maintain their computers • system software – a type of computer program that is designed to run a computer's hardware and application programs • user interface – the way in which people interact with computer programs or a website • driver – a set of instructions that tells the operating system how to communicate with a specific piece of hardware stand-alone operating

GRADE: 11	DATE:	TEACHING TIME: 8 hours
Vocabulary	Learners will need to understand the following terms for this chapter: • system – a complete operating system that works directly on a computer (or smartphone) to make sure that the tasks of the operating system are completed network operating • system – an operating system that is designed to help other computers on a network • embedded operating system – an object, software or hardware that is independent and does not need an external program or device to run it • machine code – The executable instruction code provided by all running computer system programs and applications • binary – describes a numbering scheme in which there are only two possible values for each digit: 0 and 1 • hexadecimal – describes a numbering system consisting of 16 digits [0 ... 15] • multitasking – the ability of the OS to quickly switch between many computing tasks to give the impression the different applications are executing simultaneously • multithreading – operations within a single application are divided into threads. Each of the threads can run in parallel. The OS divides processing time among each thread within the application • threads – a way for a program to split itself into two or more simultaneously running tasks

INTRODUCTION

Explain to your learners that there is an old saying that states that hardware is any part of a computer that can be hit with a hammer when you are angry, while software is the parts of a computer that can you can only shout about. This perfectly captures the idea that hardware refers to physical components (something you can touch... or hit with a hammer) while software refers to digital items made up of 1s and 0s that tell your computer what to do.

In this unit learners will be introduced to different types of software, operating systems and virtualisation.

Activity 2.1 Memorandum

2.1.1 System software and Application Software

2.1.2 – Provides a user interface for users to interact with, and manage the resources of a computer
– manages and interprets signals sent and received from your hardware.

2.1.3 The operating system processes thousands of small tasks to ensure your computer continues to run smoothly, the OS is the low-level software that supports a computer's basic functions, such as scheduling tasks and controlling peripherals.

2.1.4 – managing a computer's memory and storage
– monitoring your hardware's performance
– providing an interface for users to interact with the computer.

2.1.5 Stand alone operating systems makes sure that the tasks of the operating systems are completed, network operating systems are designed to help other computers on a network.

2.1.6 It is possible to run two operating systems on one computer at the same time. The process is known as dual-booting, and it allows users to switch between operating systems depending on the tasks and programs they're working with.

UNIT 2.1

Types of operating systems

In this unit learners are introduced to three types of operating systems. For each one they will learn about its:

- **description and purpose**: What the type of operating is and what it does.
- **cost**: How expensive it is to purchase, own or use a computer with this operating system.
- **size**: How much storage space is required for the type of operating system.
- **hardware**: What hardware is needed for the operating system.
- **examples**: Different examples of the type of operating system.

Activity 2.2 Memorandum

2.2.1 Here are the answers for the crossword puzzle:

Across

1. Stand-alone
2. Embedded
3. Android

Down

1. Embedded
2. Distributed
3. Linux
4. Network

Compilers and interpreters

To see the difference between a high-level programming language and machine code, compare the following two programs. The first program is written in a high-lel programming language while the second program is written in machine code. Both programs display the message “Hello, World!” on the screen
.

High-level programming language	Macine code
[CODE] print (“Hello, World!”) [END CODE]	[CODE] b8 21 0a 00 00 a3 0c 10 00 06 b8 6f 72 6c 64 a3 08 10 00 06 b8 6f 2c 20 57 a3 045 10 00 06 b8 48 65 6c 6c a3 00 10 00 06 b9 00 10 00 06 ba 10 00 00 00 bb 01 00 00 00 b8 04 00 00 00 cd 80 b8 01 00 00 00 cd 80 [END CODE]

High-level programming language is a lot easier for people to read. Unfortunately, the CPU cannot understand this program since it only understands machine code. To solve this problem, you need to use an interpreter or compiler that will convert the programming language that is easier to read into machine code.

Activity 2.3 Memorandum

2.3.1 Programming code interprets and sends code to the CPU line by line, while machine code translates and compiles entire program before sending it to the CPU. Programming code is faster to open but slower once it is open, while machine code is slower to open but faster once it is open. Programming code continues interpreting and running the code until an errors occurs, at which point the program crashes, while machine code stops compiling the moment an error occurs, which means the program new opens.

2.3.2 a. An interpreter reads the first line of the code, interprets the code and sends it to the CPU to be processed.

b. An Interpreter translates code

c. Slower to open program, but faster once opened.
Translates and compiles entire program before sending it to the CPU.

d. It is faster once opened.

UNIT 2.3

Overview of processing techniques

Ask learners to imagine that their music player needed to be unloaded from memory (i.e. closed) everytime they received a WhatsApp message!

Explain to them that even if they only run one or two tasks on their phones, most operating systems will have dozens of system programs also running at the same time. Work through the example on page 30 of the Theory Book, and if possible, allow them to complete the tasks on their computers. Ask some learners to share how many processes are running on their CPUs with the rest of the class.

Work through the differences between multitasking, multithreading and multiprocessing, carefully working through the examples given. Once complete, ask learners to complete Activity 2.4 on page 34 of the Theory Book.

Activity 2.4 Memorandum

2.4.1

a. five

b. process

c. Any two of the following:

Programs can run in the background: OS services and another type of background services are also given some time to run in the OS. These programs are not visible to a normal computer user. But these programs keep running to maintain other programs run smoothly. Example of background programs is a firewall, anti-virus protection programs etc.

Increase reliability: OS runs smoothly in using multitasking. All type of computer users become satisfied. Either user can run a single program or multiple programs they don't feel any fault in using a computer.

The user can use multiple programs: Multiple programs like MS Word, MS Excel, Photoshop, browser, games, and calculator can run at the same time. This is a big advantage to MOS.

Best use of computer resources: Computer resources like RAM, Processor, I/O devices, hard drive, and Gaming consoles are better managed in MOS.

d. Any one of the following:

Limitation of memory: When a computer user opens many programs at a time, the computer becomes slow. The reason behind is that many programs are loaded into main memory and CPU cannot give good time for each program and response time of completing the job becomes higher. Computers with low RAM usually face this problem. One solution to this is to increase your RAM capacity.

Limitation of the processor: If the processor is slow in the computer then it can process programs slow and manage multiple programs takes longer time. Some heavy programs cannot run smoothly on the slow processor because they need more processing powers.

CPU heat up: By doing multitasking, the processor becomes busy all the time and CPU heats up. To solve this problem you have to attach the cooling system to your CPU. This normally happens when you play heavy games on your PC.

2.4.2

a. Learner dependent answer.

b. Learner dependent answer.

Virtual machines and virtualisation

Explain to your learners that the word virtual means “almost exactly, but not technically, the same”. For example, virtual reality aims to create a virtual world that feels like the real world but is an electronic recreation of the world. To do this, modern virtual reality headsets give users a detailed, high quality 3D picture that moves as they look in different directions in real life. These headsets can be combined with surround sound to replace a user’s vision and hearing with those of a “virtual reality”.

In the same way, virtual machines are treated in the same way as a real computer. Read through the introductory text and the uses of virtual machines on page 35 of the Theory Book.

Activity 2.5 Memorandum

2.5.1 A virtual device acts as a node and is allocated its own virtual hardware, CPU, RAM and storage space.

2.5.2 Virtual machines can be used to install an application that might contain a virus. Testing it on a virtual machine will allow you to see if the application contains a virus. If it does, you can simply delete the entire virtual machine.

2.5.3 **Advantages**: Allow users to install operating systems. If you wanted to test out an open source operating system like Ubuntu, then a virtual machine allows you to do so without interferring with your computer. Virtual machines can be used to install an application that might contain a virus. Testing it on a virtual machine will allow you to see if the application contains a virus. If it does, you can simply delete the entire virtual machine. The image of the virtual harddrive can be used to back up your computer, or to transfer all your data to a new computer. Virtual machines enable mobile developers to develop applications for different versions of Android and iOS without having to own hundreds of different devices.

Disadvantages: You need a powerful computer. Operating systems and programs will run slower in virtual machines. If you have a problem in the computer that hosts the host operating system, the service may fall in the entire virtual machine.

1. a. C
   b. D
   c. B
   d. A
   e. D
2. a. True
   b. False. Embedded operating systems are almost always sold as part of the hardware devices.
   c. True
   d. False, Linux is an example of an open source operating system.
   e. True
3. System software is software designed to provide a platform for other software.
4. – It manages and interprets the signals sent and received by your hardware.
   – it manages a computer's memory and storage.
5. A network operating system is an operating designed to help other computers on a network.
6. Any two of the following:
   – The "keep it simple, stupid" principle is necessary in medium-to-large programming projects.
   – The "don't repeat yourself" principle is crucial for clean and easy-to-modify code.
   – When writing code, you want to avoid duplication of data and duplication of logic.
   – Aim to make your code open to extension but closed to modification.
   – Every class or module in a program should only concern itself with providing one bit of specific functionality.
   – The "you aren't gonna need it" principle is the idea that you should never code for functionality that you may need in the future. Chances are, you won't need it and it will be a waste of time — and not only that, but it will needlessly increase your code's complexity.
7. An interpreter reads the first line of the code, interprets it into machine code and sends it to the CPU to be processed.
8. – Multitasking
   – Multiprocessing
   – Multithreading
9. Virtual machines each have their own operating system and its own applications installed. The different virtual machines do not have access to the main computer or any of the other virtual machines. They don't realise that they are virtual machines, so they see the RAM, CPU and storage space allocated to them as if those were physical devices.
10. a. Learner dependant answer.
    b. Operations within a single application are divided into threads. Each of the threads can run in a parallel. The OS divides processing time among each thread within the application. For example downloading a large file on the internet and yet still being to continue browsing the internet.
11. a. Multi-tasking will be able to take place as it can be done with the use of a single processor
    b. Multi-processing will not be able to be used as the computer he is running has a single core processor and in order to utilise multiprocessing, it requires the use of multiple processors.
12. – Multithreading completes the instructions for multiple different tasks inside the same program by quickly switching between them, whereas multiprocessing uses multiple processors to complete tasks.
    – Multithreading allows your computer to split tasks into multiple threads, whereas multiprocessing allows you to process multiple threads at the same time.
13. a. Virtual memory is the increase of the capacity of the RAM by creating a temporary or dedicated file on the hard disk drive.
    b. Virtual memory is a memory management capability of an operating system (OS) that uses hardware and software to allow a computer to compensate for physical memory shortages by temporarily transferring data from random access memory (RAM) to disk storage.

TERM 1

CHAPTER 3

NETWORKS

CHAPTER OVERVIEW	
Unit 3.1	Overview of physical aspects of a network
Unit 3.2	Overview of network innovation

The following learning outcomes are covered by this chapter:

- list and describe network communication and data transmission
- list and describe the physical limitations of networks
- describe network innovations. including VOIP, VPNs and location-based computing
- define and provide examples of location-based services websites.

GRADE:	11	DATE:	TEACHING TIME:	4 hours

Resources	Each learner should have access to: • IT 11 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: • mesh – a type of network in which a device (node) transmits its own data as well as serves as a relay for other devices (nodes) virtual private network • VPN – an encrypted connection over the internet from a device to a network • GPS – a system of satellites, computers, and receivers that allows land-, sea-, and airborne users to determine their exact location, velocity and time 24 hours a day in all weather conditions, anywhere in the world

INTRODUCTION

In this chapter, learners will be taught more about networks, the way in which data is transferred over a network, different network hardware requirements, the limitations of networks and how data is transferred on different networks.

Activity 3.1 Memorandum

3.1.1 a. A Network is an incredibly powerful tool the most modern people and businesses depend on daily, networks have multiple uses such as: sharing resources, organising information, connecting people and providing access to entertainment.

b. – Having a network allows or grants access to the internet
– Having a network allows people and businesses to conduct successful daily lives.

c. – You are open to being exposed to network crimes.
– You are also open to things such as cyberbullying and abuse over networks.

d. Wi-Fi as it is more suitable for wireless network connections over a shorter distance, which is perfect for homes.

UNIT 3.1

Overview of physical aspects of a network

In this unit learners will learn about the physical aspects of a network. Explain to your learners that the larger and more complicated a network becomes, the harder it is to maintain and the more network administrators you will need to keep everything working.

Another important limitation of the internet is the ability to connect South Africa's networks to the international networks. For example, for a South African citizen to open websites hosted in the United States of America, the network traffic needs to travel along a massive fibre optic cable running between the countries. This cable (called a submarine cable) needs to travel thousands of kilometres underwater in order to connect the countries. Since these cables are an incredible investment, there are very few that connect Africa to the rest of the world. Furthermore, access to these cables is generally controlled by only one or two companies. Until more cables are built, the existing cables will provide the upper badwidth limit for Africa.

As a class, read through the text on pages 39 to 41 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 3.2 on page 42 of the Theory Book. Moderate their answers.

Activity 3.2 Memorandum

3.2.1

	PAN	HAN	LAN	WAN
Composition (Topology, how is everything connected)	Star topology	Star topology	Star topology or Tree topology	Star topology or Tree topology
Media hardware	computers, smartphones, tablets and personal digital assistants	person's digital devices, from multiple computers and their peripheral devices to telephones, VCRs, televisions, video games, home security systems, smart appliances, fax machines and other digital devices that are wired	devices can be connected by twisted-pair wire, coaxial cables, or fiber optic cables	network adapters, routers, modems (either external or internal) and cables. WANs use telephone lines such as IDSL, routers, and switches
Capacity (how many people or devices can be connected)	up to eight devices	up to 20 devices	up to 45 devices	up to 255 devices at a time

3.2.3

a. Topology is the physical structure of a network in which workstations are connected to the network through the actual cables that transmit data.

b. It very popular as it is easy to connect new devices and they are all connected to one central switch called the central node.

c. The main disadvantage is if the switch fails then the entire network becomes usable.

3.2.4

a. A modem and a router

b. A network card is used to connect to a cabled network.

3.2.5 The purpose of a switch is to connect many computers on the same, wired internal network and has the ability to direct network traffic to the correct port. A router is used to connect different types of networks using one device.

3.2.6 **a.** Wi-Fi and 4G/LTE

b. WIMAX is flexible and low cost, it can be installed quicker than other internet technologies because it uses shorter towers and less cabling.

c. A router.

UNIT 3.2

Overview of network innovation

In this unit learners will be introduced to three different network innovations.

Ask learners to work in small groups and assign one network innovation 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 network innovation, 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 3.3 on page 45 of the Theory Book.

