



basic education

Department:
Basic Education
REPUBLIC OF SOUTH AFRICA

**PROPOSED AMENDMENTS TO THE CURRICULUM AND
ASSESSMENT POLICY STATEMENT (CAPS) TO MAKE PROVISION
FOR CODING AND ROBOTICS GRADES R- 9**

**Curriculum and Assessment Policy
Statement**

Grade 4-6

CODING AND ROBOTICS

FOREWORD BY THE MINISTER



In the last twenty-five years, our National Curriculum Statement (NCS) has been focused on transforming Education in South Africa. The democratic values enshrined in our Constitution (Act 108 of 1996) have inspired the development of the National Curriculum. The Preamble to the Constitution states that the aims of the Constitution are to:

- *heal the divisions of the past and establish a society based on democratic values, social justice and fundamental human rights;*
- *improve the quality of life of all citizens and free the potential of each person;*
- *lay the foundations for a democratic and open society in which government is based on the will of the people and every citizen is equally protected by law; and*
- *build a united and democratic South Africa able to take its rightful place as a sovereign state in the family of nations.*

Education and the Curriculum have an important role to play in realising these aims. In 1997 Outcomes Based Education was introduced to overcome the Curricular divisions of the past and was reviewed in 2000. This led to the first Curriculum revision: The Revised National Curriculum Statement Grades R-9 and the National Curriculum Statement Grades 10-12 (2002).

In 2009 the Revised National Curriculum Statement (2002) was revised due to implementation challenges. The National Curriculum Statement Grade R-12 was developed in 2012 which combined the 2002 Curricula for Grade R-9 and Grades 10-12. The National Curriculum Statement for Grades R-12 builds on the previous curriculum but also updates it and aims to provide clearer specification of what is to be taught and learnt on a term-by-term basis.

The Curriculum has been developed encompassing the vision of the National Development Plan (NDP) aligning the Skills, Knowledge and Values required for the Technological Developments in the workplace. The NDP goals are aligned to the Sustainable Development Goals (SDG) and the African Union Agenda 2063. The Modern workplace requires learners that can adapt to a fast-changing home and work environments through empowering learners with the skills they develop through the Three Stream Model. These goals will be achieved through Differentiated Pathways and Multi-Certification levels.

The National Curriculum Statement Grades R-12 accordingly replaces the Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines with the

- Curriculum and Assessment Policy Statements (CAPS) for all approved subjects listed in this document;*
- National Policy Pertaining to the Programme and Promotion requirements of the National Curriculum Statement Grades R-12 (N4PR Revised); and*
- National Protocol for Assessment Grades R-12 (NPA).*

**Mrs Angie Motshekga,
MP Minister of Basic Education**

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SECTION 1: INTRODUCTION TO THE CURRICULUM AND ASSESSMENT POLICY

1.1 Background

The *National Curriculum Statement Grades R-12 (NCS)* stipulates policy on curriculum and assessment in the schooling sector. To improve implementation, the National Curriculum Statement was amended, with the amendments coming into effect in January 2012. A single comprehensive Curriculum and Assessment Policy document was developed for each subject to replace Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines in Grades R-12.

1.2 Overview

- (a) The National Curriculum Statement Grades R-12 (January 2012) represents a policy statement for learning, teaching and assessment in South African schools and comprises the following:
- (i) Curriculum and Assessment Policy Statements for each approved school subject,
 - (ii) The policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and
 - (iii) The policy document, National Protocol for Assessment Grades R-12 (January 2012).
- (b) The National Curriculum Statement Grades R-12 (January 2012) replaces the two current national curricula statements, namely the
- (i) Revised National Curriculum Statement Grades R-9, Government Gazette No. 23406 of 31 May 2002, and
 - (ii) National Curriculum Statement Grades 10-12 Government Gazettes, No. 25545 of 6 October 2003 and No. 27594 of 17 May 2005.
- (c) The national curriculum statements contemplated in subparagraphs b (i) and (ii) comprise the following policy documents which will be incrementally repealed by the National Curriculum Statement Grades R-12 (January 2012) during the period 2012-2014:

- (i) The Subject Statements, Learning Programme Guidelines and Subject Assessment Guidelines for Grades R-9 and Grades 10 – 12,
- (ii) The policy document, National Policy on assessment and qualifications for schools in the General Education and Training Band, promulgated in Government Notice No. 124 in Government Gazette No. 29626 of 12 February 2007,
- (iii) The policy document, the National Senior Certificate: A qualification at Level 4 on the National Qualifications Framework (NQF), promulgated in Government Gazette No.27819 of 20 July 2005,

(iv) *The policy document, An addendum to the policy document, the National Senior Certificate:*

A qualification at Level 4 on the National Qualifications Framework (NQF), regarding learners with special needs, published in Government Gazette, No.29466 of 11 December 2006, is incorporated in the policy document, National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and

(v) *The policy document, An addendum to the policy document, the National Senior Certificate:*

A qualification at Level 4 on the National Qualifications Framework (NQF), regarding the National Protocol for Assessment (Grades R-12), promulgated in Government Notice No.1267 in Government Gazette No. 29467 of 11 December 2006.

(d) The policy document, *National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12*, and the sections on the Curriculum and Assessment Policy as contemplated in Chapters 2, 3 and 4 of this document constitute the norms and standards of the *National Curriculum Statement Grades R-12*. It will therefore, in terms of *section 6A* of the *South African Schools Act, 1996 (Act No. 84 of 1996)*, form the basis for the Minister of Basic Education to determine minimum outcomes and standards, as well as the processes and procedures for the assessment of learner achievement to be applicable to public and independent schools.

1.3 General aims of the South African Curriculum

- (a) *The National Curriculum Statement Grades R-12* gives expression to the knowledge, skills and values worth learning in South African schools. This curriculum aims to ensure that children acquire and apply knowledge and skills in ways that are meaningful to their own lives. In this regard, the curriculum promotes knowledge in local contexts, while being sensitive to global imperatives.
- (b) The National Curriculum Statement Grades R-12 serves the purposes of:
- equipping learners, irrespective of their socio-economic background, race, gender, physical ability or intellectual ability, with the knowledge, skills and values necessary for self-fulfillment, and meaningful participation in society as citizens of a free country,
 - through the process of multi-certification in the GET phase,
 - providing access to higher education,
 - facilitating the transition of learners from education institutions to the workplace; and
 - providing employers with enough profile of a learner's competences.
- (c) The National Curriculum Statement Grades R-12 is based on the following principles:
- **Social transformation:** ensuring that the educational imbalances of the past are redressed, and that equal educational opportunities are provided for all sections of the population,
 - **Active and critical learning:** encouraging an active and critical approach to learning, rather than rote and uncritical learning of given truths,
 - **High knowledge and high skills:** the minimum standards of knowledge and skills to be achieved at each grade are specified and set high, achievable standards in all subjects,
 - **Progression:** content and context of each grade shows progression from simple to complex,
 - **Human rights, inclusivity, environmental and social justice:** infusing the principles and practices of social and environmental justice and human rights as defined in the Constitution of the Republic of South Africa.
 - The National Curriculum Statement Grades R-12 is sensitive to issues of diversity such as poverty, inequality, race, gender, language, age, disability and other factors,

- Valuing indigenous knowledge systems: acknowledging the rich history and heritage of this country as important contributors to nurturing the values contained in the Constitution; and
- Credibility, quality and efficiency: providing an education that is comparable in quality, breadth and depth to those of other countries.

(d) The National Curriculum Statement Grades R-12 aims to produce learners that are able to:

- identify and solve problems and make decisions using computer skills, critical and creative thinking,
- work effectively as individuals and with others as members of a team,
- organise and manage themselves and their activities responsibly and effectively,
- collect, analyse, organise and critically evaluate information,
- communicate effectively using visual, symbolic, digital and/or language skills in various modes,
- use science, technology, and critically showing responsibility towards the environment and the health of others,
- demonstrate an understanding of the world as a set of related systems by recognising that problem solving contexts do not exist in isolation, and
- having the ability to adapt to a changing world and workplace.

(e) Inclusivity should become a central part of the organisation, planning, teaching and assessment at each school. This can only happen if all teachers have a sound understanding of how to recognise and address barriers to learning, and how to plan for diversity.

The key to managing inclusivity is ensuring that barriers are identified and addressed by all the relevant support structures at an institutional level, School Based Support Team (SBST), at District level the District-Based parents and Special Schools as Resource Centres. To address barriers in the classroom, teachers should *use various curriculum differentiation strategies* such as those included in the Department of Basic Education's *Guidelines for Inclusive Teaching and Learning* (2010).

1.4. Subjects and Time allocation

1.4.1 Foundation Phase

(a) The instructional time in the Foundation Phase is as follows:

SUBJECT	GRADE R (HOURS)	GRADE 1-2 (HOURS)	GRADE 3 (HOURS)
Home Language	10	8/7	8/7
First Additional Language		2/3	3/4
Mathematics	7	7	7
Life Skills:	6	6	7
• Beginning Knowledge	(1)	(1)	(2)
• Creative Arts	(2)	2	(2)
• Physical Education	(2)	2	(2)
• Personal and Social Well-being	(1)	(1)	(1)
Coding and Robotics	1	1	2
TOTAL	(24)	(24)	(27)

- (b) Instructional time for Grades R, 1 and 2 is 23 hours and for Grade 3 is 25 hours.
- (c) Ten hours are allocated for languages in Grades R-2 and 11 hours in Grade 3. A maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 2 hours and a maximum of 3 hours for Additional Language in Grades 1-2. In Grade 3 a maximum of 8 hours and a minimum of 7 hours are allocated for Home Language and a minimum of 3 hours and a maximum of 4 hours for First Additional Language.
- (d) In Life Skills Beginning Knowledge is allocated 1 hour in Grades R – 2 and 2 hours as indicated by the hours in brackets for Grade 3.

1.4.2 Intermediate Phase

(a) The instructional time in the Intermediate Phase is as follows:

SUBJECTS	HOURS
Home Language	6
First Additional Language	5
Mathematics	6
Natural Sciences and Technology	3.5
Social Sciences	3
Life Skills	4
• Creative Arts	(1.5)
• Physical Education	(1)
• Personal and Social Well-being	(1.5)
Coding and Robotics	2
TOTALS	29.5

1.4.3 Senior Phase

(a) The instructional time in the Senior Phase is as follows:

SUBJECTS	HOURS
Home Language	5
First Additional Language	4
Mathematics	4.5
Natural Sciences	3
Social Sciences	3
Technology	2
Economic Management Sciences	2
Life Orientation	2
Creative Arts	2
Coding and Robotics	2
TOTALS	29.5

1.4.4 Further Education and Training Phase

(a) The instructional time in Grades 10-12 is as follows:

SUBJECTS	HOURS
Home Language	4.5
First Additional Language	4.5
Mathematics	4.5
Life Orientation	2
A minimum of any three subjects selected from Group B Annexure B, Tables B1-B8 of the policy document, <i>National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12</i> , subject to the provisos stipulated in paragraph 28 of the said policy document.	12 (3x4h)
TOTALS	27.5

The allocated time per week may be utilised only for the minimum required NCS subjects as specified above and may not be used for any additional subjects added to the list of minimum subjects. Should a learner wish to offer additional subjects, additional time must be allocated for the offering of these subjects.

SECTION 2: INTRODUCTION TO CODING AND ROBOTICS

2.1 What is Coding and Robotics?

The Coding and Robotics subject is central to function in a digital and information-driven world; apply digital ICT skills and transfer these skills to solve everyday problems in the development of learners. It is concerned with the various inter-related areas of Information Technology and Engineering. The subject studies the activities that deal with the solution of problems through logical and computational thinking.

In the Curriculum and Assessment Policy Statement (CAPS) for the subject Coding and Robotics in Intermediate Phase (Grades 4-6) has been organised into FOUR (4) Strands: Algorithms and Coding, Robotics Skills, Internet and E-communication and Application Skills. The subject has been organised in this way to ensure continuity with the foundational skills, knowledge and values of early childhood development, taught and developed in grades R-3. Beginning knowledge and personal and social relationships are integrated in the topics. Coding and Robotics is a subject that traverses the other co foundation phase subjects namely Languages (Home and First Additional), Natural Science and Technology, Life Skills, Social Sciences and Mathematics that ultimately strengthen and support it.

2.2 Specific Aims:

The Coding and Robotics subject is aimed at guiding and preparing learners to solve problems, think critically, work collaboratively and creatively, function in a digital and information-driven world, apply digital and ICT skills and to transfer these skills to solve everyday problems and its possibilities. Furthermore, the Subject aims at equipping learners to contribute in a meaningful and successful way in a rapidly changing and transforming society.

Through Coding and Robotics learners are exposed to a range of knowledge, skills and values that strengthen their:

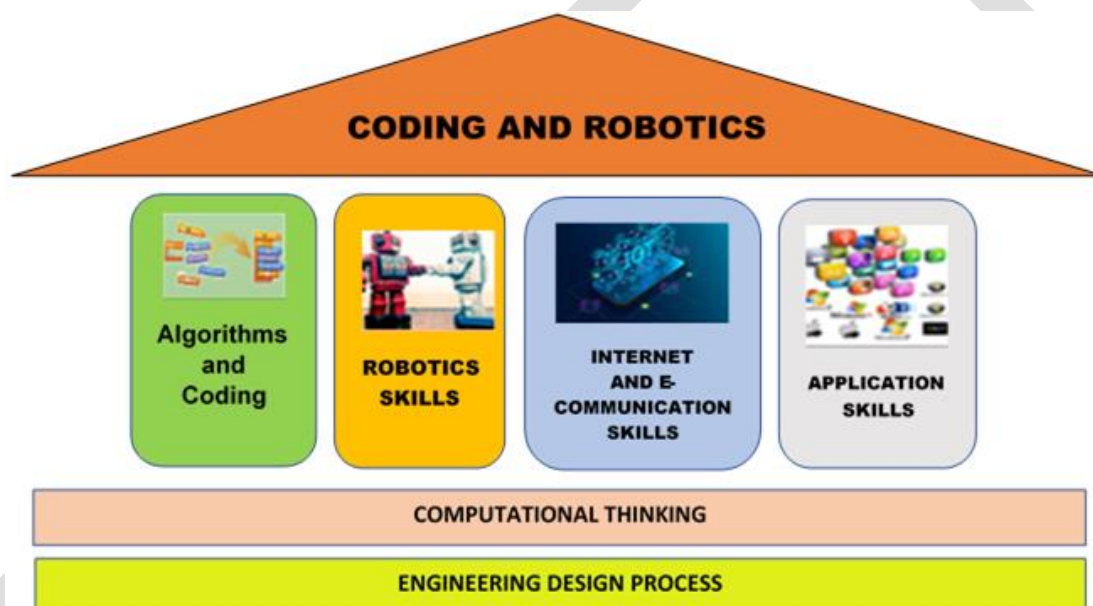
- aesthetic, creative skills and cognitive development, knowledge through engaging in music and visual art activities
- knowledge of digital and ICT skills supported by the technological process and computational thinking skills
- understanding of the relationship between people and the environment, awareness of social relationships, and elementary science.

2.3 Focus content areas:

The Coding and Robotics Foundation Phase subject consist of the following Knowledge Strands:

- Algorithms and Coding Skills
- Robotic Skills
- Internet and E-Communication Skills
- Application Skills

The Strands co-exist and overlap in their application, knowledge and skill levels. The Subject methodology is based on Computational Thinking and the Engineering Design Process.



