MINISTRY
OF
EDUCATION, YOUTH & INFORMATION
Every Child Can Learn, Every Child Must Learn

NATIONAL STANDARDS CURRICULUM

RESOURCE & TECHNOLOGY

GRADE 7 APSE I

NATIONAL STANDARDS CURRICULUM GUIDE

GRADE 7

RESOURCE & TECHNOLOGY

APSE1

ACKNOWLEDGEMENT

Our connection with each other is unquestionable and so at the end of this arduous yet rewarding journey, the Ministry of Education, Youth and Information gratefully acknowledges the contributions of the following individuals and institutions who generously gave of their time and resources in the planning and development of the National Standards Curriculum (NSC):

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- Mrs. Janice Latty-Morrison – Former Assistant Chief Education Officer, Technical & Vocational Unit, who completed the process.
- Mr. Anthony Gray – Assistant Chief Education Officer, Technical & Vocational Unit
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Industrial Education	Business Education	Home Economics Education	Agricultural Science Education
Mr. Ray Taylor, Senior Education Officer, Industrial Education	Mr. Conrad Valentine, Senior Education Officer, Business Education	Mrs. Vivene Jones-Robinson, Former Senior Education Officer, Home Economics	Mr. Ruel Service, former Senior Education Officer, Agricultural Science Education
Mr. Everette Riley, Education Officer, Industrial Education	Mrs.Winsome Mills-Neil, Education OFficer, Business Education	Mrs. Shereen Davy Stubbs, Senior Education Officer (Actg), Home Economics Education	
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- All others whose names do not appear, but who contributed to the production of the NSC

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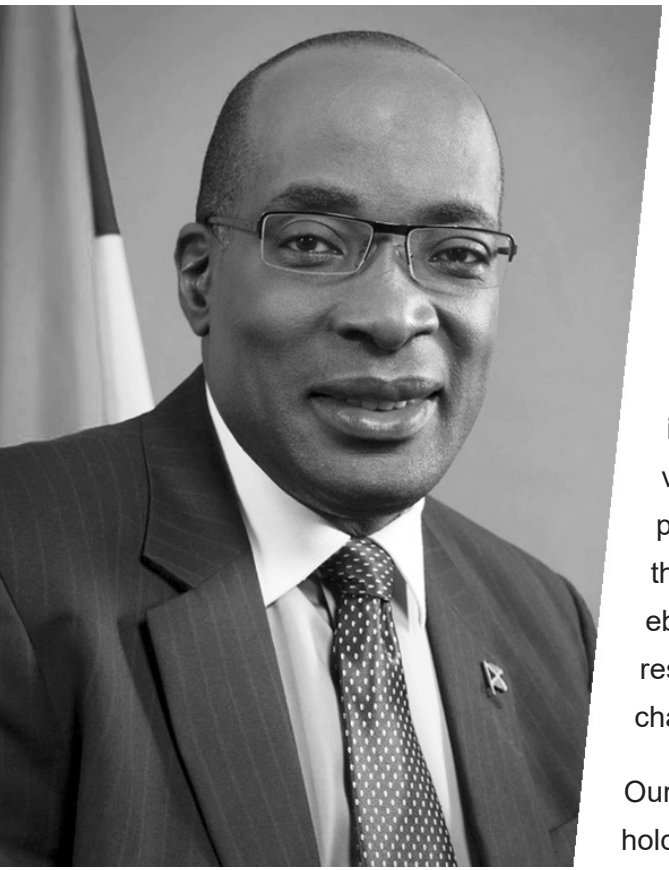


Education has always been pivotal to societal and economic development. It is for this reason that Jamaica remains unshaken and hopeful of a realized vision to be “the place of choice to live, work, raise families and do business.” The assurance of the possibility of all that such a vision entails comes from the recognition that Jamaica is endowed with tremendous God-given talent and creative potential and as a people of strong faith in spiritual principles and resilience; we are able to harness our capabilities, to make significant influence on the world. It is through this new National Standards Curriculum (NSC) that we hope to propel this vision of the education system whilst becoming more relevant, current and dynamic.