Activity 3.3 Memorandum

3.3.1

	VOIP	VPN	LOCATION-BASED COMPUTING
Definition	Voice over internet protocol	Virtual private networks	Location based computing
Advantages	• Lower costs. • Increased accessibility. • Complete portability. • Higher scalability. • Advanced features for small and large teams. • Clearer voice quality. • Supports multitasking. • More flexibility with softphones	• Enhanced security. • Remote control. • Share files. • Online anonymity. • Unblock websites & bypass filters. • Change the IP address. • Better performance. • Reduce costs.	• Building networks and partnerships. Rewards and discounts. • Building social connection. • Analyse competition.
Disdvantages	• Weak call quality. • Call drop for no reason, the voice quality itself is not good. • Latency on the line.	• A slower internet connection. • Specific blockades of VPN services (for example by Netflix) • Illegal use of VPNs themselves. • Not knowing how strong the encryption provided by your VPN is. • The logging and potential reselling of your internet habits to third parties. • Connection breaks.	• Allow users to inadvertently share their whereabouts with stalkers and other criminals. • Companies can send targeted ads.
Examples	Skype, WhatsApp, Facetime		Weather applications, Uber

Activity 3.3 Memorandum..*continued*

	INTERNET	INTRANET	EXTRANET
Use	Web browsing	Provides a locked private network	Used in companies for employees to get the benefits of the intranet when they are not in the sae physical space as the local network
Advantages	• Information, knowledge, and learning. • Connectivity, communication, and sharing. • Address, mapping, and contact information. • Banking, bills, and shopping. • Selling and making money. • Collaboration, work from home, and access to a global workforce. • Donations and funding. • Entertainment.	• Improves internal communication. • Connects your company across locations and time zones. • Helps employees find information. • Boosts recognition and reward. • Simplifies employee onboarding. • Provides organisational clarity. • Encourages knowledge sharing. • Reinforces your brand and values.	• Increased productivity. • Reduced margin of error. • Flexibility. • Timely and accurate information. • Shorter time to market. • Reduced inventory. • Build customer loyalty.
Disdvantages	• Bullying, trolls, stalkers, and crime. ... • Pornographic and violent images. ... • Addiction, time waster, and causes distractions. ... • Never being able to disconnect from work. ... • Identity theft, hacking, viruses, and cheating. ... • Spam and advertising. ... • Affects focus and patience. ... • Depression, loneliness, and social isolation.	• Costly and timely implementation. Intranet can be very costly and time-consuming to implement. • Complexity and heavy admin burden. ... • Poor user experience. • Low user adoption. • Time-consuming information search. • Decreased employee productivity. • Internal use only. • Lack of employee advocacy.	• Can be expensive to implement and maintain within an organisation (e.g., hardware, software, employee training costs), if hosted internally rather than by an application service provider. • Security of extranets can be a concern when hosting valuable or proprietary information.

1. a. D
   b. B
   c. B
2. a. True
   b. True
3. A router connects different types of networks using one device and the purpose of the switch is to connect many computers on the same, weird internal network and has the ability to direct network traffic to the correct port.
4. The purpose of a modem is to connect a computer or network to the internet
5. A VPN allows computers connected to it to access all the private network resources shared on the network.
6. a. Home area network (HAN)
   b. It enables all devices to share resources. It allows the computers on the HAN to communicate directly with one another.
   c. The router allocates IP addresses; provides internet connectivity to all devices; all connected devices are able to share resources on the network; the router allows all connected devices to transfer files, send messages and even play LAN games.
   d. Star topology
7. a. – It enhances communication and availability of information.
   – It allows for more convenient resource sharing.
   – It makes file sharing easier.
   – It is highly flexible.
   – It is an inexpensive system.
   – It increases cost efficiency.
   – It boosts storage capacity.
   b. A computer network is a digital telecommunications network for sharing resources between nodes, which are computing devices that use a common telecommunications technology. Data transmission between nodes is supported over data links consisting of physical cable media, such as twisted pair or fibre-optic cables, or by wireless methods, such as Wi-Fi.
   c. i. network cables, nodes, transmitters and receivers
   ii. network cables
   iii. WAN

SOCIAL IMPLICATIONS

CHAPTER 4

CHAPTER OVERVIEW	
Unit 4.1	The social implications of location-based computing
Unit 4.2	Ethical and legal issues of network use policies and practices
Unit 4.3	Capabilities and limitations of ICTs

The following learning outcomes are covered by this chapter:

- discuss the social implications of location-based computing
- explain the ethical and legal issues of network use policies and practices
- understand the capabilities and limitations of ICTs.

GRADE: 11 DATE: TEACHING TIME: 2 hours

Resources	Each learner should have access to:
	• IT 11 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

INTRODUCTION

Explain to your learners that the introduction of computers in our daily lives has created various issues in our society. These include, legal, ethical, economical issues as well as issues with regard to the digital divide. In this unit, they will be looking at the social issues applicable to all content that we have covered thus far in Term 1.

UNIT

4.1

The social implications of location-based computing

In Chapter 3 learners were taught about location-based computing. Read through the text on page 49 of the Theory book. Ask some learners to share their experiences with location-based computing. They need to include whether it was helpful or harmful.

Once you are satisfied that learners have a grasp on this concept, assign Activity 4.1 on page 49 as a homework activity. Ask learners to read both articles and to think about the questions at the end of the second article. Once back in class, hold a class discussion and allow learners to provide feedback.

Activity 4.1 Memorandum

4.1.1 Learner dependent answer.

4.1.2 **a.** Learner dependent answer. Accept all reasonable answers.

b. Learner dependent answer. Accept all reasonable answers.

Ethical and legal issues of network use policies and practices

As a class, read through the three scenarios on page 52 of the Theory book. Once complete, ask learners to complete Activity 4.2 on their own.

Activity 4.2 Memorandum

4.2.1 Learner dependent answer. Accept all reasonable answers.
4.2.2 Learner dependent answer. Accept all reasonable answers.
4.2.3 Learner dependent answer. Accept all reasonable answers.
4.2.4 Learner dependent answer. Accept all reasonable answers.
4.2.5 Learner dependent answer. Accept all reasonable answers.
4.2.6 Learner dependent answer. Accept all reasonable answers.
4.2.7 Learner dependent answer. Accept all reasonable answers.

UNIT 4.3

Capabilities and limitations of ICTs

In this unit learners will think about the work they have covered thus far for Term 1. They look at the various capabilites and limitations of ICTs and how it can impact on a company's performance. Work through the lists of capabilities and limitations. Explain any difficult words and terms that learners may find difficult.

Activity 4.3 Memorandum

Accept all reasonable answers. Here are some examples of what learners may use:

- Portable device such as laptops, PDAs and mobile phones are limited by their battery life. These devices only remain charged for so long before they need to be plugged into the mains. Some devices have small screens and keyboards making it difficult to read large amounts of text. Some portable devices are heavy (especially laptops). This does not make them ideal for carrying around. You may not have the funds to purchase the required equipment, not have access to the equipment, or the features you need. For example, it would be difficult for the average home user to use designs to create 3D printouts due to availability and cost. The hardware needs to be reliable. Necessary hardware and software can be expensive. IThe faster a processor on a computer, the quicker it can process data.
- Off-the-shelf software may be less expensive but is less likely to contain all the features needed, and will have unneeded features. If bespoke software is poorly written it may not take the needs of the user into account and maybe inefficient. Interfaces maybe poorly designed meaning using the system could be frustrating and time consuming.
- The operating system can limit the software and hardware that can be used. If the system only requires text inputs then a command-line operating system may do. If the system is intended for novice users then GUI would be more appropriate.
- If the systems requires lots of transmission of data using the internet and the band-width available is small, the system would not run efficiently. Conference calls may not be possible due to the limits in band-width.
- If poor, inaccurate data is collected, the information provided will be unreliable.

1. For all the apps: Users could unintentionally share their location and calendar with people who are trolling the internet looking for someone to take advantage of. Stalkers could find you easily and child or adult traffickers will know where you are at all times and could abduct you.
2. For all the apps: The use of wireless networks to connect to your friends and contacts is now standard practice. Highly confidential information is often shared on unsecured networks using mobile devices. Anyone can hack the devices that are connected to an unsecured network and take information from these devices. These networks range from coffee shops to public spaces, such as airports, to home networks that are often not password-protected and can be connected to free Wi-Fi.
3. For all the apps: Your friends and family will always know where you are and if anything bad happens, they can use the app to track your phone and find where you are. The disadvantages are discussed in Questions 1 and 2 above.

CHAPTER 1

ERRORS, DEBUGGING AND MATHEMATICAL FUNCTIONS

CHAPTER OVERVIEW	
Unit 1.1	Errors, debugging and validation
Unit 1.2	Mathematical methods

The following learning outcomes are covered by this chapter:

- consolidation of knowledge of the work done in Grade 10
- use the different mathematical methods: Random(), RandomRange(), Round(), Trunc(), Frac(), Ceil(), Floor(), Sqr(), Sqrt(), Inc(), Dec(), Pi and Power()
- use the mathematical methods to solve programs.

GRADE: 11 DATE: TEACHING TIME: 8 hours

Resources	Each learner should have access to: • IT 11 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

In this chapter, learners will revise work done in Grade 10. The chapter serves to consolidate prior knowledge learnt before moving on to teaching mathematical methods. Explain to your learners that they will use mathematical methods to solve problems during the duration of this year.

UNIT 1.1

Errors, debugging and validation

Programming errors can generally be grouped into three categories: syntax errors, runtime errors and logic errors.

Activity 1.1 Memorandum

1.1.1 Runtime error: This is a program error that occurs while the program is running. The program compiles, but something happens during execution and causes it to crash.
Logical error: The program compiles and executes successfully, but the output is incorrect, for example, if you have a math formula or algorithm incorrect.
Syntax error: Some part of the code was written wrong, and the code cannot compile until it is fixed, for example, if you misspelled a keyword, or used a colon instead of a semicolon to end a statement.

1.1.2 Here are some examples – accept all reasonable answers:

a. Syntax errors
- leaving out a semicolon at the end of a statement
- adding a semicolon at the end of a line which is not the end of a statement (for example, in an IF-THEN-ELSE statement)
- leaving out the command "var" when declaring variables
- assigning a variable using the equals sign
- making a typing mistake in the name of a variable
- not surrounding strings with the single quotation marks
- supplying variables to a function in the incorrect order or supplying an incorrect number of variables to a function

b. Runtime errors
- doing mathematical calculations on strings
- performing illegal mathematical operations (such as dividing numbers by 0)
- reading and using values from empty textboxes
- reading a list value that has not been created
- activating a ListBox's OnClick event when nothing is selected
- combining strings and numbers without changing their data types

c. Logic errors
- misspelled identifier
- previous statement not separated by semicolon
- semicolon immediately before else
- use of = instead of := for simple assignmen
- use of = instead of := for assigning control variable in for loop
- variable given same identifier as the program
- use of double quotes instead of single quotes to enclose a string

Mathematical methods

Refer learners to pages 6 - 8 of the Practical Book. Explain that a method is a segment of pre-written programming code that performs a specific task that are written by the developers of Delphi. Methods are provided in Units for use by programmers. For example, the Math Unit hosts a collection of mathematical functions. The names of the Units that the programmers are most likely to use are automatically included in the Uses clause of the Unit of the Form.

There are two types of methods: functions and procedures. In this unit learners will be introduced to the mathematical functions ROUND, TRUNC, FRAC, CEIL, FLOOR, SQR, SQRT and PI and the procedures INC and DEC.

Activity 1.2 Memorandum

1.2.1 In the Delphi statement:

a. The functions used are SysUtils and Sytem

b. IntToStr belongs to SysUtils; Round belongs to System

1.2.2 The value of iAns in each of statements is:

a. 8

b. 20

c. 20

d. 22

Activity 1.3 Memorandum

1.3.1 The coded solution can be found in the 01 - Square Cube and Square Root Ans folder.

1.3.2 The coded solution can be found in the 01 - Circle Area and Circumference Ans folder.

1.3.3 The coded solution can be found in the 01 - Learner Alphabet Ans folder.

QUESTION 1

The coded solution can be found in the 01 - Question 1 Ans folder.

QUESTION 2

The coded solution can be found in the 01 - Question 2 Ans folder.

QUESTION 3

The coded solution can be found in the 01 - Question 3 Ans folder.

QUESTION 4

The coded solution can be found in the 01 - Question 4 Ans folder.

CHAPTER 2

NESTED LOOPS

CHAPTER OVERVIEW	
Unit 2.1	Nested loops
Unit 2.2	Using nested loops
Unit 2.3	Creating shapes using nested loops

The following learning outcomes are covered by this chapter:

- describe the concept of a nested loop
- use nested loops in algorithms
- create simple nested loops in applications
- draw shapes using special symbols
- use trace tables to debug a nested loop.

GRADE:	11	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: • cipher – a code. In other words, a secret or disguised way of writing, e.g. "He wrote the messages in a cipher" • number cipher – a cipher each character in a message is converted to an encrypted number • caesar cipher –

INTRODUCTION

Learners were introduced to Loops in Grade 10. They focussed on FOR-loops, WHILE-loops and REPEAT-loops. This year they will use the loops, but will extend their knowledge to include nested loops. Explain to your learners thta a nested loop is a loop within another loop.

UNIT 2.1

Nested loops

Begin this unit by working through the various examples on pages 20 - 21 of the Practical Book. Carefully explain the structure of a nested loop and explain the importance of indenting the loops so that learners can clearly see when one loop begins and ends in comparison to another loop. Let learners practice writing nested loops using pen and paper. Allow them to work in pairs and to check each other's work. Be available to answer any questions or queries as needed.

Guided activity 2.1

Once you are confident that learners understand the concept of working with nested loops on paper, explain that you will be working in Delphi to complete the nested loop in the Guided activity. Work through the activity methodically and assist learners who may be struggling.

Activity 2.1 Memorandum

2.1.1 Here is an algorithm to display the multiplication times table for the numbers 1 to 12:

a. Algorithm

```
For i=1 to 12
begin
    For j=1 to 12
      Display (i * j) on the same line
    Move to the next line -Carriage return
end;
```

b. The coded solution can be found in the 02 - Multiplication Table Ans folder.

2.1.2 The coded solution can be found in the 02 - Multiplication Table Format Ans folder.

Using nested loops

In this unit we revise how to convert binary numbers into decimal numbers.

Guided activity 2.2

Work through the Guided activity with your learners and assist any learners who may be struggling.

Activity 2.2 Memorandum

2.2.1

Line #	BinNum	index	i	Digit	Prod	i <=	i =	j	j <= index	output
1	101									
2		3								
3			0							
4-5				1			T			
6					1					
7		2								
8								F		
10-12						1				
13									1	T
14						2				
13									2	T
14						4				
13									3	F
14			4							
16, 4, 5				2			T			
6					0					
7		1								

Line #	BinNum	index	i	Digit	Prod	i <=	i =	j	j <= index	output
8							F			
10-12					1					
13								1	T	
14					2					
13								2	F	
15		4								
16, 4, 5			3			T				
6				1						
7		0								
8							T			
9		5								
16, 4			4			F				
17										5

2.2.2 The coded solution can be found in the 02 - Binary to Decimal Ans folder.

Guided activity 2.3

Work through the Guided activity with your learners and assist any learners who may be struggling.

Guided activity 2.4

Work through the Guided activity with your learners and assist any learners who may be struggling.

Activity 2.3 Memorandum

2.3.1 The coded solution can be found in the 02 - Decimal to Binary Ans folder.
2.3.2 The coded solution can be found in the 02 - Hexadecimal to Decimal Vice Versa Ans folder.

Guided activity 2.4

The coded solution can be found in the 02 - Cryptographer Ans folder.

Activity 2.4 Memorandum

2.4.1 The coded solution can be found in the 02 - Cryptographer Ans folder.
2.4.2 The coded solution can be found in the 02 - Composite Numbers Ans folder.

Creating shapes using nested loops

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

Example 2.1

Work through the Guided activity with your learners and assist any learners who may be struggling.

Example 2.2

Work through the Guided activity with your learners and assist any learners who may be struggling.

Example 2.3

Work through the Guided activity with your learners and assist any learners who may be struggling.

Activity 2.5 Memorandum

2.5.1 Output

```
1
2 2
3 3 3
4 4 4 4
5 5 5 5 5
```

2.5.2 The coded solution can be found in the 02 - Shapes Ans folder.

QUESTION 1

Correction of code:

```
memDisplay.Lines.Clear;
  for i := 1 to 4 do
    begin
      SLine:='';
      for j := i to 4 do
        sLine:=sLine+IntToStr(j)+' ';
      memDisplay.Lines.Add(sLine);
    end;
```

QUESTION 2

The coded solution can be found in the 02 - ConShapes Ans folder.

QUESTION 3

The coded solution can be found in the 02 - Perfect Numbers Ans folder.