Topics links and overlap

Throughout the Subject of Coding and Robotics it is important to note that there will always be a degree of overlap between topics. The fundamentals of each Topic are taught in its Strand but is also reinforced in other Strands. Algorithms and Coding are used to program the logic sequence that Robotics uses and the Application skills teach learners how to interact with different digital devices. Internet and E-communications relies on the use of Digital Devices that are taught in Application skills and uses the same skills to send and create messages.

Algorithms and Coding

Algorithm and Coding programming skills in the Intermediate Phase are primarily developed by using a Block based coding Platform. The Block based platforms make use of easy to understand, drag and drop type coding where learners can focus on getting the details and correct inputs in the programs. The following Algorithm and Coding concepts are introduced:

- Variables, Strings and Integers
- Mathematical, Operational and Relational Operators
- Conditional and Nested Conditional Statements
- Looping Mechanisms
- Event Triggers & Broadcasting

Robotic Skills

Robotics consist of two merging fields that including Coding and Engineering. Learners are introduced to intermediate principles of Mechanical and Electrical engineering systems. The Robotics Strand primarily uses the Engineering Design Process and infuses the Concepts of Computational Thinking into the process. The Strand introduce Microcontrollers that will be coded using a Block Based coding platform. The Concepts and Skills taught are as follow:

- Creating logical steps that robots can follow.
- Basic Mechanical systems including pulleys, gears and linkages.
- Microcontrollers
- Block based Coding

Internet and E-Communication Skills

The Strand of Internet and e-Communications skills prepares learners to interact safely in a digital online and offline world. The following Concepts and Skills are taught in the Strand:

- Basic components of Digital Devices
- Digital citizenship and Internet use
- Concepts of Piracy, Plagiarism and Copyrights
- Cloud Computing, Automation, Internet of Things and Digital Communication

Application Skills

Application Skills comprises of end-user skills that are used on different digital platforms. In the Intermediate phase learners are engaging with applications that build on Text, Numeracy,

Presentation and Drawing Skills. The Application skills strand teaches the following skills and content:

- Text Editing Application
- Spreadsheet Application
- Presentation Application
- Multimedia Editing Application
- Computer Aided Drawing Application

2.4 Requirements for Coding and Robotics

2.4.1 Time Allocation

Strands <i>Grade 4-6 = 2 hours per week.</i>	Terms 1 - 4 Hours per week
	Grade 4 - 6
Algorithms and Coding	4
Robotic Skills	6
Internet and e-Communication Skills	2
Application Skills	4
Practical Assessment Task (PAT)	2
Assessments (Test / Examination)	2
Total	10 weeks

The Coding and Robotics Subject is practically orientated and includes practical's which are recorded as formal assessments which needs to be included during teaching time. Informal Assessments continues during lessons when learners are not doing PAT's.

2.4.2 Resources

- Each learner must have a textbook / workbook / e-book. Schools must utilise book retrieval policy where applicable.
- Schools are required to ensure that the necessary tools, devices, materials and consumables be available for teaching, learning and assessment. These resources should be indexed and checked each term.
- The school should subscribe to a minimum of two or more subject related magazines for the teacher to keep abreast with the latest developments in the industrial environment. These magazines could also be lent out to learners (in

the same way as library books). These resources must be readily available in the classroom or in the library.

- Schools offering Coding and Robotics must have a well-equipped Coding and Robotics lab for learners to complete the Practical Assessment Tasks. The Coding and Robotics lab needs to be secured with enough storage space for resources.
- The teacher should have a variety of reference books / e-books, charts and brochures in the classroom to stimulate the learners' interest in the subject.
- The teacher should have access to the internet to be able to source, download and print relevant and new information, as the industry environment is a dynamic industry continuously incorporating new trends and developments. The teacher should also have an e-mail, cloud storage facilities, as new information from subject advisors and other sources can be shared on digital platforms.
- The teacher needs to be trained in the context, content and pedagogy of the subject.
- Resources to offer Coding and Robotics as a subject are the responsibility of the school. The school should build up a collection of models, e.g. by asking learners, parents or mechanical, electrical and electronic repair workshops and suppliers to donate models.
- All resources should be captured in the LTSM inventory list and audited on a term basis; however, these resources should always be readily available for internal/external audits.
- Sustainable Support - Robotics and coding is a subject that requires sustained support. The Coding and Robotics lab requires regular resourcing for the purpose of completion of practical tasks and as well as maintenance.

2.4.2.1. Coding and Robotics Resources

The School Management Team (SMT) should take note of the implications that Coding and Robotics lab has on the budget of the school. Whilst it is common practice to provide a working budget, it is imperative to note that the budget should be structured not only to cater for completion of practical tasks by the learners, but should also allow for the teacher to replenish tools and acquire consumables for experiments, demonstrations and simulations.

The budget that schools develop should make provision for the following:

- Software licenses
- Cartridges, paper and storage media
- Breakage and maintenance
- Insurance
- Internet Connectivity
- Sustainability plan.

The teacher must also be allowed to supplement the teaching and learning support material in the form of posters, models, videos, periodicals and many more. Preventative maintenance of training kits/equipment on a regular basis, as well as provisioning for the inevitable failure of equipment should not be disregarded. The SMT should have a plan in place to regular phase out and replace obsolete tool, consumables and equipment.

2.4.2.1.1. Coding Requirements

- Free open source Software for block-based coding

2.4.2.1.2. Robotics Requirements

- Microcontroller
- Basic Electrical Components:
 - Switches
 - Batteries
 - Wires
 - Breadboards
 - LED's (Normal & RGB)
 - Resistors
 - DC Motors
 - Lightbulbs
 - Buzzer
 - MOSFET's
- Sensors Modules:
 - Temperature
 - Humidity
 - Light
 - Motion

- Basic Mechanical Components:
 - Wheels and Axles
 - Pulleys
 - Linkages
 - Gears
 - Plastic/ Cardboard Fans
 - Fasteners
- The components may be made from recyclable materials
- The following Tools are required:
 - Long nose Pliers
 - String
 - Glue
 - Scissors
 - Project Knife
 - Rulers
 - Insulation Tape
 - Screw drivers
 - Hand Figure Saw

2.4.2.1.3. Infrastructure, Equipment and Finances

- Workspace in Coding and Robotic Labs for learners should be enough for team and individual work.
- A dedicated Coding and Robotics lab should be used.
- The school must procure basic robotics components which will include a selection of basic Electronic and Mechanical components etc. Procurement of LTSM resources should be based on needs analyses from the updated inventory list. Evidence of procurements should be kept for 5 years in line with the Public Finance Management Act (PMFA).
- Schools to provide secure storage space for LTSM.

2.4.2.1.4. Computing Hardware

Coding and Robotics require learners to work in pairs and individually on computers during contact time. The Coding and Robotics Laboratory should provide for the following minimum hardware specs for Computers.

Computers should have a lifespan of 5 years. This will ensure that the Department receives value for money on the investments made.

- 2.0 GHz 64-bit processor (Core I5 CPU minimum)
- 8 GB RAM + 2GB Graphics card
- 500 GB secondary storage
- USB ports
- Keyboard and mouse
- Monitor with a resolution of 1024 x 768 or higher
- Data projector or demonstrating software (LED Lens with 3000 lumens)
- One high-speed printer per Coding and Robotics Lab
- Internet Access
- Network

2.4.2.1.5. Software Requirements:

- Antivirus and Internet Security
- Cloud Storage Services
- Operating System
- Office Suite (Text editing, Presentation and Spreadsheets)
- Application Software for Block based Coding, Multimedia Editing and Drawing
- Screen Control

2.5. Teaching Coding and Robotics in Intermediate Phase

Teaching and Learning in Coding and Robotics involves the development of a range of process and design skills. These skills are underpinned by the Engineering Design Process and the Computational Thinking Process throughout the Subject. Through the subject learners will develop the ability to think objectively and use a variety of forms of reasoning. Teachers need to create an environment that allows learners to tap into their curiosity about digital technology, supports their creativity, responsibility and grow their confidence in using technology through Coding and Robotics.

The Cognitive and Practical Coding and Robotic Skills that learners will develop are:

- Accessing and Recalling of information – use a variety of sources to gather information, remember relevant knowledge and key concepts to develop efficient and functional Coding and Robotics programs.
- Observing – noting details in programs and Coding program and Robotic structures.
- Comparing – noting similarities and differences between different types of Code, algorithms and Robots.
- Measuring – using measure instruments focusing on rulers.
- Sorting and Classifying – sort and classify code elements, mechanical components and electrical components.
- Problem solving – being able to develop programs and robots based on the needs and wants of their community.
- Raising questions – being able to think of, and articulate relevant questions about problems, issues, and Coding and Robotics within their environment.
- Logic Process – identify the logical reasoning in how solutions should be developed for the problems they have identified.
- Digital Process – the ability to identify Inputs, the processes involved and the output generated in a Program.
- Planning and Designing projects and programs – thinking through the method for an activity in advance. Identifying the components, materials and code required to complete a given task.
- Recording information – recording of circuit designs, code, structures and components, in a systematic way, including drawings and descriptions, used to complete a given task.
- Interpreting information: use data provided or gathered and process it to get to a meaningful output.
- Building Projects – building or assembling robotics projects using the appropriate tools and skills including measuring, cutting, folding, rolling, gluing, fastening and building circuits.
- Evaluate and improve – using criteria to assess codes and structures with the goal of improving the final code or robot.
- Communication – using various applications to communicate in a written, visual, oral, presentation or graphic form to other people.

2.5.1. Engineering Design Process (IDMEC)

Coding and Robotics develop valuable problem-solving skills that will benefit every learner in many life contexts for the 4IR and beyond. As learners' progress through a task, they must be taught the associated knowledge and the skills needed to design and create a solution. Knowledge is important and the learners must show that they can use the knowledge.

The Engineering Design Process (Investigate, Design, Make, Evaluate, Communicate – IDMEC) forms the backbone of the subject and should be used to structure the delivery of all learning aims. Learners should be exposed to a problem, need or opportunity as a starting point. They should then engage in a systematic process that allows them to develop solutions that solve problems, rectify design issues and satisfy needs.

Investigation in this subject involves finding out about contexts of the problem, investigating or evaluating existing products in relation to key design aspects and performing practical tests to develop understanding of aspects of the content areas or determining a product's fitness-for-purpose.

Criteria for teaching and assessing design features:

- Originality and aesthetics
- Value for money/cost effectiveness
- Fit-for-purpose and suitability of materials
- Ease of manufacture
- Safety and ergonomics
- Environmental impact

While investigating, learners should be provided with opportunities to explore values, attitudes and indigenous knowledge to develop informed opinions that can help them to make compromises and value judgements. Investigation can happen at any point in the Design Process. It should not be something that must be completed before design begins.

Designing, making and evaluating. These skills should not be separate – they are inter-related. Part of the modernisation of **Design and Making**. Designs can be drafted, virtually assembled and evaluated before they are produced.

Evaluation skills, for example, are used to choose ideas.

At this level, learners should be introduced to key aspects of design. These should be used to evaluate both existing and designed products against predetermined criteria. When making, learners should be encouraged to continue to reflect on their progress against these criteria and to modify their solutions based on problems encountered. As learner's progress, they

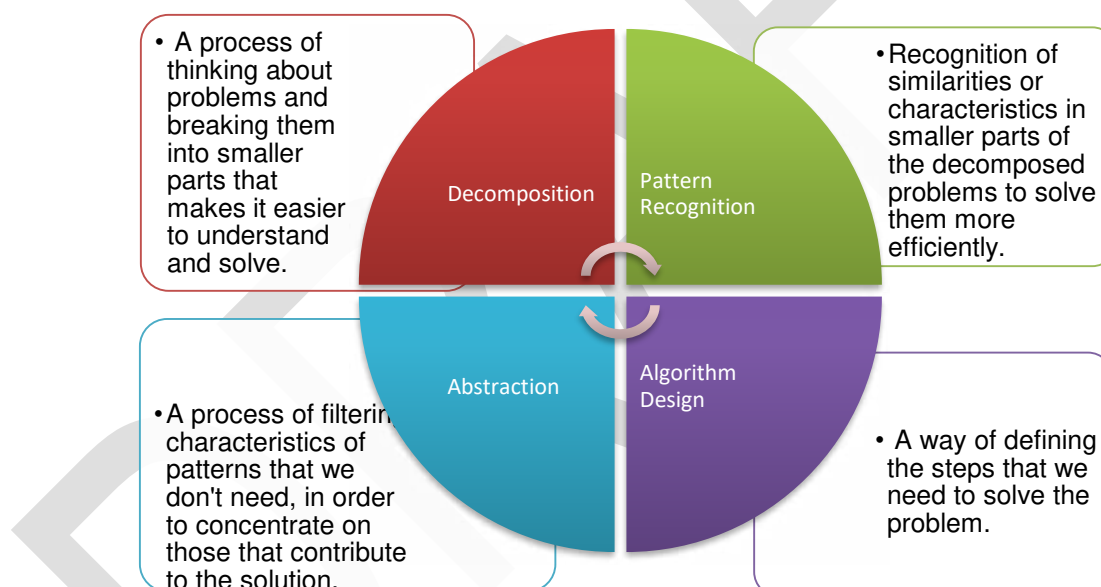
should be able to demonstrate increasing accuracy and skill, better organisation and safer working practices.

Communication should also be integral to the overall process. Learners should be recording and presenting progress in written and graphical forms on an on-going basis. Their presentations should show increasing use of media, levels of formality and conventions as they progress through the phase.

2.5.2. Computational Thinking

In education, Computational Thinking is a set of problem-solving methods that involve expressing problems and their solutions in ways that a computer could also execute.

This is a dynamic process consisting of four steps, that are outlined below:



2.5.3. Literacy and Numeracy Skills integration:

Coding and Robotics relies on the ability of learners to read and write and is central to successful learning in the Subject. Even though Coding and Robotics relies on block Based Coding in the Intermediate Phase, learners need to be able to communicate their ideas and thoughts using writing and should be able to construct meaningful and logical thoughts. Learners should engage with written examples of block code which they need to interpret and use as part of their learning.

Learners should be able to read the labels, buttons, icons and titles used on User Interfaces of various Applications. Their reading and writing skills will further be required in the use of various applications where they will be required to read and follow instructions on digital devices. These instructions include logical steps that needs to be executed in the applications or written in block based code. The learner's ability to read and write well is critical when they are assessed both informally and formally.

2.5.4. Coding and Robotics in a Localised Context

In the Coding and Robotics, curriculum is organised in strands. The use of strands integrates the content from the different subjects' areas where possible and appropriate. Teachers are encouraged to adapt the scenarios so that they are suitable for their school within the South African contexts.

2.5.5. Weighting of Strands and Topics

The Coding and Robotics curriculum is designed across 40 weeks of the year. Approximate time allocations are given for each topic during each term, indicating the weighting that each topic should receive. Coding and Robotics practical application time should be incorporated into the teaching schedule.

SECTION 3: OVERVIEW OF TOPICS AND ANNUAL TEACHING PLANS

3.1 Overview of Topics

Listed below are the topics per grade with a short explanation of the focus. Note that some topics are continued from Grade 4 to 6 showing progression and increasing in complexity from year to year, whilst other topics cease at some stage. This is not due to its importance diminishing, but rather due to the integration thereof.