The team at the Ministry of Education Youth and Information is cognizant of the fact that the curriculum is the heart and mind of education and remains the most powerful means by which any country can develop and be sustainable. It is for this reason that the NSC has been designed with the understanding that people, learning and national development are at the core of our existence in a time of rapid change in the physical, social, economic and other dimensions of the global landscape. As a consequence, we celebrate the wisdom of the developers who through the engagement of numerous stakeholder groups, have responded favourably to the need for that kind of education that prepares our young people for life; while challenging our more mature to join in this lifelong journey of learning to learn.

Our commitment to the development of each learner and our support and appreciation of the various stakeholder groups that are partnering with us in providing quality education, remain at the forefront of our efforts in ensuring that this journey transforms education. This commitment is conveyed through our adoption of a Pathway Approach to learning that demands of us to provide customized programmes, differentiated learning experiences and specialized support for our learners. Our actions have been fruitful as is evident by the systems and conditions we have put in place for successful implementation.
Like the rest of Jamaica, I look forward to the testimonials of students, parents, teachers and other stakeholders of the empowering effect of this learner- centred curriculum and remain confident that it will contribute to make Jamaica renown.

The Honourable, Senator Ruel Reid,CD

Minister of Education, Youth & Information

Building a modern society where young people can prosper and achieve their aspirations is paramount on the Ministry of Education, Youth and Information's (MoEYI) agenda. In its bid to advance this agenda the team at the MoEYI has developed the National Standards Curriculum (NSC) on a clear set of values that will permeate learning and become embedded in young people's approach to life. Young people need to be clear about their Jamaican identity. Justice, democracy, tolerance and respect need to be more than mere words; they need to become an essential part of people's lives. Young people's understanding of, and commitment to, sustainable development is critical to the future of Jamaica and of the world. These values that permeate the new curriculum and more importantly, will by its use, be ingrained in the fabric of the Jamaican society.

The development of a new curriculum is a major achievement in the life of any country. It is even more noteworthy because this curriculum embodies the set of knowledge, skills, values and attitudes that our country deems relevant at this particular time. It is intended that these attributes be conveyed to the next generation as a means of cultural continuity in preparation to cope with the future, both nationally and individually.

I am particularly excited about the prospects of the NSC honing key twenty-first century skills such as communication, collaboration, critical thinking and creativity in our youth as they prepare to take on their roles as global citizens. I encourage parents, students, teachers and indeed the community to partner with us as we prepare our young people not just for today, but for the rapidly changing times ahead.

The Honourable, Floyd Green, MP

State Minister in the Ministry of Education, Youth & Information

In responding to the challenges confronting education in Jamaica, The Ministry of Education Youth and Information has taken strategic measures to address the need for a national curriculum that is relevant for the 21st century, the dynamics of the Jamaican context and the profile of the learners at the pre-primary, primary and secondary levels. One major output of these strategic actions is the National Standards Curriculum. This curriculum is intended to be one of the means by which the Jamaican child is able to gain access to the kind of education that is based on developmentally-appropriate practice and the supporting systems and conditions that are associated with high quality education.

This curriculum has the potential to inspire and provide challenges in the form of problem situations that all our learners can handle in ways that are developmentally appropriate. It compels us to move beyond the traditional functional perspectives of being literate to a focus on the physical and physiological as well as the ethical, social and spiritual.

I invite all our stakeholders to fully embrace this new curriculum which promises to excite imaginations, raise aspirations and widen horizons. Learners will become critical and creative thinkers with the mindset required for them to be confident and productive Jamaicans who are able to thrive in global settings as they take their place in the world of uninhibited change.

Mr. Dean Roy Bernard

Permanent Secretary , Ministry of Education, Youth & Information

It was the mandate of the Curriculum Units of the Ministry of Education, Youth and Information to spearhead the crafting of a new curriculum for the nation, in keeping with international standards, global trends in the educational landscape and societal goals and aspirations. The mandate had several facets: to establish clear standards for each grade, thereby establishing a smooth line of progression between Grades from 1 to 9; to reduce the width, complexity and amount of content; to build in generic competencies such as critical thinking across the subjects; to ensure that the curriculum is rooted in Jamaica's heritage and culture; to make the primary curriculum more relevant and more focused on skills development, and to ensure articulation between primary and secondary curricula, especially between Grades 6 and 7. To achieve this, the MoEYI embarked on an extensive process of panel evaluations of the existing curricula, consultation with stakeholders, (re)writing where necessary and external reviews of the end products.