QUESTION 4

The coded solution can be found in the 02 - Multiplication Tester Ans folder.

TERM 2

CHAPTER 5

COMPUTER MANAGEMENT

CHAPTER OVERVIEW	
Unit 5.1	Safety and security
Unit 5.2	Threats
Unit 5.3	Remedies

The following learning outcomes are covered by this chapter:

- discuss computer management issues regarding safeguarding against threats
- provide remedies for safety and security issues.

GRADE: 11 DATE: TEACHING TIME: 2 hours

Resources	Each learner should have access to: • IT 11 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

INTRODUCTION

In 2015, a computer security firm called Kaspersky Inc. uncovered a computer attack by a group of Russian hackers against banks from around the world. These hackers used a phishing attack to infect computers on the bank's internal network with a virus. Once they gained access to a bank employee's computer, they used that computer to gain access to the security cameras inside the bank's offices. Using these cameras, they recorded what everyone in the bank was working on, as well as their usernames and passwords. They also recorded how employees used the bank's internal banking software to transfer money between accounts.

UNIT 5.1

Safety and security

Explain to learners that safety and security when working on a computer, espeically one connected to a network, if of vital importance. Remind them about the different threats to a computer's security they learnt about in Grade 10. These include viruses, adware, ransomware, phishing and spoofing, pharming and spam.

In this unit, learners will look at human error as a threat to a computer and the data on a computer.

Ask learners to complete Activity 5.1 on page 56 of the Theory Book.

Activity 5.1 Memorandum

5.1.1 Learners work in small groups to discuss this question.

5.1.2 GIGO, which stands for "Garbage In, Garbage Out". According to GIGO, if you capture inaccurate, unreliable or nonsense information on your computer then you can expect any program that uses this information to provide you with inaccurate, unreliable or nonsense information. For example, If you enter someone's email address or phone number incorrectly then you will not be able to contact that person.

5.1.3 Learner dependent answer. Moderate their answers.

Not all computer threats are accidental or unintentional. Explain to learners that some ways they can protect themselves from threats include:

- Keeping their antivirus application up to date
- Keeping their software up to date
- Not opening suspicious emails
- Not downloading suspicious programs or attachments
- Running a virus scan on any flash disk before using it.

Work through the text and examples on pages 57 and 58 of the Theory Book, then ask learners to complete Activity 5.2 on page 58 of the Theory Book.

Activity 5.2 Memorandum

5.2.1 Learner dependant answer.

5.2.2 Learner dependant answer.

5.2.3
1. A
2. F
3. B
4. E
5. D

5.2.4 **a.**
– The email came from a gmail account and not an FNB account.
– And there is a hyperlink attached in the email.

b. Phishing attacks try to obtain sensitive information (such as usernames, passwords and banking details) by sending emails to users that look like official emails. This is often used with email spoofing to convince victims that they email is from a legitimate source.
Pharming attacks create an official-looking website that requests sensitive information. A very common pharming attack allows users to "change" their passwords. Instead of changing their passwords, the user's username and password is recorded and their account is taken over. Pharming involves malicious code being is installed on a computer or server, which misdirects users to a fraudulent website even when the type the correct address, that requests sensitive information such as passwords and banking details which are then stolen by the cyber-criminal.

UNIT 5.3

Remedies

In this unit, we explore the remedies available for each threat discussed in the previous units. Work through the different remedies on pages 59 to 61 with your class, then ask them to work in small groups to complete Activity 5.3 on page 61 of the Theory Book.

Activity 5.3 Memorandum

5.3.1 Learners' own work. Ask each group to draw their mindmap on some poster paper and to present it to the class at the start of the next lesson. Moderate the groups' posters.

1.

a. B

b. A

c. C

d. - By opening an attachment containing a virus from an email they receive.
- By connecting to a public network, such as at a coffee shop
- By not updating their antivirus software

e. i) SPAM

ii) Yes, companies sell your information to third parties, who then use it to send SPAM to your inbox.

iii) - By not opening attachment containing virus from an email or accessing sites that are not authenticated
- By only using secure networks and passwords
- By installing and updating their antivirus software

ELECTRONIC COMMUNICATION

CHAPTER 6

CHAPTER OVERVIEW	
Unit 6.1	Mobile/wireless e-communication
Unit 6.2	Use of mobile technology
Unit 6.3	Use of wireless technologies
Unit 6.4	Data security

The following learning outcomes are covered by this chapter:

- explain the purpose, writing style and audience for e-communication
- list and describe uses of mobile technology
- describe the uses of wireless technologies
- describe how communication protocols are used to control data
- provide methods of practising data security.

GRADE: 11 DATE: TEACHING TIME: 4 hours

Resources	Each learner should have access to: • IT 11 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 media – a form of electronic communication through which users create online communities to share information, ideas, personal messages, and other content • influencers – people who have built a reputation for their knowledge and expertise on a particular topic • vlogging – a blog in which the postings are mostly in video form • podcasting – a digital recording of music, news or other media that can be downloaded from the internet to a portable media player • streaming – when a multimedia file can be viewed without being completely downloaded • protocol – a set of rules that describe how data is sent between two computers

INTRODUCTION

Today, young people from aound the world are using electronic communication to build their own businesses. Whether it is a celebrity posting pictures on Instagram, a streamer playing games on Twitch, or a style blogger keeping people updated on the newest fashions, people have realised that money can be made if you have a large enough following.

Activity 6.1 Memorandum

6.1.1 a. Electronic communications refers to any data, information, words, photos or symbols that are sent electronically to communicate with one or more people.

b. A blog is where is share pictures and information about topics that interest you and that appeal to others.

c. A VOIP (voice over internet protocol) can be anything such as skype, whatsapp or facetime.

6.1.2 a. Spam / Malware

b. Learner dependant answer.

6.1.3 a. – She has used abbreviations (slang) in work emails.
– She has left out professional formality within her email.

b. Social media applications, such as instant messengers.

c. Learner dependant answer.

UNIT 6.1

Mobile/wireless e-communication

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
- blogging
- video casting
- SMS
- podcasting
- instant messaging
- video conferencing

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, podcast or video. 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 6.2 on page 71 of the Theory Book.

Activity 6.2 Memorandum

6.1.1 1-B, 2-G, 3-C, 4-L, 5-, 6-D, 7-E, 8-H, 9-I, 10-J

6.2.2 **a.** – emails are used for contacting people all over the world for free and allows you to share files with one or more people at a time.

b. Any three of the following:
– sending mail over the internet happens instantly.
– messages are saved for future reference
– can send a single message to many people
– files can be attached to messages
– free to send messages
– asynchronous communication
– free to register

6.2.3 **a.** Any two of the following:
– the sender does not know the message receiver
– the sender does not have internet access needed for instant messaging
– the sender does not have a phone capable of using instant messaging applications

b. Any two of the following:
– quick and easy to send
– available on all mobile phones
– asynchronous communication
– can be sent without internet access
– more affordable than a phone call

c. Any two of the following:
– more expensive than instant messaging
– limited number of characters per message
– cannot send photos, videos or emojis
– often used for marketing or spam

Activity 6.2 Memorandum

6.2.4 a. Any two of the following:
- messages are free to send
- possible to see when messages are received and read
- asynchronous communication
- messages are shorter and more conversational
- can create group conversations
- can share multimedia like emojis, pictures, videos and voice recordings

b. Any three of the following:
- messages are not permanently saved and backed up
- too informal for some settings (such as business communication)
- message recipients are under pressure to respond to all messages
- can be a distraction

6.2.5 a. Podcasting is an audio only broadcast released on the internet.

b. Blogging is pictures and stories of interests released on a website, whilst podcasting is an audio-based broadcast.

UNIT 6.2

Use of mobile technology

The first mobile phone was created by Motorola in 1973. It weighed more than a kilogram and had a battery life of an hour. Once the battery was empty, it took 10 hours to recharge the phone! The phone was not available to the public and it could only work on Motorola's private cellular network.

In 1991, second generation phone networks were built in Finland. These networks were called GSM networks (short for Global System for Mobile communication) and transferred data digitally in 1s and 0s. By 1992, IBM released the world's first smartphone called the IBM Simon. It could make calls, receive faxes and emails and had an address book, calendar, clock and calculator. However, the phone was expensive, large and uncomfortable to use, and it would take another 15 years before smartphones were successfully made and sold on a large scale!

At around the same time, phone manufacturers started releasing the first mobile phones. These were called cell phones and were small, affordable and had a battery life that could last for weeks.

Work through the information on the different mobile technologies that developed over the years. This can be found on pages 73 to 75 of the Theory book. Once you are certain your learners understand all the technologies, ask them to complete Activity 6.3.

Activity 6.3 Memorandum

6.3.1
- **a.** eReaders
- **b.** Smart phones
- **c.** Tablets
- **d.** Mobile browsers
- **e.** VOIP

6.3.2 A mobile phone was specifically made to make phone calls and send SMS's, whilst feature phone can send multimedia messages, play music, take photos, read emails, and browse the internet.

6.3.3
- **a.** A smartphone has advanced features, including a high-resolution touch screen display, WiFi connectivity, web browsing, software applications and a mobile Operating System. One of the most important features of a smartphone is its connection to an app store. An app store is a centralized portal where users can search for and download software applications to run on their phones.
- **b.** Android, iOS, Windows
- **c.** Ease of access to emails, and instant connectivity to co-workers via instant messaging.
- **d.** A web browser is an application that allows easy access to the internet via the device you are using, whether it be a smart phone, tablet or computer.
- **e.** – Web pages on a desktop are more detailed than that of a mobile web page
  –Web pages are loaded faster on PC than that of a mobile web browser.
- **f.** Learner dependent answer.

UNIT 6.3

Use of wireless technologies

In this unit, learners will learn about the different wireless technologies. Wireless networks do not require cables or wires. Instead, wireless network connections send data across a specific wireless frequency. They form wireless local-area networks (WLANs). Wireless access points (WAPs) are networking devices that allow Wi-Fi devices to connect to a wired network.

Ask learners what they think wireless technologies are. Write down their ideas on the blackboard. Once your discussions are complete, instruct learners to read through the information on pages 76 to 78 of the Theory book before completing Activity 6.4.

Activity 6.4 Memorandum

6.4.1
- **a.** False. POP3 is the protocol used to receive emails.
- **b.** True
- **c.** False, SMTP stands for simple mail transfer protocol and is used to send emails.
- **d.** True
- **e.** False. HTTP and HTTPS are used to determine how web pages are viewed.

6.4.2
- **a.** Wireless technologies are networking hardware devices that allow other Wi-Fi devices to connect to a wired network.
- **b.** 3G is a 3rd generation internet network that allows easy access to the internet wherever you may be situated.
- **c.** 3rd generation internet.
- **d.** 4G/LTE has improved speeds and stability.
- **e.** Wireless network.

6.4.3
- **a.** VOIP will be used when utilising applications such as Skype or Whatsapp.
- **b.** POP3 will be used when receive emails.

UNIT 6.4

Data security

In this last unit of Chapter 6, learners look at how to keep computers and data safe. Work through the information on page 79 of the Theory Book, then ask learners to complete Activity 6.5. Verify their answers.

Activity 6.5 Memorandum

6.5.1 1-L, 2-C, 3-H, 4-E, 5-F, 6-B, 7-I, 8-G, 9-J, 10-A, 11-D, 12-K

6.5.2

a. Passwords protects you from potential threats of people anywhere around the world who would try to access your files and data that you may have.

b. – Not using the same password for everything
– make use of numbers and acceptable symbols in your password.
– make your password as long as possible.

c. Encryption is the final security toll used on computers, any data sent between two computers is changed from something that is useful to encrypted data that is difficult to decrypt and used by unauthorised people.

d. Most websites use HTTPS (HyperText Transfer Protocol Secure).

1. a. A
   b. D
2. 1-H, 2-C, 3-A, 4-F, 5-I, 6-B, 7-D, 8-J, 9-K, 10-G, 11-E
3. Electronic communication refers to any data, information, words, photos or symbols that are sent electronically in order to communicate with one or more people. Some of the most popular forms of electronic communication include calls, messages, group chats, emails, social networks and websites.
4. Emails are used for communication via the use of the internet to instantly deliver mail to a recipient, they are mainly used for work based communications.
5. – Be formal and direct.
   – Refrain from the use of slang in emails.
6. Blogging is created website where the creator of said website posts short, informal stories or articles.
   Any two of the following:
   – Easy to set up
   – Place to share a personal opinion
   – Can be both large or small
   – Does not need to be professional
   – Visitors understand layout
7. A smart phone has a high-resolution touch screen display and Wi-Fi connectivity where as a feature phone does not.
8. a. A firewall is hardware, software or a combination of both, that monitors incoming and outgoing traffic on the network.
   b. – The firewall decides whether to stop the traffic based on a set of predefined security rules.
   – It creates a barrier between an internal network and incoming traffic from external sources.
   c. A firewall blocks malicious malware or virus from entering the hardware / software.
9. a. A microblog is a combination of blogging and instant messaging and a vlog is like blogging but with videos.
   b. Microblog: Twitter
   vlog service: Youtube
10. Encryption is the final security tool used on computers, any data sent between two computers is changed from something that is useful to encrypted data that is difficult to decrypt and use by unauthorised people.
11. With encryption, any data sent between two computers is changed from something that is useful to encrypted data that is difficult to decrypt and use by unauthorised people. The only way to turn the encrypted data back into useful data is to know the encryption key, which is only known by the receiving computer.
12. – They can be streamed live, allowing people to watch the video as it is created
   – they can be made on any topic that peaks your interest.
13. – Requires a fast internet connection.
   – Uses a significant amount of data, so it can be expensive.
14. Any two of the following:
   Choose a password that is long (at least 8 characters).
   Include uppercase and lowercase letters, as well as numbers, in your password.
   Never use personal information such as a birthdate or the name of your favourite sports team as a password.
   Create different passwords for different websites. In this way, if someone hacks your social media account, they cannot use the same password for your online banking.
   Do not share your passwords with other people and do not write your passwords down.
15. a. – It has a limited battery life.
   – it can be easily misplaced.
   b. Learner dependent answer.
   c. – They are smaller and easy to navigate
   – They provide less detailed pages compared to the desktop pages.

SOCIAL IMPLICATIONS

CHAPTER 7

CHAPTER OVERVIEW	
Unit 7.1	Effects of digitalisation
Unit 7.2	Protecting your online identity

The following learning outcomes are covered by this chapter:

- describe the effect of digitalisation on future careers
- explain the effect of digitalisation on the workplace and employment practices
- describe ways to protect your online identity.

GRADE: 11 DATE: TEACHING TIME: 2 hours

Resources	Each learner should have access to:
	• IT 11 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

INTRODUCTION

In this chapter we discuss some of the social implicaitons that digitalisation has had on society.

Activity 7.1 Memorandum

Learners work in groups to discuss the questions listed on page 84 of the Theory Book. Explain that they may need to do additional resource to answer some of the questions, so allow them a day or two to find the answers.

Groups can present their findings to the rest of the class.

Effects of digitalisation

Work through the content on pages 85 to 88 with your learners. Make sure all learners understand the concepts being taught. If there are words or terms that learners do not understand, take some time to explain these before moving on to new content.

Once you have gone through the content in this unit, ask learners to complete Activity 7.2 on page 88 of the Theory Book. Moderate their work.

Activity 7.2 Memorandum

7.2.1 Learners' own work. Accept all reasonable answers.
7.2.2 Learners' own work. Accept all reasonable answers.

UNIT 7.2

Protecting your online identity

Privacy is defined as a person's ability to control how information about them is shared with other people or institutions. In this unit we examine some of the privacy issues surrounding online activities.

Ask learners to complete Activity 7.3 on page 89 of the Theory Book.