TERM1			
TOPICS	GRADE 4	GRADE 5	GRADE 6
Internet and E-Communications	<p>Introduction to basic components for smartphones and Tablets:</p> <ul style="list-style-type: none"> - Input devices - Output devices - Processing 	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> - The Appropriate use of the internet. 	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> - What the Internet of things are - How devices are connected in Internet of Things (IOT): - How devices communicate over the Internet of Things (IOT). <ul style="list-style-type: none"> - Wired network - Wireless network <ul style="list-style-type: none"> • Bluetooth • Wi-Fi
Application Skills	<p>Continue with basic features of text editor application. Introduction to:</p> <ul style="list-style-type: none"> • Formatting skills: <ul style="list-style-type: none"> - Font type - Font size - Text colour - Bold, Italics, Underline • Paragraph alignment - Left, Centre, Right • Insert illustrations • Select text • Create a heading <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Computer Aided Design Software Application • Introduce the User interface of the CAD Application • The following skills: <ul style="list-style-type: none"> - Create a new drawing - Save a drawing - Basic Drawing Tools - Line tool. 	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Formatting skills: <ul style="list-style-type: none"> - Create bulleted list – Change the look of a bullet - Creating a numbered list – Use different numbering formats • Continue with inserting illustrations. <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Dimension tools - Round Tool 	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Insert tables – max 3 columns and 6 rows. <ul style="list-style-type: none"> - Create headings for a table. - Insert information into a table - Adjust column width. - Cell shading • Formatting skills: <ul style="list-style-type: none"> - Line spacing • Continue with inserting illustrations. <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic 3D Drawing Tools <ul style="list-style-type: none"> - Extrude Tool - Round Tool
Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are introduced:</p>	<p>The following Concepts for Algorithms and Coding are introduced:</p>	<p>The following Concepts for Algorithms and Coding are introduced:</p>

TERM1			
TOPICS	GRADE 4	GRADE 5	GRADE 6
	<ul style="list-style-type: none"> • Introduction to text variables • Creating a text variable • Naming a text variable • Deleting a text variable • Store user input into a text variable. • Introductions of the following blocks: <ul style="list-style-type: none"> - Join - Ask • Output the value of a text variable. <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to number variables • Creating a number variable • Naming a number variable • Deleting a number variable • Store user input into a number variable. • Output the value of a number variable. • Continue with the following blocks: <ul style="list-style-type: none"> - Join (Operator) - Ask (Sensing) • Continue with Text variables. 	<ul style="list-style-type: none"> • Introduction to the following blocks <ul style="list-style-type: none"> - If then else - Hide and Show variables - Set x to/ Set y to <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to the following blocks <ul style="list-style-type: none"> - Continue with If then else - Introduce random. 	<ul style="list-style-type: none"> • Continue with if then • Continue with if then else • AND and OR Operators <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Continue with If then • Continue with If then else • Nested if statements.
Robotics	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Introduction to Microcontroller • Introduce the Input, Process and Output • Block Based Programming user interface for Microcontrollers • Output Devices LED & Buzzer 	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue with output devices <ul style="list-style-type: none"> - LED - Buzzers • Introduce the use of wired digital input device: <ul style="list-style-type: none"> - Buttons - Keypad/keyboard 	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Introduce input components <ul style="list-style-type: none"> - Thermal sensor • Temperature of objects: warm and cold <ul style="list-style-type: none"> - Light sensor (LDR) • Light intensity: bright and dark <ul style="list-style-type: none"> - Humidity sensor • Humidity: wet and dry

TERM 2

TOPICS	GRADE 5	GRADE 6	GRADE 7
<p align="center">Internet and E-Communications</p>	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Basic Components for Laptops and Desktop Computers • Storage. • Central Processing Unit. 	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Different online crimes: <ul style="list-style-type: none"> - Piracy of music, videos and software. - Plagiarism and copyright. - Identity theft. 	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Devices that send and receive information. • How data is generated using Input devices.
<p align="center">Application Skills</p>	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Continue with basic features of spreadsheet applications. • Formatting skills: <ul style="list-style-type: none"> - Font type - Font size - Font colour - Borders - Cell alignment • Introduction to formulas: <ul style="list-style-type: none"> - Add - Subtract • Continue with bar charts <p>The following Concepts for CAD Applications skills are introduced:</p> <ul style="list-style-type: none"> • Continue with Basic Drawing Tools <ul style="list-style-type: none"> - Line tool. - Circle Tool - Rectangle Tool 	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Pie Charts • Using Autosum • Formulas: <ul style="list-style-type: none"> - Multiplication - Division <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Dimension tools - Curve Tool 	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Filter and sorting • Functions (sum, average, max, min and round) • Line chart <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic 3D Drawing Tools <ul style="list-style-type: none"> - 3D Cut Tool
<p align="center">Algorithms and Coding</p>	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to operators - addition and subtraction • Introduction to the following operator blocks: <ul style="list-style-type: none"> - Add - Subtract 	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to the following blocks <ul style="list-style-type: none"> - Repeat until 	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Continue with if then • Continue with if then else • Continue with repeat • Continue with the pen block • Introduction to nested repeat loops. • Continue with number variables

TERM 2			
TOPICS	GRADE 5	GRADE 6	GRADE 7
	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to operators - multiply and divide • Introduction to the following operator blocks: <ul style="list-style-type: none"> - Multiply - Divide 	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Continue with the following blocks <ul style="list-style-type: none"> - Repeat until - If then else - Random 	
Robotics	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue using Microcontrollers • Continue with Block Based Programming user interface for Microcontrollers • Continue with output to <ul style="list-style-type: none"> - LED - buzzer • Output to multiple LEDs 	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Creating Sequences with outputs. • Continue with output devices <ul style="list-style-type: none"> - LED - Buzzers • Introduce the use of wired digital input device: <ul style="list-style-type: none"> - Buttons - Keypad/keyboard • Introduction to connecting DC Motors 	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Introduce input components <ul style="list-style-type: none"> - Motion sensor - Thermal sensor - Light sensor - Humidity sensor • Motion: moving and non-moving • Continue with LED/Buzzer • Continue with Numerical variables • Continue with DC motors

TERM 3			
TOPICS	GRADE 4	GRADE5	GRADE6
Internet and E-Communications	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • The development of Communication methods. • Indigenous communication methods. • The impact of technology on Communication methods. 	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Web browsers and their user interface. • Homepage user interface • Using refined searching techniques for images 	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • What is Cloud Computing • The way data is stored on a Cloud Computing Platform. • How to access a Cloud Computing Platform
Application Skills	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Presentations • Introduce the user interface of a Presentation Application. • Layout of slides <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Continue with Basic Drawing Tools <ul style="list-style-type: none"> - Line tool. - Circle Tool - Rectangle Tool 	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Manipulate the order of slide. • Copying and pasting • Animation of slides • Inserting a video. <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Trim Tool - Offset Tool 	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Continue with pictures, videos and graphs. • Flowcharts • Animation of objects and shapes. <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic 3D Drawing Tools <ul style="list-style-type: none"> - 3D Revolve Tool
Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to the following operators: <ul style="list-style-type: none"> - Greater than < - Less than > • Introduction to the following control blocks: <ul style="list-style-type: none"> - If then <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to the following block: <ul style="list-style-type: none"> - Touching • Continue with the following control block: <ul style="list-style-type: none"> - If then - Go to (x,y) 	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> - Broadcasting <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Continue with the following concepts <ul style="list-style-type: none"> - Broadcasting • Introduce the wait block 	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to lists • How to store items in a list. <ul style="list-style-type: none"> - Insert - add • How delete a chosen item from a list. <p>The following Concepts for Algorithms and Coding are continued:</p> <ul style="list-style-type: none"> • Lists • How to store items in a list. <ul style="list-style-type: none"> - Insert - add • How delete a chosen item from a list. • Introduction on how to input items into a list. • Introduction on how to determine if an item exists in a list.

TERM 3			
TOPICS	GRADE 4	GRADE5	GRADE6
Robotics	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue using Microcontrollers • Continue with Block Based Programming user interface for Microcontrollers • Continue to Output to multiple LED • Structures • Mechanical Fasteners 	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue with DC Motors • Continue with keyboard/keypad/button • Change the direction of a DC motor • Structures • Mechanical Systems Pulleys (2 Pulleys) 	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue using Microcontrollers • Continue with Block Based Programming user interface for Microcontrollers • Continue to output to multiple LED • Continue with multiple input devices • Continue with sensors • Continue with DC motor • Structures • Mechanical Gears (2 gears) • Mechanical Linkages (2 linkages)

TERM 4			
TOPICS	GRADE 4	GRADE 5	GRADE 6
Internet and E-Communications	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • The advantages of the Internet • The risks of e-communication and devices: <ul style="list-style-type: none"> - Overuse - Screen time - Fake news 	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Digital Citizenship aspects: <ul style="list-style-type: none"> - Digital Footprint - Privacy - Reputation and respect - Cyber bullying - Netiquette 	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • What is Automation • How Automation is supported through the Internet of Things.
Application Skills	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Continue with Presentations • Adding Images to Slides <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Video Editing application • Recording a Video • Upload a Video • Add a title screen to the video. 	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Continue with Presentations • Adding Images to Slides <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Add Text, including concepts of lettering. • Add colour, transition and sound effects. 	<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Continue with Presentations • Adding Video to Slides <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Trimming and merging video clips.
Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Continue with the following blocks: <ul style="list-style-type: none"> - Repeat - If Then – multiple if then statements • Continue with the following blocks: <ul style="list-style-type: none"> - Repeat - If Then - Change x by - Change y by 	<p>The following Concepts for Algorithms and Coding are continued:</p> <ul style="list-style-type: none"> • Operators • Number and Text Variables • Event Triggers • Random • Broadcasting • Hide and show variables • If then • Repeat. 	<p>The following Concepts for Algorithms and Coding are continued:</p> <ul style="list-style-type: none"> • Lists • How to store items in a list. <ul style="list-style-type: none"> - Insert - add • How delete a chosen item from a list. • Continue with: <ul style="list-style-type: none"> - How to input items into a list. - Determining if an item exists in a list. • Introduction to multiple lists (maximum of two) • Determining how many items exist in a list. • Retrieving the value item in a list given its position in the list. • Introduce the Timer block(Sensing)
Robotics	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue using Microcontrollers • Continue with Block Based Programming user interface for Microcontrollers • Continue to output to multiple LED 	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue using Microcontrollers • Continue with Block Based Programming user interface for Microcontrollers • Continue to output to multiple LED 	<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue using Microcontrollers • Continue with Block Based Programming user interface for Microcontrollers • Continue to output to multiple LED

TERM 4			
TOPICS	GRADE 4	GRADE 5	GRADE 6
	<ul style="list-style-type: none"> • Continue with Structures • Continue with Mechanical fastening methods 	<ul style="list-style-type: none"> • Continue with multiple input devices • Continue with DC motor • Continue with Structures • Continue with Mechanical Systems Pulleys (3 Pulleys) 	<ul style="list-style-type: none"> • Continue with multiple input devices • Continue with sensors • Continue with DC motor • Continue with Structures • Continue with Mechanical Gears (2 gears) • Continue with Mechanical Linkages (2 linkages)

3.2 Annual Teaching Plans

3.2.1 GRADE 4: TERM 1

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Introduction to basic components for smartphones and Tablets: <ul style="list-style-type: none"> - Input devices - Output devices - Processing <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discuss the following types of digital devices and their input and output mechanisms with learners: <ul style="list-style-type: none"> - Tablets - Smart phones - Etc. • Learner complete a worksheet where they identify basic input and output devices. • Learners complete a worksheet with the following items, Input, process and output, having to identify the parts in the process.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Basic features and user interface of text editor Application. • Keyboard typing skills <p>The following Concepts for Applications skills are continued:</p> <ul style="list-style-type: none"> • Basic features of text editor application. <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Formatting skills: <ul style="list-style-type: none"> - Font type - Font size - Text colour - Bold, Italics, Underline • Paragraph alignment - Left, Centre, Right • Insert illustrations • Select text • Create a heading <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners type a 4-word sentence to which they can apply and demonstrate the following formatting skills by first selecting the text: <ul style="list-style-type: none"> - Change the font type – Select different font types - Change the Font size - Select different font sizes - Change the Text colour - Select different text colour - Apply Bold, Italics, Underline to the text. - Change the alignment - Left, Centre, Right • Learners can type a paragraph with a heading. The heading must be bold and underlined with a chosen font colour and size. The paragraph must be a minimum of 4 sentences. Learners can choose their own font type and a font size smaller than the heading size. • Learners insert two shapes and pictures into a document.
Week 3 (2 hours)		<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Different Shapes – Round and Rectangle <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Computer Aided Design Software Application • Introduce the User interface of the CAD Application

		<ul style="list-style-type: none"> The following skills: <ul style="list-style-type: none"> Create a new drawing Save a drawing Basic Drawing Tools <ul style="list-style-type: none"> Line Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> Teachers discuss what CAD software is and the layout of the user interface. Learners create their own basic 2D drawing using the line tool and saving the file.
Week 4 (2 hours)	Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are revised from previous grades:</p> <ul style="list-style-type: none"> Coding blocks used in Grade 3 Basic features and user interface of the Coding Application. <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> Introduction to text variables Creating a text variable Naming a text variable Deleting a text variable Store user input into a text variable. Introductions of the following blocks: <ul style="list-style-type: none"> Join Ask Output the value of a text variable. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Teacher discuss what type of information can be capture as text variables. Learners create a program with 2 text variables capturing Name and Surname and display the variables in text bubble using a character.
Week 5 (2 hours)		<p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> Coding Blocks: <ul style="list-style-type: none"> Join (Operator) Ask (Sensing) Text variables. <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> Introduction to number variables Creating a number variable Naming a number variable Deleting a number variable Store user input into a number variable. Output the value of a number variable. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Teacher discuss and demonstrate what type of information can be capture as number variables. Learners create a program with 2 text variables and 1 number variables capturing Name, Surname and age, and have display the variables in text bubble using a character.
Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from the previous grades:</p> <ul style="list-style-type: none"> Breadboards Basic Electronic Components. <p>The following Concepts for Robotics are introduced:</p>

		<ul style="list-style-type: none"> • Introduction to Microcontroller • Introduce the Input, Process and Output <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners are provided with a list of input and output devices and have to categorize them according to their use. • Learners complete a worksheet where they need to Identify Different Input, Processing and output devices. • Learners are introduced to the layout of microcontrollers and how their input and output devices are connected.
Week 7 (2 hours)		<p>The following Concepts for Robotics are continued from the previous week:</p> <ul style="list-style-type: none"> • Microcontrollers <p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Block Based Programming user interface for Microcontrollers • Output Devices LED & Buzzer <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners need to Program a microcontroller to switch on and off a LED/buzzer.
Week 8 (2 hours)		<p>The following Concepts for Robotics are continued from the previous week:</p> <ul style="list-style-type: none"> • Microcontrollers • Block Based Programming user interface for Microcontrollers • Output Devices LED & Buzzer <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners need to Program a microcontroller to make a LED blink. • Learners need to Program a microcontroller to switch a Buzzer on and off automatically.
Week 9 (2 hours)	PAT	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> • Problem Statement
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> • Tests

GRADE 4: TERM 2

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous grades:</p> <ul style="list-style-type: none"> • Basic components for Smartphones <ul style="list-style-type: none"> - Input devices - Output devices - Processing <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Basic Components for Laptops and Desktop Computers • Storage. • Central Processing Unit. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discuss the following types of digital devices and their input and output mechanisms with learners: <ul style="list-style-type: none"> - Laptops - Desktop Computers - Etc. • Learner complete a worksheet where they identify basic input and output devices. • Learners complete a worksheet with the following items, Input, process, storage and output, having to identify the parts in the process based on computer template.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Basic features and user interface of spreadsheet Application. <ul style="list-style-type: none"> - Rows and columns - Cell references • Bar charts <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Continue with basic features of spreadsheet applications. • Formatting skills: <ul style="list-style-type: none"> - Font type - Font size - Font colour - Borders - Cell alignment • Introduction to formulas: <ul style="list-style-type: none"> - Add - Subtract • Continue with bar charts <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Teacher provides an example of a spreadsheet that the learners can copy. The learners can then apply the following formatting skills to the example: <ul style="list-style-type: none"> - Change the font type - Change the font size - Change the font colour - Change the Border type - Change the cell alignment • Learners are provided with a table containing two sets of numbers that needs to be subtracted and added to each other. They need to create a spreadsheet with 4 columns, Number 1, Number 2, Numbers Added and Numbers subtracted. The learners must write the formula they would use in the correct column to add and subtract the number. This activity should be done using a spread sheet application and a worksheet. <p>The following Concepts for Applications skills are revised from the previous term:</p> <ul style="list-style-type: none"> • Different Shapes – Round and Rectangle • The User interface of the CAD application