Today, we are indeed proud that, the curriculum development teams have succeeded in crafting a curriculum which has met these expectations. Under the National Standards Curriculum (NSC) focus will be given to project-based and problem-solving learning, with an integration of Science, Technology, Engineering and Mathematics/Science, Technology, Engineering, Arts and Mathematics (STEM/STEAM) methodologies across the system. Learners will benefit from more hands-on experiences which should enhance the overall learning experience and cater to the different kinds of learners in our classroom. In addition, they will be exposed to work-based learning opportunities that will help them become productive citizens of Jamaica and the world at large.

It is anticipated that as school administrators and teachers system-wide implement the National Standards Curriculum that improvements will be evident in the general academic performance, attitude and behaviour of our students.

We anticipate the participation of all our stakeholders in this process as we work together to improve the quality of life and prospects for all the children of Jamaica and to realize our mantra that *every child can, and must, learn.*

Dr. Grace McLean

Chief Education Officer, Ministry of Education, Youth & Information

The Ministry of Education Youth and Information (MOEYI) is committed to providing high quality education to all Jamaican children. We have heard the cries from the various sectors of the Jamaican society about the level of preparedness/readiness of our students for life in the 21st century; and we are taking the necessary steps to ensure that our students graduate with marketable skills. The MoEYI has reviewed and redesigned the Grades 1-9 curricula around the principles of Vision 2030 Goal number one; “Jamaicans are empowered to achieve their fullest potential”.

The National Standards Curriculum (NSC) will lay the foundation for students by preparing them for working lives that may span a range of occupations, many of which do not currently exist. This has been done by way of designers carefully integrating the theoretical principles of Science, Technology, Engineering and Mathematics/Science, Technology, Engineering, Arts and Mathematics (STEM/STEAM) methodologies into the curricula at all grade levels. The NSC illustrates that in order to make education effective for our 21st century children; we need to change how we teach, and what we teach.

We are satisfied that the curriculum designers and writers have produced a curriculum that is indeed fitting for the 21st century. The NSC was designed to develop students’ understandings of subject matter and their ability to apply what is learnt; it fosters their ability to communicate and solve problems collaboratively, think critically and create novel solutions.

The success of our children is dependent on the participation of all stakeholders in the learning process. We encourage you all to be our committed partners in education as the true impact of this curriculum will only be felt when we have all hands on board. I am indeed proud to be associated with the development and implementation of this curriculum; it will inspire hope in our nation and future generations; kudos to the various teams that contributed to its development.

Mrs Lena Buckle Scott

Deputy Chief Education Officer,

Curriculum and Support Services, Ministry of Education, Youth & Information

MESSAGE

The 21st century has challenged countries to provide quality education for all. The key challenge to this paradigm is how to develop and sustain an education structure and system that will prepare citizens to compete in the knowledge based economy.

With the paradigm shift in our labour force demands, greater emphasis is being placed on how teaching and learning takes place in our schools. This is with a view to build 21st Century skills among our students who will in a few years join our workforce at different levels. In a bid to ensure that these objectives are met, adjustments and inclusions to our curriculum at the primary level is paramount for the transformation to be effective.

For the first time in our education system, Technical and Vocational Education and Training (TVET) is being integrated at the primary level through the Resource & Technology programme. The Resource & Technology Curriculum emphasizes a project based learning approach that has been adopted to introduce content, skills and attitudes and to ensure authentic learning activities that engage students' varying interests and motivation.

The aim of Resource and Technology at this level is to foster students' awareness of foundational technical skills and their relationship to future careers and occupations. The discrete introduction of this program at Grades 4-6 proposes that students be engaged in the development of projects which will provide them with the opportunity to build foundational Technical and Vocational skills in a real life context. This inclusion not only provides progression to the upper secondary Technical Vocational programmes, but reflects awareness of our national needs.

With these benefits in mind, an inclusion of a Resource & Technology programme at our primary education level and the revision of the secondary programme is fully endorsed and supported.