Activity 7.3 Memorandum

7.3.1 Online privacy has to do with who you are AND what you are doing. On the Internet, data has high value. It's stolen, sold, collected and analysed. There are many facets to privacy. There's what you do, and who you are. Who you are is your personally identifiable information (PII) - your name, date of birth, address, ID number, phone numbers and more. What you do are the searches you perform, the websites you visit, the articles you read, even what you buy online. Whenever you download an app, visit a website or use a social media platform, chances are that company is collecting data on you. People are doing so much more online through their computers and mobile devices today. We make purchases, look up medical conditions, arrange vacations, interact with friends and relatives, just about anything imaginable. With these actions, people are inadvertently creating a huge digital paper trail of data about themselves. While it may not be PII, these companies still track what you do on the Web and collect that data in order to get a clearer picture of you.

7.3.2 Anonymity describes situations where the acting person's name is unknown. The important idea here is that a person be non-identifiable, unreachable, or untrackable.

7.3.3 In case study one it was used for the purpose of stealing money using a fake identity and in case study two it was used to infiltrate and gave access to the home of the former Alaskan governor.

7.3.4 Learners' own work. Accept all reasonable answers.

1. Accept all reasonable answers.

FARMER	Digitalisation is reducing the need for short term, manual labour that performs the "heavy lifting" of agriculture by replacing these jobs with a reduced number of highly-skilled full-time positions.
SECRETARY	Automating tasks in the office can have both positive and negative effects on workers. Certain tasks can be performed more quickly and accurately using a computer, which would allow the workers to spend more time on other aspects of their jobs. Workers may be resistant to the fact that they would have to learn how to work with computing devices in order to complete these tasks and they may feel that their jobs are threatened by the devices
MECHANIC	Robots can effectively be used to perform tasks that would be too dangerous for a human to perform or that require a large degree of repetiton. They could also be used to perform tasks that require strength beyond what a human being would have.
MEDICAL FIELD	Artificial intelligence (or AI) refers to a field of computer studies in which programmers try to create or simulate human intelligence in machines. In the workplace, the goal of AI is to allow computers to do tasks that typically require human intelligence.

2.

CAREER	JOB DESCRIPTION	EXPLAIN IF YOU WOULD LIKE TO WORK IN THIS CAREER
3D architect	3D architects are designers who use 3D software to create models of buildings and other structures.The process of 3D printing involves utilising computer-aided design (CAD) information to print products in layers. A 3D printing operator oversees the printing process. Examples include prostatic limbs, plastic models and cameras.	Learner dependent answer
Privacy consultant	Is exactly that, a consultant who deals with the online privacy of a corporation. They assess and define system specifications in relation to compliance with data protection and privacy regulations. They follow proper data management systems and build positive relationships with a variety of stakeholders.	Learner dependent answer
Medical nanobot technician	Nanorobotics is a technology field that creates machines or robots with components that are at or near the scale of a nanometre. Nanotechnology in medicine involves applications of nanoparticles currently under development research that involves the use of manufactured nano-robots to make repairs at the cellular level, this can cure cancer cells in the future.	Learner dependent answer

3. Use strong passwords; Check social media privacy settings; Avoid public Wi-Fi; Avoid Phishing emails; Always use secure websites; Update security updates; Shred sensitive documents

4. Learner dependent answer.

DATABASE MANAGEMENT

CHAPTER 8

CHAPTER OVERVIEW	
Unit 8.1	Database software
Unit 8.2	Database types
Unit 8.3	Database-related careers

The following learning outcomes are covered by this chapter:

- describe examples of database management software (DBMS)
- explain how database management decisions are made
- list and describe different database careers.

GRADE: 11 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: • database – a collection of interrelated data. In practice, these applications do the same basic tasks, but they may do them in different ways with different levels of complexity. • A Database Management System – is a collection of programs that eneables us to create and maintain a Database. It is general-purpose software system that facilitates the process of defining, constructing and manipulating database for various applications. A database system consists of the combination of a DBMS and a database. • distributed database – a database that may be stored in multiple computers, located in the same physical location; or dispersed over a network of interconnected computers • cloud – a network of remote servers hosted on the internet to store, manage, and process data

INTRODUCTION

Databases are used to store data. To understand how databases work, ask learners to imagine that they are in charge of a company like Spotify. Spotify allows subscribers to choose from, and listen to more than 30 million different songs, and as the database administrator they will be responsible for managing the data for these songs.

For each song, they need to store a lot of information, including the song title, artist name, duration of the son, album name, track number on the album and the music file itself. Spotify also stores all the information about albums. This includes information such as the album name, artist name, realease date, album duration and a picture of the album cover. They will also need to capture and store information such as list of albums recorded, list of songs recorded, a short biography and a photo of the artist.

To store such a huge amount of information, they can split the information across multiple tables. Each table will have fewer fields and far less repeated information that one single table. They can then link all the tables together using database management software (DBMS).

This chapter gives a brief overview of what a database is, how to make database management decisions, and different types of databases. They will also look at different database management careers.

UNIT 8.1

Database software

In this first unit of Chapter 8, learners are introduced to the concepts of database management software and are given examples of six of the most popular DBMS applications. 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.

Once you are happy that learners are have grasped the concepts being taught in this unit, ask them to complete Activity 8.1 on page 92 of the Theory Book.

Activity 8.1 Memorandum

8.1.1 A database is a collection of interrelated data, these applications do the same basic tasks, but they may do them in different ways with different levels of complexity.

8.1.2 The purpose of a database is t store a collection of interrelated data.

8.1.3 – create databases.
– create database tables.
– add new data to the databases.

8.1.4
a. Microsoft SQL Server – A relational database management system developed by Microsoft.
b. MySQL – An open source relational database management system
c. BlackFish SQL – A high performance, small-footprint, SQL-92 compliant transactional database, which runs on both the .NET framework and on the Java platform.

UNIT 8.2

Database types

Databases are the single most important tool used to store data by programmers and web developers and can be used to store everything from a few settings in an application or the text on a website, to all the graphic assets for a role-playing game or all the status, updates, personal messages, comments and likes on social media networks. If there is data that needs to be stored, programmers prefer to store it in a database.

Work through the information and the Case studies on pages 93 to 95 of the Theory Book. Once complete, instruct learners to complete Activity 8.2 on page 95 of the Theory Book.

Activity 8.2 Memorandum

	DEFINITION	SIZE	ACCESIBILITY
Desktop/personal database	A very small database that is only being accessed by a single user on a single computer.	Small	Single use for one user on a single computer
Server/centralised database	A dedicated server that is connected to the internet so that multiple users from multiple locations can use it.	Large	
Distributed database	A database that runs on a server first so all multiple users can connect to it.	Unlimited	

UNIT 8.3

Database careers

In this unit, learners are introduced to a few of the most pupular database careers.

Activity 8.3 Memorandum

8.3.1 a. A database administrator is the primary person involved in managing the data of a company or program.

b. A database programmer is any employee whose primary job is to create database and database queries.

c. A database analyst is responsible for working with companies to identify opportunities to set up and improve their data systems.

d. A database project manager is the person who must make sure that any database projects are completed on time, at the right cost and at the right quality level.

8.3.2 Learner dependent answer.

1. 1-B, 2-D, 3-, 4-A, 5-F, 6-E
2. a. Personal database
   b. Microsoft Access
   c. Distributed Database
   d. – Amazon web services
      – Google Firebase
3. a. Distributed databases are databases that are stored on multiple computers at the same time.
   b. Learner dependant answer.
   c. Learner dependant answer.
   d. Google Firebase.
   e. Learner dependant answer.
   f. – Create database and database structures
      – develop database queries
      –optimise database performance
4. a. C
   b. A
5. 1-E, 2-B, 3-F, 4-C, 5-D, 6-A
6. A database is used to store valuable information.
7. – What type of data you would be storing.
   – The size of the company.
8. A database on a desktop is for personal use of one person only, and a database on a server is for anyone to use who has been granted access to it ad is accessible on any computer.
9. – who you would be sharing the data with.
   –the security of the data.
   –the management of the data.
10. – MySQL
    – PostgreSQL
11. A relational database management system developed by Microsoft
12. a. Learner dependant answer
    b. Learner dependant answer
    c. Learner dependant answer
13. Learner dependent answer.
14. a. Database management software.
       – Data sharing
       – Have data independence
       – Have better data integrity.
    b. – Designing and building databases
       – Providing access to the data.
15. b. A local database is made for a personal computer and for the use of one person, and a online database so made for multiple people or a company, that is able to grant access to everyone and they are able to access it from any computer.
    c. Learner dependant answer.
16. Learner dependent answer.
17. a. – Plan and design databases
       – Add and remove fields from existing databases.
    b. Open source DBMS
    c. It is free to use and easy to access.

ARRAYS

CHAPTER 3

CHAPTER OVERVIEW	
Unit 3.1	Arrays
Unit 3.2	Searching and sorting arrays
Unit 3.3	Parallel arrays

The following learning outcomes are covered by this chapter:

- describe the concept of an array
- define the structure and syntax of an array
- use different input sources to add data to arrays
- perform calculations using arrays
- format and display the output of an array
- describe the concept and use of parallel arrays
- use parallel arrays in calculations
- search for data in single and parallel arrays
- sort single and parallel arrays.

GRADE: 11 DATE: TEACHING TIME: 12 hours

Resources	Each learner should have access to:
	• IT 11 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

GRADE: 11	DATE:	TEACHING TIME: 12 hours
Vocabulary	Learners will need to understand the following terms for this chapter: • homogenous – elements of the same type • index – the position of the element in an array • array – is a data structure that stores a set values (elements) of the same type linked to a single variable name • linear search – is a process that checks every element in the list sequentially until the desired element is found • binary search – is an algorithm used in computer science to locate a specified value (key) within an array • bubble sort – to compare adjacent elements • selection sort – to select the element that should go in each array position either in ascending or descending order sequence • assume – supposed to be the case, without proof • related information – information belonging in the same group	

INTRODUCTION

In this chapter learners are introduced to arrays. Explain to your learners that an array is a data structure that can store a set of values (or elements) of the same of the same type linked to a single variable name.

UNIT 3.1

Arrays

On pages 42 to 44 of the Practical Book we have given a detailed explanation of arrays and how to work with arrays. Work through the text and different methods with your learners. Make sure they understand what is being taught before asking them to complete Activity 3.1.

Activity 3.1 Memorandum

3.1.1 Suggested answers:

- arrName: array[1..3] of String;
- arrName[1]:='Mary';
- arrName[2]:='James';
- arrName[3]:='Fluffy';
- Here are the displayed names:
  - **a.** ShowMessage(arrName[3]);
  - **b.** ShowMessage(arrName[2]);

3.1.2 Suggested answers:

- arrAlphabet: array[1..26] of Char;
  arrProvinces: array[1..9] of String;
  arrAges: array[1..120] of Integer;
  arrCardInDeck: array[1..52] of Boolean;
- arrProvinces[1] := 'Eastern Cape';
  arrProvinces[2] := 'Free State';
  arrProvinces[3] := 'Gauteng';
  arrProvinces[4] := 'KwaZulu-Natal';
  arrProvinces[5] := 'Limpopo';
  arrProvinces[6] := 'Mpumalanga';
  arrProvinces[7] := 'Northern Cape';
  arrProvinces[8] := 'North-West';
  arrProvinces[9] := 'Western Cape';
- Suggested answers

```
For i := 1 to 52 do
    If i MOD 2 = 0 then
          arrCardInDeck[i] := False;
```

- Suggested answers

```
For i := 1 to 50 do
     arrNumbers[i] := Random(20) + 1;
```

3.1.3 The coded solution can be found in the 03 - Test Marks Ans folder.

3.1.4 The coded solution can be found in the 03 - Family Tree Ans folder.

3.1.5 The coded solution can be found in the 03 - Game Names Ans folder.

Activity 3.2 Memorandum

The coded solution can be found in the 03 - Math Calc Ans folder

Activity 3.3 Memorandum

3.3.1 The coded solution can be found in the 03 - Counters Ans folder.
3.3.2 The coded solution can be found in the 03 - Class List Ans folder.

Example 3.1

This example will help your learners to understand how they can use an array as a counter. Carefuly work through the example with your learners. If there are learners who are still struggling to grasp this concept, provide additional examples for them to work with.

Activity 3.4 Memorandum

The coded solution can be found in the 03 - Popular Stall Ans folder.

Example 3.2

This example will help your learners to understand how to insert and delete elements in an array. Carefuly work through the example with your learners. If there are learners who are still struggling to grasp this concept, provide additional examples for them to work with.

Example 3.3

This example will help your learners to understand how to delete elements in an array. Carefuly work through the example with your learners. If there are learners who are still struggling to grasp this concept, provide additional examples for them to work with.

Example 3.4

This example will help your learners to understand how to remove duplicate elements from an array. Carefuly work through the example with your learners. If there are learners who are still struggling to grasp this concept, provide additional examples for them to work with.

Activity 3.5 Memorandum

The coded solution can be found in the 03 - Staff Shifts Ans folder.

UNIT 3.2

Searching and sorting arrays

Being able to sort and search in an array is an important skill for learners to master. When they need to work with large amounts of data, it would be impossible to know the exact location of each element. So, to search and locate specific elements in an array, they can use a linear search or a binary search.

Work through the examples in the Practical Book. If there are still learners who are struggling to grasp these concepts, provide extra time for them to practise searching and sorting arrays.

Activity 3.6 Memorandum

The coded solution can be found in the 03 - Sort Application Ans folder.

Activity 3.7 Memorandum

The coded solution can be found in the 03 - Binary Search Ans folder.

UNIT

3.3

Parallel arrays

Parallel arrays are arrays that store related data. In this unit, learners will be taught how to sort and search parallel arrays. Work through the examples in the Practical Book. If there are still learners who are struggling to grasp these concepts, provide extra time for them to practise searching and sorting parallel arrays.

Activity 3.8 Memorandum

The coded solution can be found in the 03 - Searching and Sorting Ans folder.

QUESTION 1

1.1 The total votes cast by calculating the sum of the values in arrVotes:

```
iTotal := 0;  //Global variable
For i := 1 to 4 do
    iTotal := iTotal + arrVotes[i];
```

1.2 The number of seats each party will get:

```
For i := 1 to 4 do
    arrSeats[i] := Round(arrVotes[i]/iTotal + 400);
```

1.3 The party that received the highest number of votes:

```
iHighestVotes := 0;  //Global variable
For i := 1 to 4 do
    If arrVotes[i] > iHighestVotes then
     begin
         sHighestParty := arrCandidates[i];
         iHighestVotes := arrVotes[i];
     end;
memResults.Lines.Add('Party with the most votes: ' + sHighestParty);

memResults.Lines.Add('Number of votes: ' + IntToStr(iHighestVotes));
```

1.4 Algorithm:

```
For i := 1 to length of arrVotes - 1
    For j := i+1 to length of arrVotes
        If (arrVotes[i] < arrVotes[j]) then
          Temp = arrVotes[i]
          arrVotes[i] = arrVotes[j]
          arrVotes[j] = Temp
        end If
    end For
end For
```

QUESTION 2

The coded solution can be found in the 03 - Question 2 folder.

QUESTION 3

The coded solution can be found in the 03 - Question 3 folder.

TERM 2

CHAPTER 4

STRING AND DATE MANIPULATION

CHAPTER OVERVIEW	
Unit 4.1	Built-in string methods
Unit 4.2	Delimited strings
Unit 4.3	Built-in Date-Time methods

The following learning outcomes are covered by this chapter:

- describe the following concepts: function, procedure, method-call, method signature, parameter and argument
- use the following built-in string methods: Pos, Copy, Insert and Delete
- read delimited strings
- extract data from delimited strings
- store the data from delimited strings in an array
- use Date methods.