		<ul style="list-style-type: none"> The following skills: <ul style="list-style-type: none"> Create a new drawing Save a drawing
Week 3 (2 hours)		<p>The following Concepts for Applications skills are continued from previous term:</p> <ul style="list-style-type: none"> Basic Drawing Tools <ul style="list-style-type: none"> Line tool Circle Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> Learners are given a set of 2D drawings to copy using the following tools: <ul style="list-style-type: none"> Line tool Circle Tool Rectangle Tool Learners demonstrate how create their own basic 2D drawing using the Line, Circle and Rectangle tool and saving the file.
Week 4 (2 hours)	Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are revised from previous grades and terms:</p> <ul style="list-style-type: none"> Coding blocks: <ul style="list-style-type: none"> Join (Operator) Ask(Sensing) Number and Text Variables <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> Introduction to operators - addition and subtraction Introduction to the following operator blocks: <ul style="list-style-type: none"> Add Subtract <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners need to write a program using text and number variables, where the addition and subtraction operators should process the number variables to get an output.
Week 5 (2 hours)		<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> Introduction to operators - multiply and divide Introduction to the following operator blocks: <ul style="list-style-type: none"> Multiply Divide <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners need to write a program using text and number variables, where the Multiply and Divide operators should process the number variables to get an output.
Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from the previous term:</p> <ul style="list-style-type: none"> Microcontrollers Layout (Output only) Basic Electronic Components <p>The following Concepts for Robotics are continued from the previous term:</p> <ul style="list-style-type: none"> Microcontrollers Block Based Programming user interface for Microcontrollers Output to <ul style="list-style-type: none"> LED buzzer <p>Examples that can be used in class:</p>

		<ul style="list-style-type: none"> Learners control an LED and/or Buzzer using a microcontroller with various delay times. <p>The following Concepts for Robotics are continued from the previous week:</p> <ul style="list-style-type: none"> Microcontrollers Block Based Programming user interface for Microcontrollers <p>The following Concept for Robotics is introduced:</p> <ul style="list-style-type: none"> Output to multiple LEDs <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners have to Program a microcontroller to change the colour on a LED. <p>The following Concepts for Robotics are continued from the previous week:</p> <ul style="list-style-type: none"> Microcontrollers Block Based Programming user interface for Microcontrollers Output to multiple LED's <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners are provided with patterns and have to program a microcontroller using LED's (minimum of 3 LED's) as an output to replicate the patterns.
Week 7 (2 hours)		
Week 8 (2 hours)		
Week 9 (2 hours)	PAT	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> Investigation
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> Examination

GRADE 4: TERM 3

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous grades:</p> <ul style="list-style-type: none"> • Communication platforms. <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • The development of Communication methods. • Indigenous communication methods. • The impact of technology on Communication methods. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discuss the history of communication and how communication took place in South Africa. (IKS) • Learners make a timeline of the development of Communication in South Africa and where Indigenous Communications fits into the timeline.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Basic features of a text editor. <ul style="list-style-type: none"> - Font type - Font size - Font colour - Borders - Cell alignment <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Presentations • Introduce the user interface of a Presentation Application. • Layout of slides <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Teacher provides and demonstrates an example of a presentation and introduce the layout and user interface to learners. This can be done using a worksheet and presentation application. • Learners have to create their own presentation with the minimum functions and features: <ul style="list-style-type: none"> - 2 slides in the presentation - A heading in the first slide. - Change of text types - Change in colour of the text - Change the cell alignment - Change in size of text.
Week 3 (2 hours)		<p>The following Concepts for Applications skills are revised from the previous term:</p> <ul style="list-style-type: none"> • Different Shapes – Round and Rectangle • The User interface of the CAD application. • The following skills: <ul style="list-style-type: none"> - Create a new drawing - Save a drawing <p>The following Concepts for Applications skills are continued from the previous term:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Line tool - Circle Tool <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Rectangle Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners are provided with a set of 2D drawing to copy using the following tools: <ul style="list-style-type: none"> - Line tool. - Circle Tool - Rectangle Tool

		<ul style="list-style-type: none"> Learners demonstrate how to create their own basic 2D drawing using the Line, Circle and Rectangle Tools and saving the file.
Week 4 (2 hours)	Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are revised from previous terms and grades:</p> <ul style="list-style-type: none"> Coding blocks: <ul style="list-style-type: none"> Add Subtract Multiply Divide Number and Text Variables Event Triggers (Grade3) <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> Introduction to the following operators: <ul style="list-style-type: none"> Greater than < Less than > Introduction to the following control blocks: <ul style="list-style-type: none"> If then <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners write a program, capturing two inputs from a user as number variable and using the Greater than operator to determine which number is the biggest. Learners write a program, capturing two inputs from a user as number variable and using the Less than operator to determine which number is the smallest.
Week 5 (2 hours)		<p>The following Concepts for Algorithms and Coding are continued:</p> <ul style="list-style-type: none"> Control blocks: <ul style="list-style-type: none"> If then Go to (x,y) <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> Introduction to the following block: <ul style="list-style-type: none"> Touching <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Teachers discuss how “If then” Blocks can be used to control the movement of a character, object or shape. Learners write a simple program to instruct a character, object or shape to move to the edge of a stage, turn around and return to its starting point. Learners create a basic program where a character, object to shape moves around the stage and needs to count how many times in a pre-determined time span the learner can click on the character, object or shape (Mouse Game)
Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from previous grades and terms:</p> <ul style="list-style-type: none"> Microcontrollers Layout (Input & Output) Basic Electronic Components Basic Structures <p>The following Concepts for Robotics are continued from previous the term:</p> <ul style="list-style-type: none"> Microcontrollers Block Based Programming user interface for Microcontrollers Output to multiple LED <p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> Structures Mechanical Fasteners <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners select the required electrical components for their project. Learners plan and test the code required for the microcontroller and electrical components that will be used in the project. Learners plan the structure for their project and which type of fasteners they would use.

		<p>The following Concepts for Robotics are continued from previous the week:</p> <ul style="list-style-type: none"> Structures <p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> Mechanical fastening methods <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners build the structure they designed. <p>The following Concepts for Robotics are continued from previous the week:</p> <ul style="list-style-type: none"> Continue basic Structure Continue with Mechanical fastening methods <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners build the structure they designed.
Week 7 (2 hours)		
Week 8 (2 hours)		
Week 9 (2 hours)	PAT	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> Design and Make
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> Tests

GRADE 4: TERM 4

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous terms:</p> <ul style="list-style-type: none"> • Digital Devices: <ul style="list-style-type: none"> - Smartphones and Tablets - Laptops and Desktop Computers <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • The advantages of the Internet • The risks of e-communication and devices: <ul style="list-style-type: none"> - Overuse - Screen time - Fake news <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discuss the advantages of e-communication and then the risks involved. • Learners are given a scenario on how e-communication has improved the lives of people and the risks associated with it. What are the tools used for e-communication?
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous terms:</p> <ul style="list-style-type: none"> • Basic features of a Presentation Application. • User interface of a Presentation Application. <ul style="list-style-type: none"> - A heading in the first slide - Change of text types - Change in colour of the text - Change the cell alignment - Change in size of text <p>The following Concepts for Applications skill is continued:</p> <ul style="list-style-type: none"> • Presentations <p>The following Concepts for Applications skill is introduced:</p> <ul style="list-style-type: none"> • Adding Images to Slides <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners have to create their own presentation for their Project with the minimum functions and features: <ul style="list-style-type: none"> - Minimum of 4 slides. - Use of pictures. - A heading in the first slide. - Change of text types - Change in colour of the text - Change the cell alignment - Change in size of text.
Week 3 (2 hours)		<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Video Editing application • Recording a Video • Upload a Video • Add a title screen to the video. <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners have to create their own video for their Project with the minimum functions and features: <ul style="list-style-type: none"> - Minimum of 2 minutes - Have a Title screen

<p>Week 4 (2 hours)</p>	<p>Algorithms and Coding</p>	<p>The following Concepts for Algorithms and Coding are revised from previous terms and grades:</p> <ul style="list-style-type: none"> • Coding blocks: <ul style="list-style-type: none"> - Add - Subtract - Multiply - Divide - Greater than - Less than • Number and Text Variables • Event Triggers • If then • Repeat (Grade 3) • Multiple Scripts for two characters <p>The following Concepts for Algorithms and Coding are continued:</p> <ul style="list-style-type: none"> • Coding Blocks: <ul style="list-style-type: none"> - Repeat - If Then – multiple if then statements <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners write a program, capturing two inputs from a user as number variable and using the Greater than operator to determine which number is the biggest. Use a repeat to ask for 3 inputs. • Learners write a program, capturing two inputs from a user as number variable and using the Less than operator to determine which number is the smallest. Use repeat to get 3 inputs. • Learners write a program, capturing two inputs from a user. A character then outputs the addition or subtraction or multiplication of the inputs. Use repeat to get three inputs. • Learners complete a project that includes the following minimum requirements: <ul style="list-style-type: none"> - If then (sensing or operators) - Repeat - Event triggers
<p>Week 5 (2 hours)</p>		<p>The following Concepts for Algorithms and Coding are continued from the previous terms:</p> <ul style="list-style-type: none"> • Coding blocks: <ul style="list-style-type: none"> - Repeat - If Then - Change x by - Change y by <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners complete a project that includes the following minimum requirements: <ul style="list-style-type: none"> - If then (sensing) - Repeat - Event triggers • Learners create a cat and mouse game. The mouse is programmed to move around randomly on the stage. The cat tries to catch the mouse. The cat is moved through keyboard triggers. A stage monitor counter can be added to count the number of times the cat has.
<p>Week 6 (2 hours)</p>	<p>Robotics Skills</p>	<p>The following Concepts for Robotics are revised from previous terms:</p> <ul style="list-style-type: none"> • Microcontrollers Layout (Output) • Basic Electronic Components. • Basic Structures <p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • Structures • Mechanical fastening methods <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners build the structure they designed.

		<p>The following Concepts for Robotics are continued from the previous week and terms:</p> <ul style="list-style-type: none"> • Microcontrollers • Block Based Programming user interface for Microcontrollers • Output to multiple LED • Structures • Mechanical fastening methods <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners select the required electrical components for their project. • Learners plan and test the code required for the microcontroller and electrical components that will be used in the project. • Learners plan the structure for their project and which type of fasteners they would use.
Week 7 (2 hours)		
Week 8 (2 hours)		<p>The following Concepts for Robotics are continued from the previous week and terms:</p> <ul style="list-style-type: none"> • Microcontrollers • Block Based Programming user interface for Microcontrollers • Output to multiple LED • Structures • Mechanical fastening methods <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners complete the Coding, Circuit design and Process worksheets based on their project. • Learners build the structure they designed including the mechanical systems and microcontroller they need to connect the electrical components.
Week 9 (2 hours)	Evaluation	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> • Evaluation and Communication
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> • Examination

3.2.2 GRADE 5: TERM 1

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous grades and terms:</p> <ul style="list-style-type: none"> • Digital Devices: <ul style="list-style-type: none"> - Smartphones and Tablets - Laptops and Desktop Computers • The advantages and disadvantages of the Internet <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • The Appropriate use of the internet. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discuss the advantages and disadvantages of the internet. • Teachers discuss the responsible and appropriate use of the internet with learners. • Learners are given different example of internet usage and should identify the correct uses for the internet. Some examples are: <ul style="list-style-type: none"> - Piracy of music, videos and software. - Plagiarism and copyright.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Formatting skills: <ul style="list-style-type: none"> - Font type - Font size - Text colour - Bold, Italics, Underline • Paragraph alignment - Left, Centre, Right • Insert illustrations • Select text • Create a heading <p>The following Concepts for Applications skills are continued:</p> <ul style="list-style-type: none"> • Inserting illustrations <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Formatting skills: • Create bulleted list – Change the look of a bullet • Creating a numbered list – Use different numbering formats <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners can type two paragraphs with a heading. The heading must be bold and underlined with a chosen font colour and size. The paragraph must be a minimum of 4 sentences. Learners can choose their own font type and a font size smaller than the heading size. • Learners can add a list of 5 items to the previous example to which they can apply bulleting and numbering. Learners can select different bullet looks and numbering formats. • Learners must insert 2 square into a document and add arrows to connect the shapes to represent and input output multiplication flow diagram.
Week 3 (2 hours)		<p>The following Concepts for Applications skills are revised from previous and grades:</p> <ul style="list-style-type: none"> • The User interface of the CAD application. • The following skills: <ul style="list-style-type: none"> - Create a new drawing - Save a drawing • Basic Drawing Tools <ul style="list-style-type: none"> - Line tool.