GRADE:	11	DATE:		TEACHING TIME:	6 hours

Resources	Each learner should have access to: • IT 11 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

GRADE: 11	DATE:	TEACHING TIME: 6 hours
Vocabulary	Learners will need to understand the following terms for this chapter: • cipher – a code. In other words, a secret or disguised way of writing, e.g. "He wrote the messages in a cipher" • concatenates – to joins strings together into one result string • method overloading – to have more than one method with the same name • method signature – is the number of arguments and their data type • Pos – to return to the start position of one string within another string as an integer • SETLENGTH – to change the size of a string • Insert – to insert one string into another string • Delete – to delete a number of characters from a string starting from a start position • ORD – to return the ordinal value of a character • CHR – to return the corresponding character of an ASCII code • VAL – to convert a string to a numeric value • STR – to convert an integer or real number into a string, with optional basic formatting • Upcase – to convert a single letter character to uppercase • UpperCase – to converts lowercase characters in a string to uppercase • LowerCase – to converts uppercase characters in a string to lowercase • CompareText – to compare two strings for equality, ignoring case • delimiters – to show the start and ends of individual pieces of data	

INTRODUCTION

In this chapter, learners are taught about the built-in string methods that allows them to find a character in a string; replace a character in a string; delete a character in a string; and insert a character in a string without having to use a FOR-loop. They will also learn how to use these methods to manipulate individual words and phrases from strings.

UNIT 4.1

Built-in string methods

Begin this unit by revising the methods learners were taught in Grade 10 to ensure all learners are able to work with built-in mathematical methods. Once you are satisfied that all your learners are adept at using these, work through the methods discussed on pages 70 and 71 of the Practical Book.

Activity 4.1 Memorandum

4.1.1 Suggested answer:

	Statement	Output of lblOutput caption
1	`lblOutput.Caption := Copy(sName,5,1)`	'a'
2	`lblOutput.Caption := Copy(sName,1,0)`	'N'
3	`lblOutput.Caption := Copy(sName,20,2)`	''
4	`lblOutput.Caption := Copy(sName,6,4)`	'niel'
5	`lblOutput.Caption := Copy(sName,1,1) + ' ' + Copy(sSurname,1,5)`	'N Khune'
6	`lblOutput.Caption := Copy(sSurname,1,Length(sSurname))`	'Khune'
7	`lblOutput.Caption := 'Day: ' + Copy(sID,5,2)`	'Day: 22'
8	`lblOutput.Caption := 'Year: 19' + Copy(sID,1,2)`	'Year: 1996'
9	`lblOutput.Caption := IntToStr(length(Copy(sName,3,5)));`	5
10	`lblOutput.Caption := IntToStr(length(Copy(sName,1,8)));`	8

Activity 4.2 Memorandum

4.2.1 Suggested answer:

No	Statement	iAns
a.	`iAns := pos('n', sName);`	2
b.	`iAns := pos(cLetter, sName);`	1
c.	`iAns := pos(sSub, sName);`	13
d.	`iAns := pos('man', sName);`	0
e.	`iAns:= pos( sName, sSub);`	0

4.2.2 Suggested answers:

a. sName := Copy(sFullName, 1, iPos - 1);

b. sSurname := Copy(sFullName, iPos + 1, Length(sFullname) - iPos);

Activity 4.3 Memorandum

4.3.1 The values sText and sMessage after the statements are executed will be:
sText: 'Creative people'
sMessage: 'Hacking is ' where the additional five spaces are filled with random sections of text

4.3.2 Suggested answers:

a. Code to initialise the extra places created in line 2:

```
For i := 8 to Length(sText) do
       sText[i] := '-';
       sText[i] := '-';
```

b. The initialisation of the extra spaces is important to prevent odd, random text automatically being placed in the empty spaces.

Activity 4.4 Memorandum

Here is the completed table:

	Statement	Output
1	`Insert(sSub,sPhrase,1);` `lblOutput.Caption := sPhrase;`	'VeryHard work pays of'
2	`Insert(sSub + ' ',sPhrase,1);` `lblOutput.Caption := sPhrase;`	'Very Hard work pays of'
3	`Insert(cLetter,sPhrase,Length(sPhrase));` `lblOutput.Caption := sPhrase;`	'Very Hard work pays off'
4	`Insert('thorough ',sPhrase,Pos(' ' , sPhrase)+1);` `lblOutput.Caption := sPhrase;`	'Very thorough Hard work pays off'
5	`Insert('Only ',sPhrase,Pos(',' , sPhrase)+1);` `lblOutput.Caption := sPhrase;`	'Only Very thorough Hard work pays off'

Activity 4.5 Memorandum

4.5.1 iLength := Length(sValue);
4.5.2 Delete(sValue, 3, 6);
4.5.3 iPos := Pos('ann', sValue);
4.5.4 sSubstring := Copy(sValue, 3, 3);
4.5.5 Insert('hannes', sValue, 3);

Guided activity 4.1

The coded solution can be found in the 04 - String Problems Ans folder.

Activity 4.6 Memorandum

4.7.1 The coded solution can be found in the 04 - Flapping Word Ans folder.
4.7.2 The coded solution can be found in the 04 - Love Letters Ans folder.
4.7.3 The coded solution can be found in the 04 - Secret Message Ans folder.

Activity 4.7 Memorandum

4.7.1 Delphi statements to display the ordinal value (ASCII):
- a. iNum:=ord('┘');
- b. iNum:=ord('G');
- c. iNum:=ord('9');

4.7.2 Suggested answers:

```
sName := Uppercase(cmbNames.Text);
OR
sName := Uppercase(cmbNames.Items[cmbNames.ItemIndex]);
```

4.7.3 Suggested answers:
- a. Ascending
- b. Found
- c. Ascending

4.7.4 The coded solution can be found in the 04 - Password Encrypter Ans folder.

UNIT 4.2

Delimited strings

Read through the introduction to delimited string on page 86 of the Practical Book with your learners. If possible, provide a few extra examples for learners to aid in their understanding. Work throught the Guided activity with your learners before asking them to complete Activity 4.8.

Guided activity 4.2

The coded solution can be found in the 04 - Delimited Strings Ans folder.

Activity 4.8 Memorandum

The coded solution can be found in the 04 - Pig Latin Ans folder.

UNIT 4.3

Built-in Date-Time methods

The Delphi programming language includes methods and components which are specifically designed to manipulate date and time information.

Guided activity 4.3

The coded solution can be found in the 04 - Clock Ans folder.

Activity 4.9 Memorandum

4.9.1 The value of sOutput in each of the following:

a. The exact answer will change every time this exercise executes as the current date and time will always be different. It will output the current time in the default system-time format.

b. 13 Mar 2003

4.9.2 Code to separate the delimited data:

```
iCount := 0;

iPos := pos(' ', sToday);

while iPos <> 0 do
begin
   sPart := Copy(sToday, 1, iPos - 1);
   inc(iCount);
   arrDetails[iCount] := sPart;
   Delete(sToday, 1, iPos);

   iPos := Pos(' ', sToday);

   if iPos = 0 then
   begin
      iPos := pos(':', sToday);
      while iPos <> 0 do
      begin
         sPart := Copy(sToday, 1, iPos - 1);
         inc(iCount);
         arrDetails[iCount] := sPart;
         Delete(sToday, 1, iPos);

         iPos := Pos(':', sToday);

         if iPos = 0 then
         begin
           Inc(iCount);
           arrDetails[iCount] := sPart;
         end;
   end;
end;
```

Activity 4.10 Memorandum

The coded solution can be found in the 04 - Birthday Processor Ans folder.

QUESTION 1

The coded solution can be found in the 04 - WildLife Ans folder.

QUESTION 2

The coded solution can be found in the 04 - Phone Numbers Ans folder.

QUESTION 3

The coded solution can be found in the 04 - Electricity Control Ans folder.

CHAPTER 9

DATABASE DESIGN

CHAPTER OVERVIEW	
Unit 9.1	Characteristics of quality data
Unit 9.2	Creating a simple database
Unit 9.3	Working with data
Unit 9.4	Setting up relationships

The following learning outcomes are covered by this chapter:

- describe the characteristics of quality data
- describe how data should be organised in a database
- describe the characteristics that make information valuable
- design and create a simple database with a single table
- add, edit and delete data to and from the database
- process, sort and query data from the database

GRADE: 11 DATE: TEACHING TIME: 12 hours

Resources	Each learner should have access to: • IT 11 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

INTRODUCTION

The goal of this chapter is to give learners guidelines that will help them create the best possible database and to show them how to complete each step along the way. By the end of the chapters, learners will have created a database that can be used. To do this, they will begin by learning the basics of databases before moving on to learning the theory behind a good database.

Activity 9.1 Memorandum

9.1.1 Data is unprocessed numbers, signals or facts.

9.1.2 A database is designed to store data (facts), these facts are organised within the database so that they can be sorted or extracted in response to a user's requirements which will allow them to make a decision.

UNIT 9.1

Characteristics of quality data

Explain to your learners that the quality of data is one of the determining factors of the quality of a database. Most successful companies on the internets are successful because of the quality of their databases: YouTube has the world's best database of free videos, while Netfilx has the best database of television shows and movies. These companies and others like them, have entire teams of employees dedicated to obtaining more data for their databases.

As a class, work through the content on pages 103 to 108. Ensure that all learners understand the concepts being taught. Once you are satisfied with the learners' knowledge, ask them to complete Activity 9.2 on page 109 of the Theory Book.

Activity 9.2 Memorandum

9.2.1
a. A
b. C
c. D
d. C
e. B

9.2.2
– Accuracy
– Relevancy
– Consistency
– Currency
– Correctness.

9.3.2
a. Consistency
b. Relevancy
c. Relevancy
d. Accuracy

9.2.4 To check whether the data is accurate and in the correct format.

9.2.5 INCOME_BILLION: Range check - a range check ensures that the data falls within a specific range. This is useful for items such as amounts or durations.
GENRE : Data type check - a data type check ensures that the data is of the correct typ (e.g. string, integer, double or datetime).
STUDIO_NAME : Data type check - a data type check ensures that the data is of the correct typ (e.g. string, integer, double or datetime).
STUDIO_LOCATION : Data type check - a data type check ensures that the data is of the correct typ (e.g. string, integer, double or datetime).

9.2.6 Accept all reasonable examples:
Data is raw material; and information is when data is organised and presented by someone. For example, if I take individual pictures of all the learners in your school, the collection of photographs is data. When the photographs are re-organised into each class unit, then the photographs become information.
Knowledge is information read, heard, or seen, and understood.

9.2.7 The aim of grouping data is to allow you to work with data more easily.

UNIT 9.2

Creating a simple database

In this unit learners begin to create a simple database. They will need to install the database software, create the SMS database and create the first table.

Work through the content of this unit ensuring all learners understand what is required of them. Make sure all your learners have what they need in order to create their databases, and assist those learners who may be experiences difficulties loading the software or anything else. Work thorugh the each example together with you learners, taking them step by step. Check the database created by the learners and correct any errors or issues as they arise.

Once complete, ask learners to complete Activity 9.3 on page 117 of the Theory Book.

Activity 9.3 Memorandum

9.3.1 a. Learner dependent answer.
b. Learner dependent answer.
9.3.2 a. Learner dependent answer.
b. Learner dependent answer.
c. Learner dependent answer.
d. Learner dependent answer.
e. Learner dependent answer.
9.3.3 a. Learner dependent answer.
b. Learner dependent answer.
c. Learner dependent answer.
d. Learner dependent answer.

UNIT 9.3

Working with data

In this unit learners begin to add data to their simple database that they created in the previous unit.

Work through the content of this unit ensuring all learners understand what is required of them. Assist those learners who may be experiences difficulties adding the data into their databases. Work thorugh the each example together with you learners, taking them step by step. Check the database created by the learners and correct any errors or issues as they arise.

Once complete, ask learners to complete Activity 9.4 on page 120 of the Theory Book.

Activity 9.4 Memorandum

9.4.1 a. True
b. True
c. False, once a table is deleted, its gone forever.

9.4.2 a. Learner dependent answer.
b. Learner dependent answer.

9.4.3 a. Learner dependent answer.
b. Learner dependent answer.

UNIT 9.4

Setting up relationships

In this unit learners begin to set up relationships between tables in the database they created in the previous two unit.

Work through the content of this unit ensuring all learners understand what is required of them. Assist those learners who may be experiences difficulties setting up relationships between tables in their databases. Work thorugh the each example together with you learners, taking them step by step. Check the database created by the learners and correct any errors or issues as they arise.

Once complete, ask learners to complete Activity 9.5 on page 127 of the Theory Book.

Activity 9.5 Memorandum

9.5.1 ERD (Entity relationship diagram).

9.5.2 True

9.5.3 With a many-to-many relationship, many records on one table are related to many records on another table. For example, if you had a "conversations" table in your application, then each user might be part of multiple conversations while each conversation might have multiple users.

9.5.4
- **a.** Learner dependent answer.
- **b.** Learner dependent answer.
- **c.** Learner dependent answer.

9.5.5 Learner dependent answer.

9.5.6
- **a.** Learner dependent answer.
- **b.** Learner dependent answer.
- **c.** Learner dependent answer.

9.5.7
- **a.** Learner dependent answer.
- **b.** Learner dependent answer.
- **c.** Learner dependent answer.
- **d.** Learner dependent answer.

1. a. BookID
MemberID

b. Learner dependent answer. Accept all reasonable answers.

c. Learner dependant answer. Accept all reasonable answers.

d. Data validation refers to the process in which you check whether the data is accurate, in the correct format or of the correct type before recording it in your database. This ensures that the data in your database is consistent and accurate.
Data verification is a process in which different types of data are checked for accuracy and inconsistencies after data migration is done. It helps to determine whether data was accurately translated when data is transferred from one source to another, is complete, and supports processes in the new system.

e. Your tables and fields should use effective names that make sense and are easy to understand. Working with a database where all the tables are called "Table 1", "Table 2" and so forth is not best practice.

2. – 3. a) A. It is a field that uniquely identifies each record in the table.

B. Learner dependent answer. Accept all reasonable answers.

b. A. Any of the following:
- Values are atomic
- All of the values in a column have the same data type.
- Each row is unique.
- The sequence of columns is insignificant.
- The sequence of rows is insignificant.
- Each column has a unique name.

B. Learner dependent answer.

TERM 3

CHAPTER 10

SOCIAL IMPLICATIONS

CHAPTER OVERVIEW	
Unit 10.1	The effects of computer and human error
Unit 10.2	The effects of cybercrime

The following learning outcomes are covered by this chapter:

- discuss the effects of inaccurate and invalid – data input, unverified data, software bugs and incorrect hardware/software configurations
- discuss the effects of identity theft, business data theft and virus attacks to companies (ransomware and malware).

GRADE: 11 DATE: TEACHING TIME: 2 hours

Resources	Each learner should have access to:
	• IT 11 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

INTRODUCTION

In this chapter, we look at why quality data and valuable information need to be secured within a company's database.

Activity 10.1 Memorandum

10.1.1 Learner dependent answer.
10.1.2 a. Learner dependent answer. (Work in groups)
b. Learner dependent answer.
10.1.3 Learner dependent answer.
10.1.4 Learner dependent answer.
10.1.5 Learner dependent answer.

UNIT 10.1

The effects of computer and human error

Work through the content of this unit, then ask learners to complete Activity 10.2 on page 131 of the Theory Book.