		<ul style="list-style-type: none"> - Rectangle Tool <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Dimension tools - Round Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners are given a set of 2D drawing with dimensions to copy using the following tools: <ul style="list-style-type: none"> - Line Tool - Rectangle Tool - Round Tool
Week 4 (2 hours)	Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are revised from previous grades:</p> <ul style="list-style-type: none"> • Coding blocks: <ul style="list-style-type: none"> - Add - Subtract - Multiply - Divide - Greater than - Less than • Number and Text Variables • Event Triggers • If then <p>The following Concepts for Algorithms and Coding are introduced:</p> <p>Introduction to the following blocks</p> <ul style="list-style-type: none"> - If then else - Hide and Show variables - Set x to/ Set y to <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> - Learners write a program where a mouse pointer is moved over a character. When the mouse pointer touches the Character, the character should say "move away". A counter can be added that shows how many times the mouse has moved over the character.
Week 5 (2 hours)		<p>The following Concepts for Algorithms and Coding are continued:</p> <ul style="list-style-type: none"> • Coding blocks <ul style="list-style-type: none"> - If then else <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to the following blocks <ul style="list-style-type: none"> - Introduce random. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Number guessing game: This program stores a random number between 1 and 10 (inclusive). The learner must try to guess the number. The learner will be able to tell whether he/she is correct or not. Show the correct number of guesses on the stage.
Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from previous grades:</p> <ul style="list-style-type: none"> • Breadboards • Microcontroller • Basic Electronic Components. • Input, Process and Output <p>The following Concepts for Robotics are continued from previous grades:</p> <ul style="list-style-type: none"> • Output devices <ul style="list-style-type: none"> - LED

		<ul style="list-style-type: none"> - Buzzers <p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Continue with output devices <ul style="list-style-type: none"> - LED - Buzzers • Introduce the use of wired digital input device: <ul style="list-style-type: none"> - Buttons <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners program a microcontroller where they have to connect a button to an output device which has to be used to switch a device on. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers, indicating relevant code for the circuit that was built and coded using the button.
Week 7 (2 hours)		<p>The following Concepts for Robotics are continued from previous week:</p> <ul style="list-style-type: none"> • Output devices <ul style="list-style-type: none"> - LED - Buzzers <p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Multiple Output to Devices • Introduce the use of wired digital input device: <ul style="list-style-type: none"> ○ Keypad/keyboard <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners program a microcontroller where they have to connect a keypad/keyboard to an output device which has to be used to switch a device on and off. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers, indicating relevant code for the circuit that was built and coded using a keyboard/keypad.
Week 8 (2 hours)		<p>The following Concepts for Robotics are continued from previous week:</p> <ul style="list-style-type: none"> • Multiple Output to devices <ul style="list-style-type: none"> - LED - Buzzers • Using wired digital input device: <ul style="list-style-type: none"> • Keypad/keyboard <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners program a microcontroller where they have to connect a keypad/keyboard to multiple output devices (minimum of two) which has to be used to switched on and off. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between multiple components and one microcontrollers, indicating relevant code for the circuit that was built and coded using a keyboard/keypad.
Week 9 (2 hours)	Evaluation	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> • Problem Statement
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> • Test

GRADE 5: TERM 2

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous grades and terms:</p> <ul style="list-style-type: none"> • Online Platforms. • Applications <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Different online crimes: <ul style="list-style-type: none"> - Piracy of music, videos and software. - Plagiarism and copyright. - Identity theft. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discusses different online crimes and their implications. • Learners complete an activity where they have to identify the different crimes committed using online platforms.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Formatting skills: <ul style="list-style-type: none"> - Font type - Font size - Font colour - Borders - Cell alignment • Bar charts • Formulas: <ul style="list-style-type: none"> - Add - Subtract <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Pie Charts • Using Autosum • Formulas: <ul style="list-style-type: none"> - Multiplication - Division <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners are provided with a table containing two sets of numbers that needs to be multiplied and divided to each other. They need to create a spreadsheet with 4 columns, Number 1, Number 2, Numbers Multiplied and Numbers divided. The learners must write the formula they would use in the correct column to multiply and divide the numbers. This activity should be done using a spread sheet application and a worksheet. • Learners have to create a cost analysis spreadsheet for their PAT project using spreadsheet using formulas including Autosum. Calculations for price, actual cost of the products multiplied by the number of products. The costs need to be displayed in a Pie chart. <p>The following Concepts for Applications skills are revised previous grades and terms:</p> <ul style="list-style-type: none"> • The User interface of the CAD application. • The following skills: <ul style="list-style-type: none"> - Create a new drawing - Save a drawing • Basic Drawing Tools <ul style="list-style-type: none"> - Line Tool - Rectangle Tool - Circle Tool
Week 3 (2 hours)		<p>The following Concepts for Applications Skills are continued from previous terms and grades:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Line Tool

		<ul style="list-style-type: none"> - Rectangle Tool - Circle Tool <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Dimension tools - Curve Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners are given a set of 2D drawing with dimensions to copy using the following tools: <ul style="list-style-type: none"> - Line Tool - Rectangle Tool - Circle Tool - Round Tool - Curve Tool
Week 4 (2 hours)	Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are revised from previous terms and grades:</p> <ul style="list-style-type: none"> • Coding blocks: <ul style="list-style-type: none"> - Add - Subtract - Multiply - Divide - Greater than - Less than • Number and Text Variables • Event Triggers • Random <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to the following blocks <ul style="list-style-type: none"> - Repeat until <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners create a typing game where a character asks for a specific word to be typed. If the word is typed correctly, the character congratulates the learner, otherwise, the question is repeated <p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • Coding blocks <ul style="list-style-type: none"> - Repeat until - If then else - Random <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners create a number guessing game: This program stores a random number between 1 and 10 (inclusive). The character will ask for the number to be guessed. The character will then say if the number is guessed correctly or not. The guessing will continue until the corrected number is guessed. The number of guesses can be shown on the stage.
Week 5 (2 hours)		<p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • Coding blocks <ul style="list-style-type: none"> - Repeat until - If then else - Random <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners create a number guessing game: This program stores a random number between 1 and 10 (inclusive). The character will ask for the number to be guessed. The character will then say if the number is guessed correctly or not. The guessing will continue until the corrected number is guessed. The number of guesses can be shown on the stage.
Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from previous grades and terms:</p> <ul style="list-style-type: none"> • Breadboards • Microcontroller • Basic Electronic Components. • Input, Process and Output <p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • Multiple output devices <ul style="list-style-type: none"> - LED - Buzzers • Use of wired digital input devices: <ul style="list-style-type: none"> - Keyboards <p>The following Concept for Robotics are introduced:</p> <ul style="list-style-type: none"> • Creating a sequence using multiple inputs.

		<p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners create a program for a microcontroller that needs to output a sequence using multiple inputs (at least two) with one output device. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers, indicating relevant code for the circuit that was built and coded using a keyboard/keypad.
Week 7 (2 hours)		<p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • Creating a sequence using multiple inputs. • Multiple output to devices <ul style="list-style-type: none"> - LED - Buzzers • Use of wired digital input devices: <ul style="list-style-type: none"> - Keyboards <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners create a program for a microcontroller that needs to output a sequence using multiple inputs (at least two) with multiple output devices (at least two). • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers, indicating relevant code for the circuit that was built and coded using a keyboard/keypad.
Week 8 (2 hours)		<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Introduction to connecting DC Motors <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners connect a DC motor to a microcontroller and switch it on and off. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between the DC motor and microcontroller, indicating relevant code for the circuit to switch the motor on and off.
Week 9 (2 hours)	Evaluation	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> • Investigation
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> • Examination

GRADE 5: TERM 3

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous grades and terms:</p> <ul style="list-style-type: none"> • The user interface of websites. • The advantages and disadvantages of the Internet • The Appropriate use of the internet. • Search engine tools <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Web browsers and their user interface. • Homepage user interface • Using refined searching techniques for images <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discusses different browsers and their user interface layout. • Learners complete an activity where they have to identify the different tools on the user interface of a web browser. • Learners are given a list of items and have to search for images of the items.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from pervious grades:</p> <ul style="list-style-type: none"> • Basic features of a text editor. <ul style="list-style-type: none"> - Font type - Font size - Font colour - Borders - Cell alignment • Introduce the user interface of a Presentation Application. • Layout of slides <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Manipulate the order of slide. • Copying and pasting • Animation of slides • Inserting a video. <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • The Teacher discuss and show learners how to: <ul style="list-style-type: none"> - Manipulate the order of slide. - Change the background of slides - Copying and pasting - Animation of slides - Inserting a video. • Learners have to create their own presentation with the minimum functions and features: <ul style="list-style-type: none"> - 5 slides in the presentation - Each slide must have a different background. - An Introduction slide - Contain a video - Have transition between slides.
Week 3 (2 hours)		<p>The following Concepts for Applications skills are revised from previous terms and grades:</p> <ul style="list-style-type: none"> • The User interface of the CAD application. • The following skills: <ul style="list-style-type: none"> - Create a new drawing - Save a drawing • Basic Drawing Tools <ul style="list-style-type: none"> - Line Tool - Rectangle Tool - Circle Tool - Dimension tools

		<ul style="list-style-type: none"> - Curve Tool <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic Drawing Tools <ul style="list-style-type: none"> - Trim Tool - Offset Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners are given a set of 2D drawing with dimensions to copy using the following tools: <ul style="list-style-type: none"> - Line Tool - Rectangle Tool - Circle Tool - Round Tool - Curve Tool - Trim Tool - Offset Tool
Week 4 (2 hours)	Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are revised from previous terms and grades:</p> <ul style="list-style-type: none"> • Operators • Number and Text Variables • Event Triggers • Random <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to the following concepts <ul style="list-style-type: none"> - Broadcasting <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to the following concept: <ul style="list-style-type: none"> - Broadcasting <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners write a program that has two characters. The broadcast message “backflip” is used to trigger the code of the second character. Character 1 will perform a backflip/spin and transmit a message “backflip” when complete. Once the message is received by the second actor, it will congratulate the first actor.
Week 5 (2 hours)		<p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • The following concept: <ul style="list-style-type: none"> - Broadcasting <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduce the wait block <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners write a program that includes 2 characters: The first character will spin 360 degrees and broadcast the message “backflip”. The first actor will now WAIT for the second actor to complete its action before continuing. Once the second actor receives the message, it will spin 720 degrees. When the second actor is done, the code for actor 1 will continue and say “show off”. • Learners create a program called My Family. Characters can be chosen to represent each member of the learner’s family. The program is an animation where each member of the family is introduced by the character represented by the learner. All sprites should hide when the green flag is clicked and wait until they are introduced by the presenter and then appear on the stage in the previously set position. The appearance of the characters occurs using messages. The presenter is the only character appearing on the stage the whole time. He/she will say his/her name first, and then introduce the rest of the family.

Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from previous grades and terms:</p> <ul style="list-style-type: none"> • Microcontrollers Layout (Input and Output) • Basic Electronic Components. • Basic Structures <p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • DC Motors • keyboard/keypad/button <p>The following Concept for Robotics are introduced:</p> <ul style="list-style-type: none"> • Change the direction of a DC motor <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners connect a DC motor to a microcontroller and change the direction of rotation. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between the keyboard/keypad/button, DC motor and microcontroller, indicating relevant code to switch the direction of rotation. <p>The following Concept for Robotics is continued from previous terms:</p> <ul style="list-style-type: none"> • Structures <p>The following Concept for Robotics is introduced:</p> <ul style="list-style-type: none"> • Mechanical Systems Pulleys (2 Pulleys)
Week 7 (2 hours)		<p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners plan the structure for their project and determine how pulleys should be used in their project. <p>The following Concept for Robotics is continued from previous week:</p> <ul style="list-style-type: none"> • Structures <p>The following Concept for Robotics is introduced:</p> <ul style="list-style-type: none"> • Mechanical Systems Pulleys (3 Pulleys)
Week 8 (2 hours)		<p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners plan the structure for their project and determine how pulleys should be used in their project.
Week 9 (2 hours)	Evaluation	Practical Assessment Task: <ul style="list-style-type: none"> • Design and Make
Week 10 (2 hours)	Evaluation	Formal Assessment: <ul style="list-style-type: none"> • Test

GRADE 5: TERM 4

WEEK	TOPIC	CONTENT
<p>Week 1 (2 hours)</p>	<p>Internet and E-communications</p>	<p>The following Concepts for Internet and E-communications are revised from previous terms and grades:</p> <ul style="list-style-type: none"> • The user interface of websites. • The Appropriate use of the internet. <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Digital Citizenship aspects: <ul style="list-style-type: none"> - Digital Footprint - Privacy - Reputation and respect - Cyber bullying - Netiquette <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discusses different aspects of Digital Citizenship with learners using real life examples including: <ul style="list-style-type: none"> - The way animals leave tracks in the sand when walking. - Differences between interacting in person and on a digital platform using text, video and sound. • Learners complete an activity where learners simulate how they will interact with each other using online platforms to communicate. • Learners can be show different videos illustrating different scenarios and they need to identify what the person in doing wrong.
<p>Week 2 (2 hours)</p>	<p>Application Skills</p>	<p>The following Concepts for Applications skills are revised from previous grades and terms:</p> <ul style="list-style-type: none"> • Basic features of a Presentation Application. • User interface of a Presentation Application. <p>The following Concept for Application skills are continued from previous terms:</p> <ul style="list-style-type: none"> • Making Presentations <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Adding Images to Slides <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners have to create their own presentation for their Project with the minimum functions and features: <ul style="list-style-type: none"> - Minimum of 5 slides. - Include a video clip. - Include a bar chart. - Include animation. <p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • User interface of the Video Editing Application • Recording a Video • Upload a Video • Add a title screen to the video. • Title screen
<p>Week 3 (2 hours)</p>		<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Add Text, including concepts of lettering. • Add colour, transition and sound effects. <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners have to create their own video for their Project with the minimum functions and features: <ul style="list-style-type: none"> - Minimum of 2 minutes - Have a Title Screen - Text, including concepts of lettering. - Colour, transitions and sound effects.

<p>Week 4 (2 hours)</p>	<p>Algorithms and Coding</p>	<p>The following Concepts for Algorithms and Coding are revised from previous terms:</p> <ul style="list-style-type: none"> • Operators • Number and Text Variables • Event Triggers • Random • Broadcasting • Hide and show variables • If then • Repeat <p>The following Concepts for Algorithms and Coding are continued from previous terms:</p> <ul style="list-style-type: none"> • Operators • Number and Text Variables • Event Triggers • Random • Broadcasting • Hide and show variables • If then • Repeat. <p>Example to be used in class: Learners start a project with the following requirements:</p> <ul style="list-style-type: none"> - Learners create a pong game. Learners can choose a theme, ball object and paddle object. - Learners code the ball to move around randomly on the stage. The ball needs to bounce off the edge off the stage - Learners code the paddle so that it can be controlled/moves with the mouse. <p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • Operators • Number and Text Variables • Event Triggers • Random • Broadcasting • Hide and show variables • If then • Repeat.
<p>Week 5 (2 hours)</p>		<p>Continue with project from previous week.</p> <ul style="list-style-type: none"> • Learners add the following code: <ul style="list-style-type: none"> - Make ball bounce off paddle. - Score points when ball touches paddle. - Say the game “is over you won” when a certain number of points are reached.
<p>Week 6 (2 hours)</p>	<p>Robotics Skills</p>	<p>The following Concepts for Robotics are revised from the previous term:</p> <ul style="list-style-type: none"> • Microcontrollers layout (input and output) • Basic electronic components • Basic structure <p>The following Concepts for Robotics are continued from the previous terms:</p> <ul style="list-style-type: none"> • Structures • Mechanical Systems Pulleys (3 Pulleys) <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners plan the structure for their project and determine how pulleys should be used in their project.
<p>Week 7 (2 hours)</p>		<p>The following Concepts for Robotics are continued from previous terms:</p>

		<ul style="list-style-type: none"> • Microcontrollers • Block Based Programming user interface for Microcontrollers • Output to multiple LED's • Multiple input devices • DC motor • Structures • Mechanical Systems Pulleys (3 Pulleys) <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners select the required electrical components for their project and combined them with the pulley system. • Learners plan the structure for their project with the mechanical pulley system they would use. • Learners plan and test the code required for the microcontroller and electrical components that will be used in the project.
Week 8 (2 hours)		<p>The following Concepts for Robotics are continued from the previous week:</p> <ul style="list-style-type: none"> • Microcontrollers • Block Based Programming user interface for Microcontrollers • Output to multiple LED • Multiple input devices • DC motor • Structures • Mechanical Systems Pulleys (3 Pulleys) <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners complete the Coding, Circuit design and Process worksheets based on their project. • Learners build the structure they designed including the mechanical systems and microcontroller they need to connect the electrical components.
Week 9 (2 hours)	Evaluation	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> • Evaluation and Communication
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> • Examination

3.2.3 GRADE 6: TERM 1

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous grades:</p> <ul style="list-style-type: none"> • Networks: <ul style="list-style-type: none"> - Components - Layouts. - Wireless and Wired Networks <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • What the Internet of things are • How devices are connected in Internet of Things (IOT): • How devices communicate over the Internet of Things (IOT). <ul style="list-style-type: none"> - Wired network - Wireless network <ul style="list-style-type: none"> • Bluetooth • Wi-Fi <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discusses how devices connect to the Internet of Things (IOT) with learners focusing the following: <ul style="list-style-type: none"> - Wired connection - Wireless connections • Learners complete an activity where they need to match different digital devices and their methods of connecting to the Internet of Things with each other.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Formatting skills: <ul style="list-style-type: none"> - Font type - Font size - Text colour - Bold, Italics, Underline - Create bulleted list – Change the look of a bullet - Creating a numbered list – Use different numbering formats • Paragraph alignment - Left, Centre, Right • Insert illustrations • Select text • Create a heading <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Insert tables – max 3 columns and 6 rows. <ul style="list-style-type: none"> ○ Create headings for a tables. ○ Insert information into a table ○ Adjust column width. ○ Cell shading • Formatting skills: <ul style="list-style-type: none"> • Line spacing • Images <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners can type three paragraphs with a heading. The heading must be bold and underlined with a chosen font colour and size. The paragraph must be a minimum of 4 sentences. Learners can choose their own font type and a font size smaller than the heading size. • Learners add a table to their document. The table must have a minimum of 3 columns and 6 rows. The teacher can provide as an example the costing requirements for the PAT project for the year. Headings for columns: Item, Number required, Cost per Item. • Learners can add a flow diagram to the document, using a minimum of 4 shapes and arrows to describe design process for the PAT project.
Week 3 (2 hours)		<p>The following Concepts for Applications skills are revised from grades:</p> <ul style="list-style-type: none"> • The User interface of the CAD application.