Activity 10.2 Memorandum

10.2.1 a. Computer software (including the operating system) has certain expectations about the system it will operate on. These expectations include minimum hardware requirements and specific hardware components. Installing software on an incorrect hardware configuration can cause instability and crashes.

b. Missing data, wrong data, Inappropriate data, Nonconforming data, Duplicate data and Poor data entry.

c. According to GIGO, if you capture inaccurate, unreliable or nonsense information on your computer then you can expect any program that uses this information to provide you with inaccurate, unreliable or nonsense information. For example, If you enter someone's email address or phone number incorrectly then you will not be able to contact that person.

d. Any three of the following: Lock up the server room; Set up surveillance; Make sure the most vulnerable devices are in a locked room; Log off all workstations; Protect any portable hardware; Disable the drives

e. Infiltration via malware and viruses; Targeted attacks using social engineering

UNIT 10.2

The effects of cybercrime

In this unit we look at some of the different types of cybercrime. Work through the content of this unit, then ask learners to complete Activity 10.3 on page 133 of the Theory Book.

Activity 10.3 Memorandum

10.3.1 – Identity theft
– Business data theft
– Virus attack to business.

a. To steal information or money.

b. Banks and large companies are common targets for hacking jobs, but sometimes smaller companies or even a specific person's computer are targeted, as well.

10.3.2 Learners' own work. Moderate their posters.

10.3.3 Learners' own work. Moderate their plans.

Below we have given some sample answers. Accept all reasonable answers from learners.

Case study 1

a. Information that is input by the user is erroneous. Human errors and poor auditing and control procedures of the data lead to inaccurate data capture. Causes for data to be inaccurate: missing data, wrong data, Inappropriate data, Nonconforming data, Duplicate data and Poor data entry.
b. Put proper auditing and control procedures for data in place where more than one person verifies the data being captured.
c. Wrongul arrests or no arrests.

Case study 2

a. Unverified data: When data entered into a computer is not verified, these data types can often be stored incorrectly, causing serious errors. Data verification is necessary to determine whether data was accurately captured from the source to the computer. A type of Data Verification is double entry and proofreading data.
b. Put proper auditing and control procedures for data in place where more than one person verifies the data being captured.
c. Personal loss, loss of time, loss of money, etc.

Case study 1

a. Ransomware is software that encrypts the business data. The business must then pay the ransom to have their data decrypted. All operation that needs this data comes to a halt. Business loses a lot time and money.
b. Do not download any software from sources you do not know.
c. Personal loss, loss of time, loss of money, etc.

Case study 2

a. Malware is malicious software written to destroy a computer system.
b. Do not download any software from sources you do not know.
c. Personal loss, loss of possessions, loss of money, etc.

TERM 3

CHAPTER 5

TEXT FILES

CHAPTER OVERVIEW	
Unit 5.1	Introduction to text files
Unit 5.2	Reading from a text file
Unit 5.3	Writing to a text file
Unit 5.4	Creating reports

The following learning outcomes are covered by this chapter:

- create text files
- use text file functions and procedures
- read and display data from a text file and write data to a text file
- use string manipulation functions to read delimited text files
- catch and handle errors
- create reports using data from a text file.

GRADE:	11	DATE:	TEACHING TIME:	10 hours

Resources

Each learner should have access to:

- IT 11 Practical Book
- QR Code Reader
- Computer with Delphi IDE loaded onto it
- Data files for the learners and solution folders for the teacher

GRADE: 11	DATE:	TEACHING TIME: 10 hours
Vocabulary	Learners will need to understand the following terms for this chapter: • physical file – to name an external file name found on a storage device and contains the actual data • logical file – is a variable (in RAM) that points to the physical file on your storage medium • end of line <eoln> – to indicate the end of the line when the [Enter] button is pressed • end of file <eof> – to indicate the end of a file when the file is saved • FileExists – to determine whether a file exists or not • Exception Handling – a way to prevent a program from crashing when a file does not exist • exception – is generally an error condition or event that interrupts the flow of your program • append – to open an existing file for writing, set the file pointer to the end of the file and allows you to add data to the file	

INTRODUCTION

Text files are stored on a storage medium. Text files provide a simple, convenient and permanent way of storing textual data and are commonly used for importing and exporting data to and from programs. A text file does not have any formatting or structure and therefore you can transfer them between programs. You can store information permanently in a text file and read and manipulate this information using a Delphi program.

UNIT
5.1

Introduction to text files

In this unit learners are introduced to text files and learn how to create text files, display the contents of the text file, save the contents of a MemoBox or RichEdit component as a text file, and name a text file logically.

Activity 5.1 Memorandum

5.1.1 The completed IndustrialRevolution.txt text file has been provided as an example.
5.1.2 The completed StudyTips.txt text file has been provided as an example.

Activity 5.2 Memorandum

The coded solution can be found in the 05 - Text Load Save Ans folder.

Activity 5.3 Memorandum

5.3.1 Creates a link between the logical file name and the physical file found on a storage medium.
5.3.2 Here is the completed table:

Rewrite	Create a new file with write only access(writing) and sets the file pointer at the beginning of the file. If the file already exists, the contents of the file is lost. A buffer is created in RAM when this procedure is executed. The buffer is opened for writing and the file pointer is set to the beginning of the buffer area in RAM.
Reset	Opens an existing file for read only access and sets the file pointer at the beginning of the file so that text can be read from the beginning of the text file. If the file does not exist, the program will crash. Programming code must be used to determine whether a file exists or not.
Append	Opens the file for writing and sets the file pointer to the end of the file so that text can be written to the end of the text file Note that the file that you want to append to must exist for you to make use of the Append procedure. It only allows you to add data to the end of the file.

5.3.3 EOF returns a boolean value that indicates whether you have reached the end of the file or not.
5.3.4 Closes the link between the text file's logical name and the physical file name. You cannot read or write to the text file once it is closed.

UNIT 5.2

Reading from a text file

Work through the steps when reading a text file on page 106 of the Practical Book. Provide examples that learners can use as practise. Work through the different examples given and make sure all learners are able to work confidently when working with text files.

Example 5.1

Work through Example 5.1 with your learners and assist any learners who may be struggling to grasp any concepts taught in this unit. Allow learners sufficient time to practise their programming skills and be available to ask any questions that learners may have. If you learners don't have access to a computer at home, encourage them to use pen and paper as far as reasonably possible.

Activity 5.4 Memorandum

5.4.1 The coded solution can be found in the 05 - Clients Ans folder.
5.4.2 The coded solution can be found in the 05 - Clients Delimited Ans folder.
5.4.3 The coded solution can be found in the 05 - Verify Login Ans folder.

UNIT
5.3

Writing to a text file

In this unit learners will create and add data to a new file, add data to an existing file and then learn how to append data.

Guided activity 5.1

The coded solution can be found in the 05 - Storing Login Ans folder.

Guided activity 5.2

The coded solution can be found in the 05 - Team Tracker Ans folder.

Example 5.2

Work through the example with your learners and answer any queries learners may have. Provide addtional examples for learners to work with if needed.

Example 5.3

Work through the example with your learners and answer any queries learners may have. Provide addtional examples for learners to work with if needed.

Activity 5.5 Memorandum

5.5.1 The coded solution can be found in the 05 - Favourite Song Ans folder.
5.5.2 The coded solution can be found in the 05 - Calorie Counter Ans folder.

UNIT 5.4

Creating reports

In this unit learners will learn to create reports using their stored data.

Guided activity 5.4

The coded solution can be found in the 05 - Team Scores Ans folder.

Activity 5.6 Memorandum

5.6.1 The coded solution can be found in the 05 - Report Shop Sales Ans folder.
5.6.2 The coded solution can be found in the 05 - Report on Favourite Songs Ans folder.

QUESTION 1

The coded solution can be found in the 05 - Gaming Websites Ans folder.

QUESTION 2

The coded solution can be found in the 05 - Website Users Ans folder.

QUESTION 3

The coded solution can be found in the 05 - Staff Login Ans folder.

USER-DEFINED METHODS

CHAPTER 6

CHAPTER OVERVIEW	
Unit 6.1	User-defined methods
Unit 6.2	Procedures
Unit 6.3	Functions
Unit 6.4	Basic input validation techniques

The following learning outcomes are covered by this chapter:

- define and describe user-defined methods
- give the structure of a function and a procedure
- differentiate between a function and a procedure
- use functions and procedures to solve problems
- explain the relationship between actual parameters and formal parameters
- explain how value parameters work
- perform basic input validation using code.

GRADE: 11 DATE: TEACHING TIME: 10 hours

Resources	Each learner should have access to: • IT 11 Practical Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

GRADE: 11	DATE:	TEACHING TIME: 10 hours
Vocabulary	Learners will need to understand the following terms for this chapter: • user-defined – is methods written by programmers themselves • formal parameter – to declare variable(s) next to the procedure name • value parameter – when a procedure is called, memory locations are created for each of the formal parameters and the values of the arguments are assigned to the corresponding formal parameters. Changes made to a value parameter will not affect its corresponding argument. When the procedure is exited, the memory locations of the formal parameters 'die' away • method overloading – to have more than one method with the same name • method signature – to name a method and its formal parameters list • Luhn algorithm – is a simple checksum formula used to validate a variety of identification numbers, such as credit card numbers, IMEI numbers, and Canadian Social Insurance Numbers	

INTRODUCTION

In this chapter, learners focus on user-defined methods, which are written by the user to perform a specific task. Just like built-in methods, user-defined methods can be defined and used anywhere in a program.

UNIT

6.1

Introduction to user-defined methods

Introduce the unit by working through the text and table on page 130 of the Practical Book. Ask learners about the methods they have already learnt about and used in their programming. Ask a volunteer to explain what the difference is between a procedure and a function.

Activity 6.1 Memorandum

6.1.1 A user-defined method needs to be created from scratch by the programmer and thus requires more effort from the programmer to create. It allows the programmer to create a method that does exactly what he or she wants it to do.

6.1.2 The difference between a function and a procedure:

Function	Procedure
A call to a function is always within another statement.	A call to a procedure is a stand-alone statement.
A function always returns a single value.	A procedure does not return a value through its name.
A function starts with the keyword, Function.	A procedure starts with the keyword, Procedure.
A function name is assigned a data type.	A procedure name is not assigned a data type.

UNIT 6.2

Procedures

In this unit learners will learn how to declare and define a procedure with no parameters. Carefully work through the examples on pages 132 to 135 with your learners making sure all the learners understand what is being taught. Then ask them to work on their own to complete Activity 6.2.

Activity 6.2 Memorandum

6.2.1 True

6.2.2 The form name has been removed from the method header of the procedure. This means that the names of all components mentioned in the procedure need to be preceded by the form name, for example, TfrmThreeNumbers.redResults.Lines.Add('Sum: '+'+IntToStr(iSum));

6.2.3 The coded solution can be found in the 06 - Three Numbers Ans folder.

6.2.4 The coded solution can be found in the 06 - Shapes Ans folder.

6.2.5 The coded solution can be found in the 06 - Unique Numbers Ans folder.

Guided activity 6.1

The coded solution can be found in the 06 - Area Perimeter Ans folder.

Activity 6.3 Memorandum

6.3.1 Suggested answers:

a. Various answers are possible – here are some options. Consider all other options provided by the learners and check them for correctness.
Procedure with parameters: ShowMessage(sOutput)
Function without parameters: Random

b. Various answers are possible – here are some options. Consider all other options provided by the learners and check them for correctness.
Procedures without parameters: Randomize, setFocus, Clear
Functions with parameters: Round(iNumber), Trunc(rNumber), Sqrt(rNumber)

c. Modular programming is when a program is broken into simpler subtasks and these subtasks are kept as separate modules. The use of modular programming structure enhances the accuracy and clarity of a program.
Advantages (any three):
- More readable – It divides a program into smaller and more understandable tasks.
- Easier to debug.
- Easier to update.
- Less repetitive – it can shorten code, that is, if a method is called several times, it saves repetition of code.
- Simpler to understand.
- More efficient.

6.3.2 The coded solution can be found in the 06 - Area Perimeter Ans folder.

Activity 6.3 Memorandum...*continued*

6.3.3 The corrections are shown in bold and by crossing out as appropriate.

Procedure 1

```
Procedure SetFormHeight(iHeight : Integer);
begin
  frmMain.Height := iHeight;
end;
```

Procedure 2

```
procedure FormSize(iHeight, iWidth, sText);
begin
  frmMain.Height := iHeight;
  frmMain.Width := iWidth;
  frmMain.Color := clWhite;
  frmMain.lblResult.Caption := sText;
end;
```

Procedure 3

```
procedure ShowValue(iValue, iNumberOfTimes : Integer, sDe-
scription : String);
var
  i, iNumberOfTimes : Integer;
begin
  for i := 1 to iNumberOfTimes do
    ShowMessage(sDescription + ': ' + IntToStr(iValue));
end;
```

Activity 6.4 Memorandum

6.4.1 The coded solution can be found in the 06 - Square Shapes Ans folder.

6.4.2 The coded solution can be found in the 06 - Word Competition Ans folder.

Functions

Explain to your learners that functions work in the same way as procedures – they also perform a specific task and can be called from anywhere in your program. Work through the syntax of a function without parameters and the syntax of a function with parameters. Then complete Guided activity 6.2 and avail yourself to any learners who may have queries or questions.

Guided activity 6.2

The coded solution can be found in the 06 - Power Factorial Ans folder.

Activity 6.5 Memorandum

6.5.1 The coded solution can be found in the 06 - Vowels Ans folder.
6.5.2 The coded solution can be found in the 06 - Power Factorial Ans folder.
6.5.3 The coded solution can be found in the 06 - Improved Word Competition Ans folder.

UNIT

6.4

Basic input validation techniques

For any data input, a validation check is used to ensure that the data received is actually what is required by the application. Validation checks are a safeguard against incompatible values that could cause interruptions in the flow of the program or cause the program or operating system to crash. Validation techniques do not determine whether the data input is accurate. Different validation techniques are used to validate data input.

Activity 6.6 Memorandum

6.6.1 The coded solution can be found in the 06 - Validate Information Ans folder.

QUESTION 1

1.1 The coded solution can be found in the 06 - Learner Year Mark Ans folder.

1.2 The coded solution can be found in the 06 - Convert Measurement Ans folder.

QUESTION 2

2.1 The coded solution can be found in the 06 - Change Delimiters Ans folder.

2.2 The coded solution can be found in the 06 - Make 15 Ans folder.

INTERNET AND WWW

CHAPTER 11

CHAPTER OVERVIEW	
Unit 11.1	Evolution of the internet
Unit 11.2	Big data concepts
Unit 11.3	Multimedia as part of internet technologies
Unit 11.4	Compression technologies

The following learning outcomes are covered by this chapter:

- describe the evolution of the internet in terms of software and applications
- explain the differences between downloading, streaming and live streaming
- describe the role of multimedia on the internet
- explain how multimedia compression technology works

GRADE:	11	DATE:	TEACHING TIME:	2 hours

Resources	Each learner should have access to:
	• IT 11 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

INTRODUCTION

In this chapter we look at the way in which the internet has changed the way we work and play. In the introduction in the Theory Book, we talk about eSports. In August 2018, the world's largest eSports tournament to date was hosted in Vancouver, Canada. The tournament had prize money of more than R350 000 000 and 15 000 000 people watched the grand finals online!

The incredible growth of eSports was only possible because of the internet and internet technologies and how they have changed the way people live.

Activity 11.1 Memorandum

11.1.1 a. Email.

b. Social media

c. IP Address

d. IP Address

e. Router

11.1.2 a. The Internet is a global network of networks while the Web, also referred formally as World Wide Web (www) is collection of information which is accessed via the Internet.

b. SMTP (simple mail transfer protocol)

c. – Modem
– Router

UNIT 11.1

Evolution of the internet

In this unit we look at the changes that have occured on the internet. Work through the content 137 to 140 of the Theory Book with your learners. The content highlight the different changes the internet has gone through over the last two decades. If possible, allow learners to access the web to look at different examples of websites.