		<ul style="list-style-type: none"> • The following skills: <ul style="list-style-type: none"> - Create a new drawing - Save a drawing • Basic Drawing Tools <ul style="list-style-type: none"> - Line Tool - Rectangle Tool - Circle Tool <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic 3D Drawing Tools <ul style="list-style-type: none"> - Extrude Tool - Round Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners are given a set of 2D drawing with dimensions to draw and extrude to 3D shapes. Learners have to use the 3D Round tool to create different features on the shapes.
<p>Week 4 (2 hours)</p>	<p>Algorithms and Coding</p>	<p>The following Concepts for Algorithms and Coding are revised from previous grades:</p> <ul style="list-style-type: none"> • Operators • Number and Text Variables • If then • If then else. • Repeat. <p>The following Concepts for Algorithms and Coding are continued from previous grades:</p> <ul style="list-style-type: none"> • if then • if then else <p>The following Concepts for Algorithms and Coding is introduced:</p> <ul style="list-style-type: none"> • AND and OR Operators <p>Example to be used in class:</p> <ul style="list-style-type: none"> • The teacher can provide real world examples of the use of AND and OR. <ul style="list-style-type: none"> ○ If it is raining AND I am outdoors, THEN I need to use an umbrella ○ If it is raining OR it is cold, THEN I need to wear a jacket. • Learners program a character that will say “Please enter a number between 50 and 100”, and then wait for an answer. The character will then say “Excellent” if answer is correct and “Better luck next time if the answer is incorrect”. This example can be extended to allow for multiple inputs using the repeat loop. • Learners program a character that will say “Please enter a number less than 50 or greater than 100”, and then wait for an answer. The character will then say “Excellent” if answer is correct and “Better luck next time if the answer is incorrect”. This example can be extended to allow for multiple inputs using the repeat loop. <p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • if then • if then else
<p>Week 5 (2 hours)</p>		<p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Nested if statements. <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Teachers uses a real life example to explain the nested if: If my test mark is above 80 THEN I get a distinction ELSE, If my test mark is above 50 THEN then I pass, ELSE, You need to try again.

		<ul style="list-style-type: none"> Learners program a character to ask and wait for input for a test score. The total mark for the test is 100. The character must say the following: <ul style="list-style-type: none"> “You received a distinction”, if the score is above 75, “You passed” if the score is above 50, “Please try again”, if the score is above 0. Learners can program a character to find the largest of three numbers.
Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from previous grades:</p> <ul style="list-style-type: none"> Breadboards Microcontroller Basic Electronic Components. Input, Process and Output <p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> Introduce input components <ul style="list-style-type: none"> Thermal sensor Temperature of objects: warm and cold <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners are given an option of 3 Projects that they need to complete. They need to follow the Design Process steps and complete the following for their project: <ul style="list-style-type: none"> Write a problem statement and Investigate possible solutions. Learners program a microcontroller where they have to connect a thermal sensor and a buzzer/LED – if the temperature is above a certain level, the buzzer/LED should switch on. Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers indicating the relevant code for the circuit that was built and coded using the conditional statement to switch on the buzzer/LED.
Week 7 (2 hours)		<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> Introduce input components <ul style="list-style-type: none"> Light sensor (LDR) Light intensity: bright and dark <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners program a microcontroller where they have to connect a light sensor and a buzzer/LED – if the light intensity is below a certain level, the buzzer/LED should switch on. Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers indicating the relevant code for the circuit that was built and coded using the conditional statement to switch on the buzzer/LED.
Week 8 (2 hours)		<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> Introduce input components <ul style="list-style-type: none"> Humidity sensor Humidity: wet and dry <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> Learners program a microcontroller where they have to connect a humidity sensor and a buzzer/LED – if the humidity is below a certain level, the buzzer/LED should switch on. Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers indicating the relevant code for the circuit that was built and coded using the conditional statement to switch on the buzzer/LED.
Week 9 (2 hours)	Evaluation	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> Problem Statement
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> Test

GRADE 6: TERM 2

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous term and grades:</p> <ul style="list-style-type: none"> • Networks both wired and wireless • The Internet of Things (IOT): • How devices connect to the Internet of Things (IOT): <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • Devices that send and receive information. • How data is generated using Input devices. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discusses how devices connected to the Internet of Things send and receive information. • Learners complete an activity where they identify the type of data generated by the device.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Formatting skills: <ul style="list-style-type: none"> - Font type - Font size - Font colour - Borders - Cell alignment • Bar charts • Formulas: <ul style="list-style-type: none"> - Add - Subtract - Divide - Multiply <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Filter and sorting • Functions (sum, average, max, min and round) • Line chart <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners are provided with a table containing set of numbers (5 numbers in each list) and have to apply the formulas to calculate the following with the data: <ul style="list-style-type: none"> - Sum of the numbers - Average of the numbers - The biggest number (MAX) - The smallest number (MIN) - Round the number up or down. • Learners have to create a cost analysis spreadsheet for their PAT. The items need to be displayed using a line graph indicating the items and quantity needed. The project spreadsheet has to use formulas to indicate the following information: <ul style="list-style-type: none"> - The total cost of the project - The average cost of the items - The most expensive item. - The cheapest item - The total cost round up without cents. <p>The following Concepts for Applications skills are revised:</p> <ul style="list-style-type: none"> • The User interface of the CAD application. • The following skills: <ul style="list-style-type: none"> - Create a new drawing - Save a drawing • Basic Drawing Tools

		<ul style="list-style-type: none"> - Line Tool - Rectangle Tool - Circle Tool - Extrude Tool - Round Tool
Week 3 (2 hours)		<p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic 3D Drawing Tools <ul style="list-style-type: none"> - 3D Cut Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners are given a set of 2D drawing with dimensions to draw and extrude to 3D shapes. Learners have to use the 3D Cut tool to create different features on the shapes.
Week 4 (2 hours)	Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are revised from previous terms and grades:</p> <ul style="list-style-type: none"> • Operators • Number and Text Variables • If then • If then else. • Repeat. • Pen and stamp blocks <p>The following Concepts for Algorithms and Coding are continued:</p> <ul style="list-style-type: none"> • if then • if then else • repeat • pen block <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to nested repeat loops. <p>Example to be used in class:</p> <ul style="list-style-type: none"> • Learners write a program where a character moves across the edges of the stage 4 times using nested repeat loops and if then. • Learners write a program where the character will draw patterns on the stage using the nested repeat loops and pen blocks. Eg. concentric squares. <p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • repeat • number variables • nested repeat loops <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners write a program where the character recites the times table from 1 to 5. Learners can first program a character to count from 1 to 12, using a repeat loop. The program can then be adapted to provide the times tables for 1, 2, 3, 4 or 5. The program can then be further adapted using a another repeat loop to recite the times able from 1 to 5.
Week 5 (2 hours)		<p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • repeat • number variables • nested repeat loops <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners write a program where the character recites the times table from 1 to 5. Learners can first program a character to count from 1 to 12, using a repeat loop. The program can then be adapted to provide the times tables for 1, 2, 3, 4 or 5. The program can then be further adapted using a another repeat loop to recite the times able from 1 to 5.
Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from previous term:</p> <ul style="list-style-type: none"> • Breadboards • Microcontroller • Basic Electronic Components. • Input, Process and Output <p>The following Concepts for Robotics are continued from previous term:</p> <ul style="list-style-type: none"> • LED's • Buzzer's <p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Introduce input components

		<ul style="list-style-type: none"> - motion sensor • Motion: moving and non-moving <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners are given an option of 3 Projects that they need to complete. They need to follow the Design Process steps and complete the following for their project: <ul style="list-style-type: none"> - Investigate possible solutions for the problem statement. • Learners program a microcontroller where they have to connect a motion sensor and a buzzer/LED – if there is movement, the buzzer/LED should switch on. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers indicating the relevant code for the circuit that was built and coded using the conditional statement to switch on the buzzer/LED.
Week 7 (2 hours)		<p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • Numerical variables • DC motors <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners program a microcontroller where they have to connect a DC motor. The speed of rotation from the DC motor is determined by the value of the input variable. The variable needs to be created with code. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers indicating the relevant code for the circuit that was built and coded.
Week 8 (2 hours)		<p>The following Concepts for Robotics are continued from previous week and terms:</p> <ul style="list-style-type: none"> • Variables • Sensors <ul style="list-style-type: none"> - Thermal sensor - Light sensor - Humidity sensor • DC motors <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners program a microcontroller where they have to connect a thermal/light/humidity sensor to a DC motor – the speed of the motor will rely on the intensity readings of the sensor. • Learners complete a Coding and Circuit worksheet. The Coding and Circuit worksheet must show the connection between components and microcontrollers indicating the relevant code for the circuit that was built and coded.
Week 9 (2 hours)	Evaluation	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> • Investigation • Design
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> • Examination

GRADE 6: TERM 3

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous terms and grades:</p> <ul style="list-style-type: none"> • Networks both wired and wireless • The Internet of Things (IOT): • How devices connect to the Internet of Things (IOT) • Username and Passwords. <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • What is Cloud Computing • The way data is stored on a Cloud Computing Platform. • How to access a Cloud Computing Platform <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discusses different types of Cloud Computing platforms with regards to: <ul style="list-style-type: none"> - The method of accessing the Platform - The layout of the network and how the data travels to the Platform. • Learners complete an activity where they complete a flowchart of how data moves between devices and the Cloud Computing Platform.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • Basic features of a text editor. • Layout of slides • Manipulate the order of slide. • Copying and pasting • Animation of slides • Inserting a video. <p>The following Concepts for Applications skills are continued from previous grades:</p> <ul style="list-style-type: none"> • with pictures, videos and graphs <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Flowcharts • Animation of objects and shapes. <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • The Teacher discuss and show learners how to: <ul style="list-style-type: none"> - Themes - Create flow charts using objects or shapes. - Animate objects and shapes. • Learners have to create their own presentation with the minimum functions and features: <ul style="list-style-type: none"> - 6 slides in the presentation - Make use of a Theme - An Introduction slide - Contain a picture, video and graph. - Contain a Flowchart - Animated slide, object or shapes.
Week 3 (2 hours)		<p>The following Concepts for Applications skills are revised from previous terms:</p> <ul style="list-style-type: none"> • The User interface of the CAD application. • The following skills: <ul style="list-style-type: none"> - Create a new drawing - Save a drawing • Basic Drawing Tools <ul style="list-style-type: none"> - Line Tool - Rectangle Tool - Circle Tool - 3D Extrude Tool

		<ul style="list-style-type: none"> - 3D Round Tool - 3D Cut Tool <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Basic 3D Drawing Tools <ul style="list-style-type: none"> - 3D Revolve Tool <p>Examples to be used in class.</p> <ul style="list-style-type: none"> • Learners are given a set of 3D drawing that they have to replicate using the various 2D and 3D drawing tools with a focus on the 3D Revolve Tool.
Week 4 (2 hours)	Algorithms and Coding	<p>The following Concepts for Algorithms and Coding are revised from previous terms:</p> <ul style="list-style-type: none"> • Operators • Number and Text Variables • If then • If then else. • Repeat. <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • Introduction to lists • How to store items in a list. <ul style="list-style-type: none"> ○ Insert ○ add • How delete a chosen item from a list. <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners create a simple list of 5 items: <ul style="list-style-type: none"> ○ Favourite toys ○ Friends ○ Television shows ○ Favourite Games • Learners program a character to recall the items in the list they created. <p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • Lists • How to store items in a list <ul style="list-style-type: none"> ○ Insert ○ add • How delete a chosen item from a list. <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • How to input items into a list • How to determine if an item exists in a list. <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners create a program where a character interacts with the learners asking them to type different items to create a list of the following things(examples): <ul style="list-style-type: none"> • Favourite toys • Friends • Television shows • Favourite Games • Learners create a program where the character interacts with the learners asking the learner for an item from a favourite list. The character will check if the item exists in the list. If the item exists, then it will say “Seems like it’s one of your favourites”. If it does not exist, then the item can be added to the list.
Week 5 (2 hours)		<p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • Lists • How to store items in a list <ul style="list-style-type: none"> ○ Insert ○ add • How delete a chosen item from a list. <p>The following Concepts for Algorithms and Coding are introduced:</p> <ul style="list-style-type: none"> • How to input items into a list • How to determine if an item exists in a list. <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners create a program where a character interacts with the learners asking them to type different items to create a list of the following things(examples): <ul style="list-style-type: none"> • Favourite toys • Friends • Television shows • Favourite Games • Learners create a program where the character interacts with the learners asking the learner for an item from a favourite list. The character will check if the item exists in the list. If the item exists, then it will say “Seems like it’s one of your favourites”. If it does not exist, then the item can be added to the list.
Week 6 (2 hours)	Robotics Skills	<p>The following Concepts for Robotics are revised from previous terms:</p> <ul style="list-style-type: none"> • Microcontrollers layout (input and output) • Basic electronic components • Basic structure <p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • Microcontrollers

		<ul style="list-style-type: none"> • Block Based Programming user interface for Microcontrollers • Output to multiple LED • Multiple input devices • Sensors • DC motor <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners select the required electrical components for their project. • Learners plan and test the code required for the microcontroller and electrical components that will be used in the project. <p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • Structures
Week 7 (2 hours)		<p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Mechanical Gears (2 gears) <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> - Learners design the structure they designed including the mechanical Gear systems.
Week 8 (2 hours)		<p>The following Concepts for Robotics are continued from previous week:</p> <ul style="list-style-type: none"> • Structures <p>The following Concepts for Robotics are introduced:</p> <ul style="list-style-type: none"> • Mechanical Linkages (2 linkages) <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> - Learners design the structure they designed including the mechanical Linkage systems.
Week 9 (2 hours)	Evaluation	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> • Make
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> • Test

GRADE 6: TERM 4

WEEK	TOPIC	CONTENT
Week 1 (2 hours)	Internet and E-communications	<p>The following Concepts for Internet and E-communications are revised from previous terms and grades:</p> <ul style="list-style-type: none"> • Networks both wired and wireless • The Internet of Things (IOT): • How devices connect to the Internet of Things (IOT) • Username and Passwords. <p>The following Concepts for Internet and E-communications are introduced:</p> <ul style="list-style-type: none"> • What is Automation • How Automation is supported through the Internet of Things. <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Teacher discusses a factory setup scenario with learners and explain how Automation through the Internet of Things can improve the production line. • Learners play a game where they are divided into groups. Some of the groups may communicate while other may not and all the groups are given the same production sequence to complete making boxes. The learners then need to see who can make the most boxes and explain why they could make more.
Week 2 (2 hours)	Application Skills	<p>The following Concepts for Applications skills are revised from previous terms:</p> <ul style="list-style-type: none"> • Basic features of a Presentation Application. • User interface of a Presentation Application. <p>The following Concept for Applications skills is continued from previous terms:</p> <ul style="list-style-type: none"> • Presentations <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Adding Video to Slides <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners have to create their own presentation for their Project with the minimum functions and features: <ul style="list-style-type: none"> - Minimum of 6 slides. - Include a video clip. - Include Flow Chart - Include a line chart. - Include animation of objects.
Week 3 (2 hours)		<p>The following Concepts for Applications skills are revised from previous grades:</p> <ul style="list-style-type: none"> • User interface of the Video Editing Application • Recording a Video • Upload a Video • Add a title screen to the video. • Title screen • Add Text, including concepts of lettering. • Add colour, transition and sound effects. <p>The following Concepts for Applications skills are introduced:</p> <ul style="list-style-type: none"> • Trimming and merging video clips. <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners have to create their own video for their Project with the minimum functions and features: <ul style="list-style-type: none"> - Minimum of 2 minutes - Have a Title Screen - Text, including concepts of lettering. - Colour, transitions and sound effects.

<p>Week 4 (2 hours)</p>	<p>Algorithms and Coding</p>	<p>The following Concepts for Algorithms and Coding are revised from previous terms:</p> <ul style="list-style-type: none"> • If then • If then else. • Repeat. <p>The following Concepts for Algorithms and Coding are continued from previous terms:</p> <ul style="list-style-type: none"> • Lists • How to store items in a list <ul style="list-style-type: none"> ○ Insert ○ add • How delete a chosen item from a list • Continue with: <ul style="list-style-type: none"> ○ How to input items into a list. ○ Determining if an item exists in a list. • Introduction to multiple lists (maximum of two) • Determining how many items exist in a list. • Retrieving the value item in a list given its position in the list. <p>The following Concept for Algorithms and Coding is introduced:</p> <ul style="list-style-type: none"> • Introduce the Timer block(Sensing) <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners create a question and answer quiz project. The project needs to include the following aspects: <ul style="list-style-type: none"> ○ Create two lists that needs to be preloaded into the program, one with questions and the other with the correct answers. The list could include mathematics or any other topic. ○ Add a character that will interact with the learner to get their answers to the questions. ○ Add a timer to the project.
<p>Week 5 (2 hours)</p>		<p>The following Concepts for Algorithms and Coding are continued from the previous week:</p> <ul style="list-style-type: none"> • Lists • How to store items in a list <ul style="list-style-type: none"> ○ Insert ○ add • How delete a chosen item from a list. • Continue with: <ul style="list-style-type: none"> ○ How to input items into a list ○ Determining if an item exists in a list. • Multiple lists (maximum of two) • Determining how many items exist in a list. • Retrieving the value item in a list given its position in the list. • Timer block(Sensing) <p>Examples to be used in class:</p> <ul style="list-style-type: none"> • Learners continue with the question and answer quiz project. The following can be added to the project: <ul style="list-style-type: none"> ○ Add the code to determine if answers to questions are correct. ○ Generate and display the score.
<p>Week 6 (2 hours)</p>	<p>Robotics Skills</p>	<p>The following Concepts for Robotics are revised from previous terms:</p> <ul style="list-style-type: none"> • Microcontrollers layout (input and output) • Basic electronic components • Basic structure <p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • Structures • Mechanical Gears (2 gears) • Mechanical Linkages (2 linkages)

		<p>Examples that can be used in class:</p> <ul style="list-style-type: none"> - Learners design the structure they designed including the mechanical Gears/Linkage systems.
Week 7 (2 hours)		<p>The following Concepts for Robotics are continued from previous terms:</p> <ul style="list-style-type: none"> • Microcontrollers • Block Based Programming user interface for Microcontrollers • Output to multiple LED • Multiple input devices • Sensors • DC motor <p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners select the required electrical components for their project. • Learners plan and test the code required for the microcontroller and electrical components that will be used in the project. <p>The following Concepts for Robotics are continued from the previous weeks:</p> <ul style="list-style-type: none"> • Microcontrollers • Block Based Programming user interface for Microcontrollers • Output to multiple LED • Multiple input devices • Sensors • DC motor • Structures • Mechanical Gears (2 gears) • Mechanical Linkages (2 linkages)
Week 8 (2 hours)		<p>Examples that can be used in class:</p> <ul style="list-style-type: none"> • Learners complete the Coding, Circuit design and Process worksheets based on their project. • Learners build the structure they designed including the mechanical systems and microcontroller they need to connect the electrical components.
Week 9 (2 hours)	Evaluation	<p>Practical Assessment Task:</p> <ul style="list-style-type: none"> • Evaluation
Week 10 (2 hours)	Evaluation	<p>Formal Assessment:</p> <ul style="list-style-type: none"> • Examination

SECTION 4: ASSESSMENT IN CODING AND ROBOTICS

4.1 Introduction

Assessment is a continuous planned process of identifying, gathering and interpreting information about the performance of learners, using various forms of assessment.

It involves four steps:

- generating and collecting evidence of achievement;
- evaluating this evidence;
- recording the findings and
- using this information to understand and thereby assist the learner's development to improve the process of learning and teaching.

Assessment should be both informal (Assessment for Learning) and formal (Assessment of Learning). In both cases, regular feedback should be provided to learners to enhance the learning experience.

In Coding and Robotics, throughout the Intermediate Phase, the emphasis in assessment is on both writing and doing practical work using digital devices. This means that learners in the Intermediate Phase are assessed through their written and practical coding projects, written and practical robotics projects, electronic circuits, workbook activities and application skills activities.

Coding and Robotics gives learners an opportunity to explore the Technological and Digital world and to further their understanding of it. Across all four Coding and Robotics Strands, the purpose of assessment is to support and encourage the learners, and to assess the learners' holistic development. We know that learners develop knowledge, skills and values by observing their participation and engagement in activities related to those concepts.

Informal assessment of Coding and Robotics throughout the Senior Phase is conducted on an ongoing basis. One good way to do this is to keep an observation book for the teacher. Anything observed of interest or of concern should be noted in the observation book, and followed up each day. These notes should also be included in planning and preparation for remedial purposes, and can also include future assessments. The forms of assessment should be age and development level appropriate. The design of the tasks should cover the content

of the subject and include a variety of tasks designed to achieve the objectives of that specific subject.

Assessments can be conducted individually, in teams during projects and practical activities. Checklists and rubrics may be used to record assessments. Assessments (formal and informal) will enable the teacher to track and monitor the learner's progress throughout the term.

4.2 Assessment in Coding and Robotics

Learners should be given adequate guidance and support to engage with the test format. Assessment (informal and formal) throughout the Senior Phase entails continuous assessment and tests/examinations.

4.2.1 Informal or Daily Assessment

Assessment for learning has the purpose of continuously collecting information about learner performance that can be used to improve their learning. Informal assessments should include a range of cognitive levels and abilities of learners.

Informal assessment is a daily monitoring of learners' progress. This is done through online classroom quizzes, observations, discussions, practical demonstrations, learner-teacher conferences, informal classroom interactions, etc. Informal assessment may be as simple as stopping during the lesson to observe learners or to discuss with learners how learning is progressing. Informal assessment should be used to provide feedback to learners and to inform planning for teaching but need not be recorded. It should not be separate from the learning activities taking place in the classroom.

Online self, peer and team assessments actively allow learners to assess themselves. This is important as it allows learners to learn from and reflect on their own performance.

4.2.2 Formal Assessment

All assessment tasks that make up a formal programme of assessment for the year are regarded as Formal Assessment. Formal assessment tasks are marked and formally recorded by the teacher for progression and certification purposes. All Formal Assessment tasks are subject to moderation for the purpose of quality assurance and to ensure that appropriate standards are maintained.

Formal assessment provides teachers with a systematic way of evaluating how well learners are progressing in a year and in a subject. Examples of formal assessments can be done physically and online and includes tests, examinations, practical tasks, projects, oral presentations, demonstrations, performances, etc.

4.2.2.1 Formal Assessment Requirements for Coding and Robotics

- School Based Assessment (SBA): SBA, which is written at the end of term 1, 2 and 3, shows the learner's progress throughout the year and accounts for 40% of the learner's promotion mark,
- In Grades 4 and 5 all SBA is set and moderated internally.
- In Grade 6 the formal assessment (40%) is internally set and marked but externally moderated.
- Practical Assessment Task (PAT): PAT accounts for the skills the learner has mastered. This is
 - assessed at intervals and requires the learner to engage in multiple practical sessions. During these weekly sessions, skills such as simulation, experimentation, hand, tool, coding, digital and machine skills and workshop practice are honed and perfected to the point where the learner may engage in the tasks set out for that term. The PAT accounts for 20% of the learner's promotion mark.
- In Grades 4 - 5 the Practical Assessment Task is set and marked internally but externally moderated.
- In Grade 6 the Practical Assessment Task (20%) is externally set, internally marked and externally moderated.
- End of the examination: At the end of each academic year every learner is required to write a final examination consist of one paper. The Paper covers all the theoretical work covered through the year. This paper counts 20% of the learner promotion mark.
- The end of the year written assessments i.e. PATS, Practical and Theory Examinations (60%) for Grade 6 is externally set, marked and moderated.

4.2.2 Tests and Examinations

Tests and rubrics should be carefully planned, prepared and moderated. Learners should be given adequate support and guidance prior to writing Tests and Exams. In the Senior Phase

for Coding and robotics learners are required to write Tests in Term 1 and 3 and Examinations in Term 2 and 4.

4.2.2.1. Tests

The tests in Term 1 and 3 should be based on the following suggested minimum criteria

Term	Topics	Grade		4	5	6
		Hours	Weighting	Marks		
1 & 3	Algorithms and Coding	4	25%	8	10	13
	Robotics	6	37.5%	11	15	19
	Internet and E-Communication	2	12.5%	4	5	6
	Application Skills	4	25%	7	10	12
TOTALS		16	100%	30	40	50

Table 4.2: Minimum Grade 4-6 Test Mark Allocations and Weightings for Terms 1 and 3

Furthermore, Test need to adhere to the following requirements:

- A theory test for formal assessment should not comprise of a series of small tests but should cover a substantial amount of content and the duration should at least be 60 minutes in grades 4 – 6
- Each test must accommodate a range of cognitive levels.
- The forms of assessment used should be age and development level appropriate. The design of these tasks should cover the content of the subject and include a variety of tasks designed to achieve the objectives of the subject.

Grades	Tests Term 1 and 3	
	Time Allocation	Mark Allocation
4	60 minutes	50 marks
5	60 minutes	50 marks
6	60 minutes	60 marks

4.2.2.2. Examinations

Examinations consist of one Theory Paper. The Exams in Term 2 and 4 should be based on the following suggested minimum criteria in Table 4.3:

Terms	Topics	Grade		4	5	6
		Hours	Weighting	Marks		
2 & 4	Algorithms and Coding	4	25%	10	15	20
	Robotics	6	37.5%	15	23	30
	Internet and E-Communication	2	12.5%	5	7	10
	Application Skills	4	25%	10	15	20
TOTALS		16	100%	40	60	80

Table 4.3: Grade 4-6 Exam Mark Allocations and Weightings for Terms 2 and 4.

Examination time allocation in Coding and Robotics will be as follows:

Grades	Examination	
	Time Allocation	Mark Allocation
4	90 minutes	60 marks
5	90 minutes	80 marks
6	120 minutes	100 marks

All question papers set by the teacher throughout the year, including the November paper must be scrutinized by the head of department at the school and approved by the Coding and Robotics facilitator for the district. In the Grade 6 examination only Grade 6 content will be assessed. However, prior knowledge from Grades 4 - 6 may be necessary to interpret and answer some of the questions.

4.2.3 Practical Assessment Tasks (PAT)

Practical Assessment Tasks involves projects and practical exercises that learners will complete throughout the year. Learners will complete mini PATS during the year and this will contribute to the learner's final mark as follows:

- Term 1-3: 60% of Term SBA mark in each term
- Term 4: 60% of the Final Mark

The Term 1-3 mini PATS will be set internally by the teacher and contributes towards the SBA together with Term 1 and 3 tests and the exams from Term 2. The mini PATs should be completed throughout the term to ensure that it covers the work being taught in the term and at the end of the Term they make up the Mini PAT.

The Term 1-3 mini PAT's should require the learner to:

- Perform the task/carry out instructions (per criteria given)
- The mini PAT should be based all 4 strands of the coding and robotics curriculum.

The Term 4 PAT will serve as the final project for learners in Grades 4-6 and contribute towards the final together with the Term 4 exams. The Term 4 PAT for Grade 6 is set by the Department of Basic Education and the Term 4 PAT for Grades 4 - 5 is set internally by the teacher. The Term 4 PAT is the Final Project and should cover the Coding and Algorithms, Robotics and Application Skills Term 4 Topics, where content from previous Terms for Internet and E-Communication may be included.

The Term 4 PAT should require the learner to:

- Plan/prepare/investigate/research to solve the identified problem/task
- Perform the task/carry out instructions (per criteria given)
- Develop the project per the given criteria
- Allow for some innovation and creativity.
- The PAT should be based all 4 strands of the coding and robotics curriculum.

Topics	Term 1 -3	Term 4
	Weighting	Weighting
Algorithms and Coding	20%	20%
Robotics	25%	25%
Application Skills	10%	10%
Internet & E-communications	5%	5%
TOTALS	60%	60%

To set the different Term PATs, the teacher should:

- Determine the content/skills/knowledge to be addressed
- Set clear criteria and give extensive instructions to guide the learner (the learner should know exactly what to do and what is expected)
- Keep the scope manageable
- Determine which resources will be required to complete the project and ensure that learners have access to these resources
- Determine the time frame/duration/due date
- Determine mark distribution and compile an assessment tool.

4.2.4 Cognitive Levels of Assessment

Formal and Informal assessments should cater for a range of cognitive levels and abilities of learners as shown below:

Cognitive Levels	Percentage of Task
Lower Order: Knowledge	40%
Middle Order: Comprehension and Application	40%
Higher Order: Analysis, Evaluation and Synthesis	20%

4.3 Inclusion

The Screening, Identification, Assessment and Support (SIAS) provides a policy framework for the standardisation of the procedures to identify, assess and provide programmes for all learners requiring support to enhance their participation and inclusion in schools. Planning assessment for Intermediate Phase learners requires teachers to be sensitive to learners experiencing barriers to learning that may prevent them from performing at their best. Learners experiencing barriers to learning must be provided with differentiated opportunities of assessment. These learning barriers may be “contextual”, “systemic”, “individual”, and “pedagogic”. They will have had different educational experiences up to that point, and acquired different skills. The teacher needs to identify each learner’s needs through formal and informal assessment. It may be necessary to allow some learners to catch up and other learners to do extension activities. Based on on-going assessment, the teacher is expected to accommodate all learners in programmes of learning and assess that.

Like all teaching and learning, assessment needs to be inclusive in its approach to assessing learners’ performance. Inclusivity is a central principle of the NCS (White Paper 6), so it is critical that alternative forms of assessment are planned around the different needs and learning styles displayed by learners.

4.4 Assessment across the Senior Phase

The Programme of Assessment is designed to spread formal assessment tasks in Coding and Robotics in a school throughout a term. Without this programme, tests and tasks are crowded into the last few weeks of the term creating unfair pressure on the learners.