Once complete, ask learners to complete Activity 11.2 on page 141 of the Theory Book.

Activity 11.2 Memorandum

11.2.1 1-E, 2-F, 3-A, 4-D, 5-B, 6-C

11.2.2 **a.** A website is a collection of web pages and related content that is identified by a common domain name and published on at least one web server.

b. WEB 1.0: Web pages from that era were static pages with all the information programmed directly onto the web page. As a result, these web pages stayed the same way until a web developer changed the web page's code. Web pages from that era were also not interactive, so once a user landed on a web page, the only thing they could do was read the information and look at the pictures.
WEB 2.0: With Web 2.0, users play a role in the development of content, whether through posting a status update on Facebook, uploading a video on YouTube, or writing an article for Wikipedia. Using this model, Wikipedia has become the world's largest encyclopaedia with articles on 6 million different topics in more than 100 languages. Every month, 120 000 Wikipedia visitors from around the world update existing articles or write new articles.
WEB 3.0: Web 3.0 will be able to get the context from the user; and then be able to provide the user with the most useful information. Web 3.0 can be likened to an artificial intelligence assistant that understands its user and personalizes everything.

c. Spotify, Netflix - however, accept all other reasonable answers.

11.2.3 This is an optional activity that learners can do.

UNIT 11.2

Big data concepts

In this unit learners are introduced to the concept of Big Data. Work through the content given on pages 142 and 143 of the Theory Book. Make sure your learners understand the concept being taught. Explain any new or difficult words and terms.

Once complete, split learners into small groups of four to five learners. Each group must complete Activity 11.3 on page 143 of the Theory Book. Allocate a time slot for each group to provide feedback during your next IT lesson.

Activity 11.3 Memorandum

Learners' own work. Moderate each groups' work.

UNIT 11.3

Multimedia as part of internet technologies

In this unit learners look at multimedia as part of internet technologies. Discuss and ask learners if any of them have accessed YouTube, Netflix or Spotify. Ask volunteers to explain to the rest of the class what their experiences were like with these websites. Explain that these websites are all examples of multimedia websites.

Work through the content on pages 144 to 146 of the Theory Book. Answer any questions your learners may have. If your school network allows it, allow learners to visit one of the multimedia websites. You can decide on which content they can access beforehand, and load it onto their computers.

Once complete, ask learners to complete Activity 11.4 on page 146 of the Theory Book.

Activity 11.4 Memorandum

11.4.1 Downloading is the easiest way to share media on the internet, a link is shared with access to a file that is shared by the media owner. Streaming allows you to play media over the internet.

11.4.2 – media can be downloaded to your computer and played from your hard drive
– media can be streamed directly from the internet and played in your web browser.

11.4.3 For online media companies, the problem with sharing media through downloads is that it is difficult for the companies to make money from the video. Once the video has been downloaded, it can be shared with hundreds or thousands of people without the video creator earning any additional money.

11.4.4 a. The internet is a global computer network providing a variety of information and communication facilities, consisting of interconnected networks using standardised communication protocols.

b. Video on demand (VOD) websites, like Netflix and Showmax, allow you to watch broadcast television shows and events 'on demand'. Unlike YouTube and Facebook that allow anyone to upload videos, VOD service providers are more like satellite television providers in that they specialise in high-quality, professionally produced television series and movies. Unlike with television, you can watch these episodes and movies whenever you want to.
The one type of service that still allows videos to be downloaded are IPTV (short for Internet Protocol Television) services like DSTV's Catch-up. These services are usually sold as an optional extra with an expensive satellite television contract and allow you to watch episodes or movies that you missed later (or 'on demand').

11.4.5 a. Wi-Fi is a wireless networking protocol that allows devices to communicate without direct cable connections.

b. Streaming is utilising multimedia over the internet.

c. – media can be downloaded to your computer and played from your hard drive
– media can be streamed directly from the internet and played in your web browser.

UNIT 11.4

Compression technology

In this unit learners are taught about compression technology and how it relates to the internet. Work through the content on pages 147 to 148 of the Theory Book with your learners.

Once complete, ask learners to complete Activity 11.5 on page 149 of the Theory Book.

Activity 11.5 Memorandum

11.5.1 **a.** True

b. False. The more a file is compressed, the smaller the file becomes but the worse its quality becomes.

c. True

d. True

e. False. Video compression codecs can save a lot of space by only recording the pixels that change noticeably from one frame to the next.

11.5.2 **a.** It diminishes the videos quality.

b. JPEG format is for image, Mpeg4 format is better for videos.

c. The more a file is compressed, the smaller the file becomes but the worse its quality becomes. This means that compressed files require less bandwidth to stream and can be downloaded more quickly, but they may not look as good as uncompressed files.

11.5.3 Youtube is a free video streaming platform and Netflix is a paid subscription video platform, that is also a video-on-demand website.

11.5.4 Live streaming allows you to watch content creators as they record live, and a video-on-demand website allows you to watch movies and tv shows when ever.

11.5.5 Learner dependant answer.

11.5.6 **a.** Video compression make large video files into smaller sized file for each transference from one system to another.

b. The JPEG (or .jpg) file format (which is short for Joint Photographic Experts Group) is one of the most popular formats used to store images. As with MP3s, a JPEG can compress a file to almost 10% of its original size, allowing you to dramatically decrease the size of images. It does this by looking at the image as small blocks of pixels and determining if they can be represented using fewer colours without changing the way the image looks. This works well in photos.

1.

SOFTWARE	DEFINITION	APPLICATION
WEB 1.0		
WEB 2.0		
WEB 3.0		
Internet of things		

2. Learners complete the mindmap by copying it into their workbooks and filling in the missing information.
Definition: big data generally is large datasets; the category of computing strategies and technologies that are used to handle large datasets.
Uses
1. Customer profiling: by using big data, you can gain an insight into your customers. Businesses can gain a comprehensive and data-based description of a customer that includes variables such as demographics, and consumption patterns. These patterns give you insights as to who your customers are, what they want and what they need, allowing you to connect with your customers in a way that appeals to their interests.
2. Advanced patient care: In the past, nurses and doctors monitored patients' physical vital signs every few hours but a patient's condition may have declined between the time of scheduled visits. Or if a patient has been discharged, there is no way to monitor their progress, if they skip their medications or ignore dietary and self-care instructions given by their doctor after leaving the hospital. Real-time monitoring and body sensors provide a more personalised treatment to enhance patient outcomes. This has the potential to lower costs of hospital care as less attention is needed by a nurse, because a computer can analyse the big data. Wireless sensors can capture and transmit patient vitals far more frequently than human beings can visit the bedside, and these measurements can be analysed in real time for advanced care. Diagnosis times are shortened and treatments are prescribed quicker.
3. The agricultural sector has benefited from big data in many ways. Sensors on fields and crops provide data on the soil conditions, wind direction and speed, fertiliser requirements, water availability and pest infestations. Farm equipment like tractors are equipped with GPS units to find their optimal usage. Analysis of big data can also help prevent spoilage by moving products faster and more efficiently. Drones can patrol fields to alert farmers to crop ripeness or potential problems. RFID-based traceability systems can provide a constant data stream on farm products as they move through the supply chain, from the farm to the compost or recycle bin. Individual plants can be monitored for nutrients and growth rates.

3. In your own words explain the following:

a. Download vs streaming multimedia:
Downloading is the easiest way to share media on the internet. The media owner can simply upload the file to their website and then share a link to that file with website visitors. To play an item shared like this:
1. open the website in your web browser
2. download the media file to a location on your hard drive
3. open the media file on your hard drive using any installed media player.
Since downloaded media is difficult to monetise, most large online multimedia companies share their media through streaming. To play streaming media:
1. open the website in your web browser
2. open the media file in your web browser
3. the media file should start playing automatically.

b. Live broadcasts: These videos show a live broadcast of something happening, whether it is a game being played, a music concert or a sporting event

c. Video on-demand: Video on demand (VOD) websites, like Netflix and Showmax, allow you to watch broadcast television shows and events 'on demand'. Unlike YouTube and Facebook that allow anyone to upload videos, VOD service providers are more like satellite television providers in that they specialise in high-quality, professionally produced television series and movies. Unlike with television, you can watch these episodes and movies whenever you want to.

4. Files are compressed, or made smaller, by removing some of the data.

CHAPTER 12

INTERNET SERVICES TECHNOLOGIES

CHAPTER OVERVIEW	
Unit 12.1	Types of websites and supporting technologies
Unit 12.2	Internet-related careers

The following learning outcomes are covered by this chapter:

- give an overview of internet services technologies
- compare static vs dynamic sites and location-based services sites
- explain the function of HTTP, HTTPS
- describe the purpose, advantages and limitations of multi factor authentication, one time pin (OTP) and security token valid for limited period
- describe internet related careers

GRADE:	11	DATE:	TEACHING TIME:	4 hours

Resources	Each learner should have access to: • IT 11 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

INTRODUCTION

In this chapter learners will look at the different types of websites that can be found on the internet. Check learners' prior knowledge by referring back to the work they completed in 11, Unit 11.1. Check their understanding of the different changes that the internet has gone through.

Activity 12.1 Memorandum

For this activity, allow learners to work in small groups to discuss the different types of websites. Allow about 10 - 15 minutes for these discussions. Alternatively, you can assign one or two types of websites per group and ask the groups to provide feedback to the rest of the class.

UNIT 12.1

Types of websites and supporting technologies

Work through the content on pages 153 to 155 of the Theory Book with your learners. Here we explain the different types of websites and what they do.

Once you are confident that all learners understand the different types of websites, ask them to complete Activity 12.2 on page 156.

Activity 12.2 Memorandum

12.2.1 a. Advocacy
b. Content aggregator
c. Portal
d. Social media
e. Web application
f. Blog
g. Personal

12.2.2 Web 2.0 website, as Web 1.0is more specifically design for personal information purposes.

12.2.3 a. Any two of the following:
- Easy to host and develop.
- Affordable to host and develop.
- Can display multimedia.

b. Any two of the following:
- Changes to the template can be made once and immediately affect all pages.
- Can be updated without programming knowledge.
- Scripts can be used to update the website to only show the most relevant information.
- Can interact with the user.
- Since the content is dynamic, users are more likely to revisit the site to read the new content.
- Can display multimedia.

12.2.4 Blogging

12.2.5 – HTTP (Hypertext Transfer Protocol) is the protocol that controls how web pages are sent from a web server to a user's web browser. It helps to transfer information like document, file, image, video between computers over internet

– HTTPS (Hypertext Transfer Protocol Secure) is a secure version of HTTP in which data is encrypted before it transferred. This type of technology is used by, for example, banks because of all the sensitive information their clients access when doing transactions on internet banking.

12.2.6

	PURPOSE	ADVANTAGES	DISADVANTAGES
Multi-factor authentication	Individuals are authenticated for online services through more than one required security and validation procedure. It comprises of physical, logical and biometric validation techniques used to secure an online facility, product or service.	• Protection in layers improves security. • Achieves necessary compliance requirements. • Increases productivity and brings a better usability experience.	• Inability to login due to theft of smartphone or physical device which is required and may not be available. • Cost of setting up this system is high.

12.2.6

	PURPOSE	ADVANTAGES	DISADVANTAGES
One time pin	A password that is valid for only one login session or transaction, on a computer system or other digital device. OTP is an example of a security token that is valid for limited period.	• Safe from re-use attacks: a fraudster who uses trickery to capture your OTP can't reapply it, since it's no longer valid for future logins or sessions. • Allows you to keep your emails safe: OTPs are generally received on mobile devices via SMS hence you don't need to have access to your email while you're connected to an unsecured Wi-Fi hotspot. • Convenient to use: most individuals own a mobile phone, and SMS functionality exists on every device making one-time passwords convenient to use.	• Could get out of sync: algorithm-based OTPs need to cope with drifting out of sync with the authentication server if the system needs the OTP to be submitted by a deadline. • Can lock you out of your account: if your OTP device is ever stolen or lost, multiple login attacks by the hacker can permanently lock you out of your account. • May be costly for the providers: for OTP providers, costs can be a problem, especially if they're offering OTP hardware.
Security token valid for limited period	The security token is generated after successful authentication of the user. It remains valid for a specific period that has been set. After the specified duration is over, the authentication token expires and cannot be used to perform operations.	When you forget your password, the specific site will generate a security token that will be emailed to your account, which can be used to change your password.	If your email address that is stored on that site is incorrect then you cannot receive a security token or it might be sent to an incorrect email address.

UNIT 12.2

Internet-related careers

Work through the content of this unit, then ask learners to complete Activity 12.3 on page 157 of the Theory Book.

Activity 12.3 Memorandum

12.3.1 The graphics and multimedia designer is responsible for creating all the graphical elements on the website. This includes all the buttons, icons and pictures shown on a website. The graphics of a website create a first impression, and many visitors will not look at the content of a website if it does not have professional graphics.

12.3.2 **a.** Any two of the following:
This includes:
– Designing the layout of web pages.
– Identifying features for the website.
– Designing the look and feel of the website.
– Coding the website, although this function is often left to specialised web developers.

b. Learner dependent answer.

1. a. C
   b. A
   c. B
   d. A
2. a. False. Web 2.0 and 3.0 websites are generally dynamic web pages.
   b. True
   c. True
   d. False. Video compression works by recording the difference between a frame and the next.
   e. True
3. – Static websites
   – Dynamic websites
   – Location-based service sites
4. Location-based websites work by making use of the user's location to determine which website or information to show the user.
5. a. RSS works by having the Web site author maintain a list of notifications on their Web site in a standard way. Special computer programs called RSS aggregators have been developed that automatically access the RSS feeds of Web sites you care about on your behalf and organise the results for you.
   b. Distributing podcasts
6. A web author is responsible for writing and editing the text and creating the videos that are used on a website.

7a. – e. Learners' own work. Accept all reasonable answers.

SOCIAL IMPLICATIONS

CHAPTER 13

CHAPTER OVERVIEW	
Unit 13.1	Social implications of big data
Unit 13.2	Influences of globalisation and fourth industrial revolution (4IR)

The following learning outcomes are covered by this chapter:

- discuss the social implications of big data with regards to online services and video conferencing, interactive whiteboards, social websites
- describe the influences of globalisation and fourth industrial revolution (4IR).

GRADE: 11 DATE: TEACHING TIME: 2 hours

Resources	Each learner should have access to:
	• IT 11 Theory Book • QR Code Reader • Computer with Delphi IDE loaded onto it • Data files for the learners and solution folders for the teacher

INTRODUCTION

Computers have economic effects, specifically for businesses where they:

- automate repetitive tasks
- provide more information
- increase competition
- improve communication
- improve the accuracy of work
- improve reliability
- teach people new skills.

While these improvements are fantastic, they have negative side-effects as well. Computers also have complex legal and ethical implications as well. In addition, computers, and specifically the internet, also expose people to digital threats.

In this chapter we will look at big data and the social implications associated with it.

Activity 13.1 Memorandum

13.1.1 VOLUME: These datasets are larger than traditional datasets, so there is more demand placed on the processing and storage life cycle. Often, the data will exceed the capabilities of a single computer.
VARIETY: Big data comes from many different sources and needs to handle potentially useful data by consolidating all information into a single system. The formats and types of media can vary significantly as well.
VELOCITY: Big data practitioners prefer a real-time streaming system as data is constantly being added, processed, and analysed. This requires robust systems with highly available components to safeguard against failures along the data pipeline.
VALUE: The ultimate challenge of big data is reaching decision making process which is aided by the input of valuable data. Sometimes, the systems and processes in place are so complex that using the data and extracting actual value can become difficult..

13.1.2 – Customer profiling: by using big data, you can gain an insight into your customers. Businesses can gain a comprehensive and data-based description of a customer that includes variables such as demographics, and consumption patterns. These patterns give you insights as to who your customers are, what they want and what they need, allowing you to connect with your customers in a way that appeals to their interests.
Advanced patient care: In the past, nurses and doctors monitored patients' physical vital signs every few hours but a patient's condition may have declined between the time of scheduled visits. Or if a patient has been discharged, there is no way to monitor their progress, if they skip their medications or ignore dietary and self-care instructions given by their doctor after leaving the hospital. Real-time monitoring and body sensors provide a more personalised treatment to enhance patient outcomes. This has the potential to lower costs of hospital care as less attention is needed by a nurse, because a computer can analyse the big data. Wireless sensors can capture and transmit patient vitals far more frequently than human beings can visit the bedside, and these measurements can be analysed in real time for advanced care. Diagnosis times are shortened and treatments are prescribed quicker.
The agricultural sector has benefited from big data in many ways. Sensors on fields and crops provide data on the soil conditions, wind direction and speed, fertiliser requirements, water availability and pest infestations. Farm equipment like tractors are equipped with GPS units to find their optimal usage. Analysis of big data can also help prevent spoilage by moving products faster and more efficiently. Drones can patrol fields to alert farmers to crop ripeness or potential problems. RFID-based traceability systems can provide a constant data stream on farm products as they move through the supply chain, from the farm to the compost or recycle bin. Individual plants can be monitored for nutrients and growth rates.

13.1.3 Customised learning programs suited for each individual to improve the overall results.
Can be used to customise learning programmes
Can be used to reduce dropouts
Can be used for targeted recruiting of quality educators

13.1.4 Analysis from Big Data can be used by businesses to discriminate against consumers when they are being analysed and assessed in greater detail.
Companies also capture big data on consumer habits for targeted marketing. This has raised concerns about privacy because every time you click on a website, post on social media, use a mobile app and comment via email or to call centres, your data is collected for future use. Society have a right to their privacy but without their knowledge or consent this right is being eroded.
As big data increases, it exposes more of our data to potential security breaches. For example, if you have approved a company to analyse your data, how certain are you that they will not fall prey to a cyber-attack or that they will not sell your data. This could result in your private data being in unsafe hands.

UNIT 13.1

Social implications of big data

Work through the content of this unit, then ask learners to complete Activity 13.2 on page 162 of the Theory Book.

Activity 13.2 Memorandum

Split the learners into small groups of four to five learners each. The groups discuss the implications big data has on Online banking, booking reservations, E-learning and video conferencing. They can use the information in the Theory Book as their starting points:

- Online banking: Proper analysis of big data can help detect any and all the illegal activities that are being carried out, like the misuse of credit cards, misuse of debit cards, customer statistics alteration and money laundering.
- Booking reservations: Big data from several sources has helped travel agencies, hotels and the tourism industry better understand what customers are looking for and this has led to more direct reservations.
- E-learning: Big data that is being collected is related to the students, faculties, courses and results. This can provide insights to improve the effectiveness of educational institutes, like:
  - customised learning programs suited for each individual to improve the overall student results
  - reframing the course material directed at what is relevant and what students are needing to learn
  - improved grading systems to get clarity on students' progress
  - individual career prediction based on the student's progress, strengths, weaknesses, interests
  - providing relevant resources necessary for students' learning, for example, data for interactive whiteboards.
- Video conferencing: Video conferencing is the use of technology, by users living in different areas that receive and transmit audio-video signals enabling real-time communication. This can help to link companies' far-flung employees and customers in order to reduce travel cost.

Influences of globalisation and fourth industrial revolution (4IR)

Work through the content of this unit, then ask learners to complete Activity 13.3 on page 163 of the Theory Book.

Activity 13.3 Memorandum

Split the learners into small groups of four to five learners each. The groups research the influences of the 4IR on the following sectors: Retail, Building, Social, Travel. If you would prefer, assign one topic to specific groups, which they then need to present to the rest of the class.

Instruct your learners to make a poster of their findings, which you can put up in the classroom so that it is accessible to all the learners.

Assess each group's poster.

1. a. Big data makes it possible for you to gain more complete answers because you have more information. More confidence in available data—means a completely different approach to tackling problems.
   b. Learners' own work. Accept all reasonable answers.
   c. Learners' own work. Accept all reasonable answers.
2. An interactive whiteboard is a large interactive display in the form of a whiteboard.
   - Makes review or revision of lessons more convenient
   - Makes it easier for the teacher to structure lessons
   - Makes the learning process more fun
   - Increases the level of engagement between teachers and learners
   - Allows learners with various disabilities to learn better
   - Brings convenience and flexibility in learning
   - Saves on teaching costs
3. Learners' own work. Accept all reasonable answers.

TERM 4

CHAPTER 7

USER INTERFACES

CHAPTER OVERVIEW	
Unit 7.1	Multi-screen user interfaces
Unit 7.2	Dynamic user interfaces

The following learning outcomes are covered by this chapter:

- describe the basics of human-computer interaction
- use the Hide and Show methods with components
- dynamically instantiate a passive component
- dynamically instantiate an active component
- add an event to a dynamically instantiated component
- use more than one form
- pass data between forms.

GRADE: 11 DATE: TEACHING TIME: 6 hours

Resources	Each learner should have access to: • IT 11 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: • independent – to run on its own • circular dependency – to cause an application to crash • dynamic instantiation – when a component or object is created during run-time

INTRODUCTION

A user interface is the interface a user will interact with on an app. In Grade 10 learners analysed different user interfaces and began understanding how to navigate between screens. This year they will add to that knowledge and learn to add different elements to a user interface.

UNIT 7.1

Multi-form user interfaces

Explain to your learners that multi-form user interfaces will only be tested in their practical assessment task (PAT) and not in their exams. To create a multi-form (or multi-screen) user interface, they need to follow three steps: creating a second form; moving between the forms; and passing data between the forms.

Guided activity 7.1

Work through the Guided activity methodically and step-by-step with your learners making sure all learners understand what to do before moving on to Activity 7.1.

Activity 7.1 Memorandum

The coded solution can be found in the 07 - FriendBook Ans folder.

Activity 7.2 Memorandum

The coded solution can be found in the 07 - Change Main Form Ans folder.

Dynamic instantiation of objects

Explain the term ‘dynamic instantiation’ to your learners. Work through the examples and the text and make sure all learners understand the work being taught in this unit. They will use the knowledge from this unit in their practical assessment task (PAT).

Example 7.1

The coded solution can be found in the 07 - Rainbow Boxes Ans folder.

Activity 7.3 Memorandum

The coded solution can be found in the 07 - Dynamic Components Ans folder.

DATABASES

CHAPTER 8

CHAPTER OVERVIEW

The following learning outcomes are covered by this chapter:

- create a simple database using Microsoft Access
- create a connection to a database using Delphi
- use a data module to connect to a database
- display the data from a database in Delphi
- access fields and records within a database
- select appropriate records using Delphi components or code
- modify values in a database using Delphi code
- manipulate database records using code
- use algorithms when working with databases
- filter a database using code with criteria.

GRADE: 11	DATE:	TEACHING TIME: 18 hours
Resources	Each learner should have access to: • IT 11 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: • TADOConnection – as the name suggests, the TADOConnection component is used to create a connection to an external database • TADOTable – the TADOTable component uses the database connection to connect to a specific table inside your database • TDataSource – the TDataSource component creates a connection between your database table(s) and the Delphi components. A DataSource can contain data from an entire table, a part of a table or data from several tables combined	

INTRODUCTION

Working with and understanding how databases work is a big part of programming. Work through the concepts being taught in this chapter with your learners and provide addtional examples for learners to work with as and when necessary.

UNIT

8.1

Creating a database

Refer back to the work learners have already done with databases to assess prior knowledge. If you find that there are learners who have gaps in their knowledge, rather spend some time working to make sure all learners have a firm knowledge foundation to work from.

Example 8.1

Work through the example with your learners and answer any questions that your learners may have.

Activity 8.1 Memorandum

8.1.1 Check that the learner has created the ContactsDB database with the correct fields and at least five records entered.

Fields:

a. Name
b. Surname
c. Age
d. Phone number
e. E-mail address
f. Last date spoken

8.1.2 Check that the learner has created the ShopsDB database with the correct fields and at least five records entered.

Fields:

a. Name
b. Physical address
c. Web address
d. Type (e.g. electronics, clothes, fast food, groceries)
e. Number of times you have used them
f. Last time you used them

UNIT
8.2

Connecting to a database

In this unit, learners will be taught how to create connections between an application and a database. Work through all the examples with your learners making sure all learners are able to work with databases and applications.

Example 8.2

The coded solution can be found in the 08 - FriendBook Ans folder.

Example 8.3

The coded solution can be found in the 08 – FriendBook_1 Ans folder.

Example 8.4

The coded solution can be found in the 08 – FriendBook_2 Ans folder.

UNIT 8.3

Reading data from a database

Explain to your learners that once they have made a database connection, they can start using and displaying the data in their application.

Example 8.5

The coded solution can be found in the 08 – FriendBook_3 Ans folder.

Activity 8.2 Memorandum

8.2.1 The solution can be found in the 08 - SoftDrink_1 Ans folder.

8.2.2 The solution can be found in the 08 - SoftDrink_2 Ans folder.

UNIT 8.4

Writing data to a database

Work through the different examples and guided activities for the two methods of writing data to a database. Make sure all learners are able to work independently to complete their applications.

Example 8.6

The coded solution can be found in the 08 – FriendBook_3 Ans folder.

Guided activity 8.1

The coded solution can be found in the 08 - FriendBook Ans folder.

UNIT 8.5

Manipulating data

Work through the different examples and guided activities in this unit. Make sure all learners are able to work independently to complete their applications.

Example 8.9

The coded solution can be found in the 08 - DamsApplication Ans folder.

Guided activity 8.2

The coded solution can be found in the 08 - DamsApplication Ans folder.

Guided activity 8.3

The coded solution can be found in the 08 - DamsApplication Ans folder.

Guided activity 8.4

The coded solution can be found in the 08 - DamsApplication Ans folder.

Guided activity 8.5

The coded solution can be found in the 08 - DamsApplication Ans folder.

Guided activity 8.6

The coded solution can be found in the 08 - DamsApplication Ans folder.

Guided activity 8.7

The coded solution can be found in the 08 - DamsApplication Ans folder.

Guided activity 8.8

The coded solution can be found in the 08 - DamsApplication Ans folder.

QUESTION 1

1.1 The coded solution can be found in the 06 - Learner Year Mark Ans folder.

1.2 The coded solution can be found in the 06 - Convert Measurement Ans folder.

QUESTION 2

2.1 The coded solution can be found in the 06 - Change Delimiters Ans folder.

2.2 The coded solution can be found in the 06 - Make 15 Ans folder.

Consider using string methods for the quick learners to isolate the digits in a number (see Guided activity).

Guided activity A.1

Work through the Guided activity methodically and make sure all learners understand the concepts being taught.

Activity A.1 Memorandum

1. Suggested answers:
   - Algorithm to determine whether a number is prime or not:

```
Set Factors = False
      Set Value = 2
      Get Number
      While Value <= Number DIV 2 AND Factors = False
          if Number MOD Value = 0 then
                  Factors = True
          Increase Value by 1
        End While
      if Factors = False then
            Display 'Number is prime'
     Else
           Display 'Number is not prime'
```

1. Suggested answers... *continued*

- IPO chart:

Input	Processing	Output
Number	Value = 2 Factors = False While Value <= Number DIV2 if Number MOD Value = 0 then Factors = True, exit loop Else increase Value by 1 If Factors = False Else if Factors = True	 'Number is prime' 'Number is NOT prime'

- Trace table using the value of 6:

Line number	Factors	Value	Number	Value <= Number DIV 2?	Factors = False?	Number MOD Value	Number MOD Value = 0?	Output
1	False							
2		2						
3			6					
4				True	True			
5						0	True	
6	True							
7		3						
4				True	False			
10								Number is NOT prime

ANNEX A.2

Delphi components

Reinforce the naming convention for components for example the prefix for a button component is btn.

- Use the Object Inspector or programming code to change the properties of components. For example: btnSelect.Caption := 'Choose'. Changes the Caption property of the button to 'Choose'.
- Component methods: Whenever activated, the code of a component method is executed when the component is invoked. Example btnSort.Hide.
- Delphi is based on OOP concepts, and in particular, the GUI-components are instances of the classes used to define them. The common way in which we access the properties of a component is the "dot notation". We use the syntax: objectName.propertyName;
- When you use the dot notation in Delphi, all of the component's properties and methods (function and procedures) pop up in a scrollable list for selection. (If this does not seem to work, make sure you have the "code insight" features turned on. To check this, go to Tools>Options>Editor-Options>code Insight)

Activity A.2 Memorandum

The coded solution can be found in the 01 - GUIComponents Ans folder.

ANNEX

A.3

Variables

Reinforce the use of unique variable and component names that adhere to the following naming conventions:

- Variables start with a letter, followed by letters or digits or the underscore(_) character. No other special characters are allowed.
- Names should describe the data they will contain.
- Names should use camel case, which means the first word or letter is in lowercase, and each word afterwards starts with an uppercase letter. Example: countEvenNumbers.
- Component names should start with three letters describing the component. Example: btnChangeText for a button or lblHelloWorld for a label.

Example A.5

The coded solution can be found in the 08 – FriendBook_3 Ans folder.

Activity A.3 Memorandum

A.3.1 The coded solution can be found in the 01 - Distance Conversion Ans folder.

A.3.2 The coded solution can be found in the 01 - Tile Cost Ans folder.

ANNEX A.4

Decision making

Reinforce the how we use decision-making when working in programming. Revise the various expressions, variables, statements and operators.

Example A.2

The coded solution can be found in the 08 – FriendBook_3 Ans folder.

Example A.3

Work through the Example methodically and make sure all learners understand the concepts being taught.

Example A.4

Work through the Example methodically and make sure all learners understand the concepts being taught.

Example A.5

Work through the Example methodically and make sure all learners understand the concepts being taught. .

Example A.6

Work through the Example methodically and make sure all learners understand the concepts being taught.

Example A.7

Work through the Example methodically and make sure all learners understand the concepts being taught. .

Activity A.4 Memorandum

The coded solution can be found in the 01 - Client Data Ans folder.

ANNEX

A.5

Looping

Loops repeat certain lines of code until a specific condition is met. In most programming languages, including Delphi, there are three types of loop constructs: FOR-loops; REPEAT-loops; and WHILE-loops.

Example A.8

The coded solution can be found in the 08 - DamsApplication Ans folder.

Guided activity A.2

The coded solution can be found in the 01 - High Roller Ans folder.

Activity A.5 Memorandum

A.5.1 The coded solution can be found in the 01 - Isolate Digits Ans folder.

A.5.2 The coded solution can be found in the 01 - Fibonacci Sequence Ans folder.

ANNEX A.6 Strings

This section will look at how strings can be combined, compared and manipulated.

Activity A.6 Memorandum

A.6.1 Suggested answers:

a. Finding a character sChar in sLine string:

```
Get sChar
Set Position = 0
For i = 1 to length of String
       If character at position i in String = sChar
             Set Position = i
      End If
End For
If Position > 0 then
       Display 'sChar found at position Position'
Else
       Display 'sChar not found in String'
```

b. Replacing a character in sLine string with a character sReplace:

```
Get sToReplace
Get sReplace
Set Position = 0
For i = 1 to length of String
       If character at position i in String = sToReplace
             Set character at i  = sReplace
      End If
End For
Display String
```

A.6.2 The coded solution can be found in the 01 - ID Validator Ans folder.