4.4.1. Programme of Assessment (PoA) Grade 4-6

	Formal School-Based Assessments			Final End-of-Year Assessments
	Term 1	Term 2	Term 3	Term 4
Grade 7-9	Mini PAT 60%	Mini PAT 60%	Mini PAT 60%	Final PAT 60%
	Theory Test 40%	Theory Exam 40%	Theory Test 40%	Theory Examination 40%
Term Report	100%	100%	100%	100%
End of Year	School Based Assessment (SBA) = 75%			Consolidated Term 4 Weighting (CTW) = 25%
Promotion /Progression	SBA + CTW = Promotion/ Progression 75% + 25 % = 100%			

4.5 Moderation of Assessment

Moderation refers to the process that ensures that the assessment tasks are fair, valid and reliable. Moderation should be implemented at school, district, provincial and national levels. Comprehensive and appropriate moderation practices should be in place for the quality assurance of all subject assessments.

4.5.1 Mini PAT and PAT Moderation

Moderation of each term's Project phase can start as early as the following term i.e. mini-PATs can be moderated at the end of the second term. The Project will only be moderated upon completion.

The moderation process is as follows:

- During moderation learners are selected at random to demonstrate the completion of the different Project phases.
- Learners being moderated will have access to their completed Project during moderation and may refer to their different Project phases completed earlier in the year.
- Learners may not ask assistance from other learners during moderation.
- All Projects must be on display for the moderator.

- The moderator will select at random no less than two Projects, which learners should explain (how the Project was manufactured).
- Where required, the moderator should be able to call on the learner to explain the Programs function, principles of operation and request the learner to exhibit the skills acquired through the Coding.
- Upon completion, the moderator will, if needed, adjust the marks of the group up or downwards, depending on the decision reached because of moderation.
- Normal examination protocols for appeals will be adhered to if a dispute arises from adjustments made.

4.5.2 SBA Moderation

Moderation of practical and theory tests and examinations shall be conducted by the subject facilitator/or a peer teacher. Grade 4 and 5 tasks are internally moderated except for the PAT that is externally moderated. The subject advisor must moderate a sample of these tasks during school visit, to verify the standard of the internal moderation. Moderation requires the re-marking of the learners work to ensure assessment by the teacher is correct.

Grade 6 tasks should be moderated by the District/Provincial Subject Advisor. This process will be managed by the Provincial Education Department. School-based moderation by the HOD requires the HOD to check the following:

- **Learner compliance:**
 - **Work done by learners comply with the following requirements:**
 - Date
 - Topic
 - Homework assignments reflecting a textbook page and exercise reference
 - Learner scripts are required to show scrutiny and interaction from the teacher in red pen.
 - All teacher actions/interventions in the script must be dated
 - Learners are required to mark all self-assessments in pencil and all corrections to be shown in pencil.
 - **Safety:**

- Learners are required to dress (PPE) appropriately when entering the Robotics Lab.
- Personal safety should be adhered to
- Learner conduct in the Robotics Lab must be orderly and appropriate
- Learners are required to enact safety drills, practise safe operating procedures, perform housekeeping tasks and assist in Robotics Lab preventative maintenance such as cleaning, painting, sanding, etc.
- **Practical Assessment Tasks/Session in Robotics Laboratories:**
 - Learners are required to actively engage in Practical Assessment Tasks, assignments, simulations and experiments
 - Learners who are un-cooperative will receive de-merits or a zero-mark allocation for the section of work
 - Learners who act unsafely in the Robotics Lab, placing other learners in danger, will be removed from the Robotics Lab and should perform additional tasks/engage in corrective behaviour tasks to show improvement in safety awareness and skill. This will be done outside of normal contact time.
- **Teacher compliance:**
 - **Preparation done by teacher includes:**
 - Keeping to pace setters/work schedule
 - Work schedule dates are planned and achieved dates are indicated
 - Lesson plans for each topic
 - Lesson plans and dates in learners' books are aligned.
 - Worksheets/tasks/homework assignments in lesson planning aligns with learners' books.
 - Work is done every day in the learners' books.
 - Workbooks are regularly checked and dated by the teacher.
 - Tests have memorandums before they are written.

- Examinations and major tests are moderated by a peer teacher/HOD/facilitator from District.
- **Workshop/Lab management**
 - Storeroom is indexed, neat and clean
 - Inventory is kept up to date every term
 - Robotics Lab is clean and neat
 - Preventative maintenance schedule is drawn up
 - Robotics Lab budget is prepared and ready.
 - Procurement schedule for Practical and consumable items are kept up to date
 - Replacement of old equipment is planned and rolled out.
- **Classroom management**
 - Classroom is neat and clean
 - Posters and exhibits are evident
 - Pin boards are neatly populated
 - Teacher workstation/desk is neat and clean
 - Filing is neat and tidy.

4.6 Practical Assessment Task (PAT)

The Department of Basic Education issues a Project Guideline for Grade 6 every year. The format of the Grade 6 Project Guideline is duplicated for Grades 4 - 5.

As part of the Project the scenarios. These scenarios are set in the following contexts:

Topics	Grade 4	Grade 5	Grade 6
Projects (PATs)	Robot using LED: Intersection Robot (Traffic Light)	Frame Robots using: DC motors Tower Crane	Robots using Sensors: Aquaponics Smart home

In all grades, each learner must do a Project Assessment Task for the year

- Grades 4-5: Teachers will set and assess the Project and it will be moderated externally by the subject specialists.

- Grade 6: The Project Assessment Tasks for Grade 6 will be assessed by the teacher and will be externally moderated by the District/Provincial subject specialists.
- The date for the external moderation will be decided by the province in which the school is situated.
- The provincial education departments or schools may not change or use the task of the previous year.
- Providing the resources for the Project is the responsibility of the school and schools should ensure that adequate time and funding is allocated for the completion of the Project.

Project sessions should be scheduled in such a way that learners have enough time to practise skills needed for the completion. Weekly practice sessions are needed for the learner to hone the needed skills. A guideline of one (1) hours per week is given for Grades 4 - 6.

Each scenario consists of several activities which will combine to form the Project mark. Owing to the nature of a Project, the scenario chosen by the teacher for the school, may not necessarily tie up with the topic being taught at a time.

In cases where the Grades 4-5 Project and topics are set by the teacher internally, the Head of Department at the school and Coding and Robotics District Subject Advisor are required to approve each task before it is implemented in the Coding and Robotics workshop or laboratory.

Provinces may opt to develop Project guidelines for Grades 4-6 to ensure a unified curriculum approach. These guidelines may however not contradict the design principles outlined in the Grade 6 Project guideline.

The compilation of the Project mark is detailed in the table below:

Description	Time Frame	Weighting of Final 20%	Marks
Mini-PAT	Term 1	3%	20
Mini-PAT	Term 2	3%	20
Mini-PAT	Term 3	3%	20
PAT	Term 4	3.5%	20
Total		12.5%	80

4.7 Recording and reporting

Recording is a process in which the teacher documents the level of a learner's performance and progress towards the achievement of the knowledge as prescribed in the Curriculum and Assessment Policy Statements. Records of learner performance should provide evidence of the learner's progression within a grade and her /his readiness to progress to the next grade.

Reporting is a process of communicating learner performance to learners, parents, schools, and other stakeholders. Learner performance can be reported in several ways, including report cards, parents' meetings, school visitation days, parent-teacher conferences, phone calls, letters, class or school newsletters, etc.

Codes and Percentages for Recording and Reporting

Rating code	Description of competence	Percentage
7	Outstanding achievement	80 - 100
6	Meritorious achievement	70 - 79
5	Substantial achievement	60 - 69
4	Adequate achievement	50 - 59
3	Moderate achievement	40 - 49
2	Elementary achievement	30 - 39
1	Not achieved	0 - 29

Note: The seven-point scale should have clear descriptors that give detailed information for each level.

Teachers will record actual marks against the task by using a record sheet; and report percentages against the subject on the learners' report cards.

Assessments are recorded and reported to parents. It is not necessary to keep a formal record of all learner's work. It is useful, however, to keep some work that can show progress over time. Teachers can give learners a choice of keeping work that gives a good indication of the learner's abilities at a time. These can be kept in files, and displayed during parent interviews and evenings. Otherwise, learners' work should be displayed in the classroom. At certain points learners, can take their work home after it has been evaluated so that the classroom does not become cluttered.

Record Keeping

Learner evidence can include;

- class workbooks,
- worksheets,
- posters,
- projects,
- for items, such as practical demonstrations,
- presentations and
- models, etc.

It is important that teachers should record comments in the observation book or assessment record sheets. This collection of evidence, together with other assessment tools such as checklists, observation sheets, etc., will enable the teacher to track and report systematically to the relevant stakeholders on the learner's progress and achievement throughout the year. The collection of learner evidence should be accessible to the relevant stakeholders (School Management Team, parents, guardians, Education Support Services).

Observation book

Teacher observation is one of several types of assessment techniques recommended as part of instruments used for Assessment and Reporting on learner performance. Other assessment techniques include consultation, focused analysis, peer assessment and self-assessment. Observation involves teachers in observing learners as they participate in planned activities. Teacher observation occurs continually as a natural part of the learning and teaching process and can be used to gather a broad range of information about students' demonstrations of learning outcomes.

All teachers are expected to keep a Portfolio of Evidence. The portfolio may be a file, folder or any other storage system that the school has agreed on. Items that should be kept in the teacher's portfolio are:

- Assessment activities and memoranda
- Programme of Assessment;

- Assessment recording sheets;
- Assessment Tools (checklists, observation sheets, rubrics, etc.)

Assessment Record Sheet

Teachers' records of learner progress should be kept either electronically (on a computer) or in files, books or folders or any other form the school has agreed on. These record sheets should have the following information.

- Annual Teaching Plans
- Grade and class
- Learners' names
- Date of assessment task
- The form of assessment and short description of the assessment task
- The final rating that has been awarded to the learner

Comments for support purposes when and where appropriate. The final or overall rating which is awarded to a learner for Coding and Robotics should give a holistic picture of the learner's achievement. The final rating is based on all the formal assessment tasks that the learner has been assessed on in a term. Other relevant factors (like the development of the learner over time) should also be considered.

Reporting in Intermediate Phase: Grade 4 to 6

Teachers and the school need to be accountable to learners, parents, the education system and the wider community. Being accountable means that schools are required to give feedback to parents on their children's progress and performance using a formal reporting instrument such as a report card. Report cards should be sent to parents and guardians once a term.

In addition to the report cards, schools are expected to use other reporting mechanisms such as:

- parents' meetings
- school visitation days
- parent-teacher conferences
- phone calls

- letters
- school newsletters

Different platforms including digital platforms can be used to report to parents and guardians on a regular basis. This will allow parents/ guardians to remain involved and participate in their children's education.

4.8 General

This document should be read in conjunction with:

- 4.8.1 National policy pertaining to the programme and promotion requirements of the National Curriculum Statement Grades R-12; and*
- 4.8.2 National Protocol for Assessment Grades R-12,*
- 4.8.3 White Paper 6 on Special Needs Education: Building an Inclusive Education and Training System (2001),*
- 4.8.4 Guidelines for Responding to Diversity in the Classroom through the Curriculum and Assessment Policy Statements (2011),*
- 4.8.5 Guidelines to Ensure Quality Education and Support in Special Schools and Special School Resource Centres (2013),*
- 4.8.6 Policy on Screening, Identification, Assessment and Support (2014),*
- 4.8.7 Guidelines for Full-service/Inclusive Schools (2010), and*
- 4.8.8 Standard Operating Procedures for Assessment of Learners Who Experience Barriers to Assessment (2016).*

GLOSSARY:

APPLICATION SKILLS

CONCEPTS	DEFINITIONS
Application	An application, or application program, is a software program that runs on your computer. Web browsers, e-mail programs, word processors, games, and utilities are all applications
Column	On a display screen in character mode, a column is a vertical line of characters extending from the top to the bottom of the screen
Computing device / Computer	A computer is a device for working with information. The information can be numbers, words, pictures, movies, or sounds
Desktop	Desktop personal computers, or pcs, are used for tasks at the office, at school, and at home
Difference	Differing from all others; not the same
Digitally compile	To gather together: to compile data digitally
Graphics	A picture, map, or graph used for illustration
Graphics editing application	A program or collection of programs that enable a person to manipulate images or models visually on a computer
Grid/matrix	Rectangular grids, or sheets, that are made up of columns, rows, and cells
Keyboard	A computer keyboard is an input device that allows a person to enter letters, numbers, and other symbols (these are called characters) into a computer.
Programs	A set of step-by-step instructions that tell a computer to do something with data
Row	A series of persons or things arranged in a usually straight line Especially: a horizontal arrangement of items
Sequence	A continuous or connected series
Similarities	When something is the same
User interface (UI)	A program that controls a display for the user (usually on a computer monitor) and that allows the user to interact with the system
Word processing	The means by which information is transformed into a typed or printed page is called word processing. Word processing involves the use of computers, software, and printers to get data into printed form

CODING AND ROBOTICS

CONCEPT	DEFINITION
Algorithms	A process or set of rules to be followed in calculations or other problem-solving operations, especially by a computer.
Computational abstraction	Once we have recognised patterns in our problems, we use abstraction to gather the general characteristics and to filter out of the details we do not need in order to solve our problem.
Copyright	Copyright is the exclusive right given to the creator of a creative work to reproduce the work, usually for a limited time.
Cyber bullying	Cyberbullying is bullying that takes place over digital devices like cell phones, computers, and tablets. Cyberbullying can occur through SMS, Text, and apps, or online in social media, forums, or gaming where people can view, participate in, or share content. Cyberbullying includes sending, posting, or sharing negative, harmful, false, or mean content about someone else.
Debug	The process of identifying and removing errors from computer hardware or software.
Design principles	Design Principles are fundamental points of advice for making easy-to-use, pleasurable designs as we select, create and organize elements and features in our work.
Digital citizenship	Digital citizenship refers to the responsible use of technology by anyone who uses computers, the Internet, and digital devices to engage with society on any level.
E-communication	E-communication, or electronic communication, refers to the transfer of writing, signals, data, sounds, images, signs or intelligence sent via an electronic device. Some examples of e-communication are email, text messages, social media messaging and image sharing.
Ethical	Relating to moral principles or the branch of knowledge dealing with these.
GUI	Graphical User Interface - A GUI (graphical user interface) is a system of interactive visual components for computer software. A GUI displays objects that convey information and represent actions that can be taken by the user. The objects change colour, size, or visibility when the user interacts with them.
Screen time	Time spent using a device such as a computer, television, or games console.
Sprite/ character	Blocks are puzzle-piece shapes that are used to create code. The blocks connect to each other vertically like a jigsaw puzzle, where each data type has its own shape and a specially shaped slot for it to be inserted into, which prevents syntax errors. Series of connected blocks are called scripts. A few categories of blocks: Motion, Looks, Sound, Event, Control, Sensing, Operators, Variables, List, and My Blocks. The list blocks are shown under the Variables Blocks.

GLOSSARY OF ACRONYMS AND ABBREVIATIONS

Acronyms and Abbreviations	Meanings
FOSS	Free Open Source Software
GETC	General Education and Training Certificate
GETC:TO	General Education and Training Certificate: Technical Occupational
GETC:TV	General Education and Training Certificate: Technical Vocational
GUI	Graphical User Interface
I/O	Input-Output
ICT	Information and Communication Technology
IDMEC	Investigation, Design, Make, Evaluate, Communicate
IP	Internet Protocol
IPO	Input-Processing-Output
OHS	Occupational Health and Safety
PAT	Practical Assessment Task
PoA	Programme of Assessment
PoE	Portfolio of Evidence
RAM	Random Access Memory
ROM	Read-Only Memory
SBA	School Based Assessment
SSD	Solid State Hard drive
URL	Uniform Resource Locator
USB	Universal Serial Bus
VoIP	Voice over Internet Protocol
VPN	Virtual Private Network
WAN	Wide Area Network
Wi-Fi	Wireless Fidelity
WWW	World Wide Web