Mr. Anthony Gray

Assistant Chief Education Officer,

Technical and Vocational Unit, Ministry of Education, Youth & Information

TERMS	DEFINITIONS/MEANINGS
Range of Content	Provides an overview of the concepts, knowledge, skills and attitudes that will be developed in a unit of study.
About the Unit	Gives a brief overview of the content, skills and methodologies that are used as well as the attitudes to be developed.
Standards	Statements that explain what all students are expected to know and be able to do in different content areas by the end of a course of study e.g. by the end of period spanning grades 4 – 9.
Attainment Targets	An attainment target is a desired or expected level of performance at the end of a course of work, within a given/specified teaching- learning period. Attainment targets identify the knowledge, skills and understanding which students of different abilities and maturities are expected to have by the end of each Grade. It is the standard that we expect the majority of children to achieve by the end of the grade.
Benchmarks	Behaviours students are expected to exhibit at different stages of development and age/grade levels.
Theme/Strands	Unifying idea that recurs throughout a course of study and around which content, concepts and skills are developed.
Prior Learning	It is what students are expected to already know through learning and experience about a topic or a kind of text.
Specific Objectives	Specific objectives state what the student is expected to know or understand as a result of the learning experience. The specific objective is usually framed in the areas of the knowledge, skills and attitudes that the students are expected to achieve. Specific objectives tell us what the children will learn or will be taught.
Suggested Teaching/Learning Activities	A teaching/learning activity is an organised doing of things towards achieving the stated objectives. They are suggested activities that are crafted in a way to be an efficient vehicle which can move the student between what is to be learnt (objective) and what the student is to become (outcome).
Key Skills	Indicate the important skills that students should develop during the course of a unit. Key skills are aligned to the suggested teaching and learning activities in the unit which are intended to develop the skill to which it is aligned. Included in the key skills are the 21st century skills such as critical thinking and problem solving, collaboration, communication and ICT.

TERMS	DEFINITIONS/MEANINGS
Assessment	An assessment is a determination of whether intended results have been achieved. This section of the curriculum speaks to both the product that will be judged as well as the criteria against which it will be judged. It must be noted that this section does not introduce new activities. Instead, it speaks to the judging of the suggested teaching and learning activities Formal assessment may be conducted with the aid of instruments (e.g. via written test, portfolio) or by requiring students to complete assigned tasks (e.g. performance), and is usually recorded against a predetermined scale of grading. Informal assessment (e.g. via observation or spontaneous student expression) may also reveal important evidence of learning.
Points to Note	This section provides technical information that must be considered in delivering the unit. It may also include information that provides additional explanation of key concepts that may be unfamiliar to the teacher as well as suggestions for infusion within the unit.
Extended Learning	These are opportunities for students to utilise the knowledge and skills they would have acquired in the unit in authentic situations/experiences.
Learning Outcomes	A learning outcome is a demonstration/ behavioural evidence that an intended result has been achieved at the end of a course of study. The learning outcome tells us if pupils have understood and grasped what they have been learning.
Links to other Subjects	Suggests opportunities for integration and transfer of learning across and within different subject areas.
Key Vocabulary	This section consists of a number of words/phrases that addresses the skills, topics and content that must be covered in the unit.

The Resource and Technology curriculum has been revised at Grades 7-9 and succeeds the previous curriculum which was first introduced in the education system in 1989 with a second review conducted in 1999. The revised Resource and Technology programme has been developed as a working document at the primary and secondary levels of the education system. The subject is now organized in four modules namely, Agriculture and the Environment, Business Basics, Industrial Techniques, and Family and Consumer Management formerly referred to as Home and Family Management. The Design Arts module in the former curriculum is now infused as a unit in the Visual Arts programme. Each module presents appropriate content through which the understand-ing, creation and application of technology may be achieved, providing technological knowledge and skills peculiar to each.

The first edition of the Resource & Technology curriculum has been developed for the upper primary level as a discrete subject and is a pre-cursor to the Grades 7-9 Resource and Technology programme. Students will be exposed to foundational technical and vocational skills. The curriculum is different in format and design providing numerous opportunities to be engaged in practical skills, constructed according to strands and attainment targets. Teachers may design or modify the projects to suits the needs of the local environment.

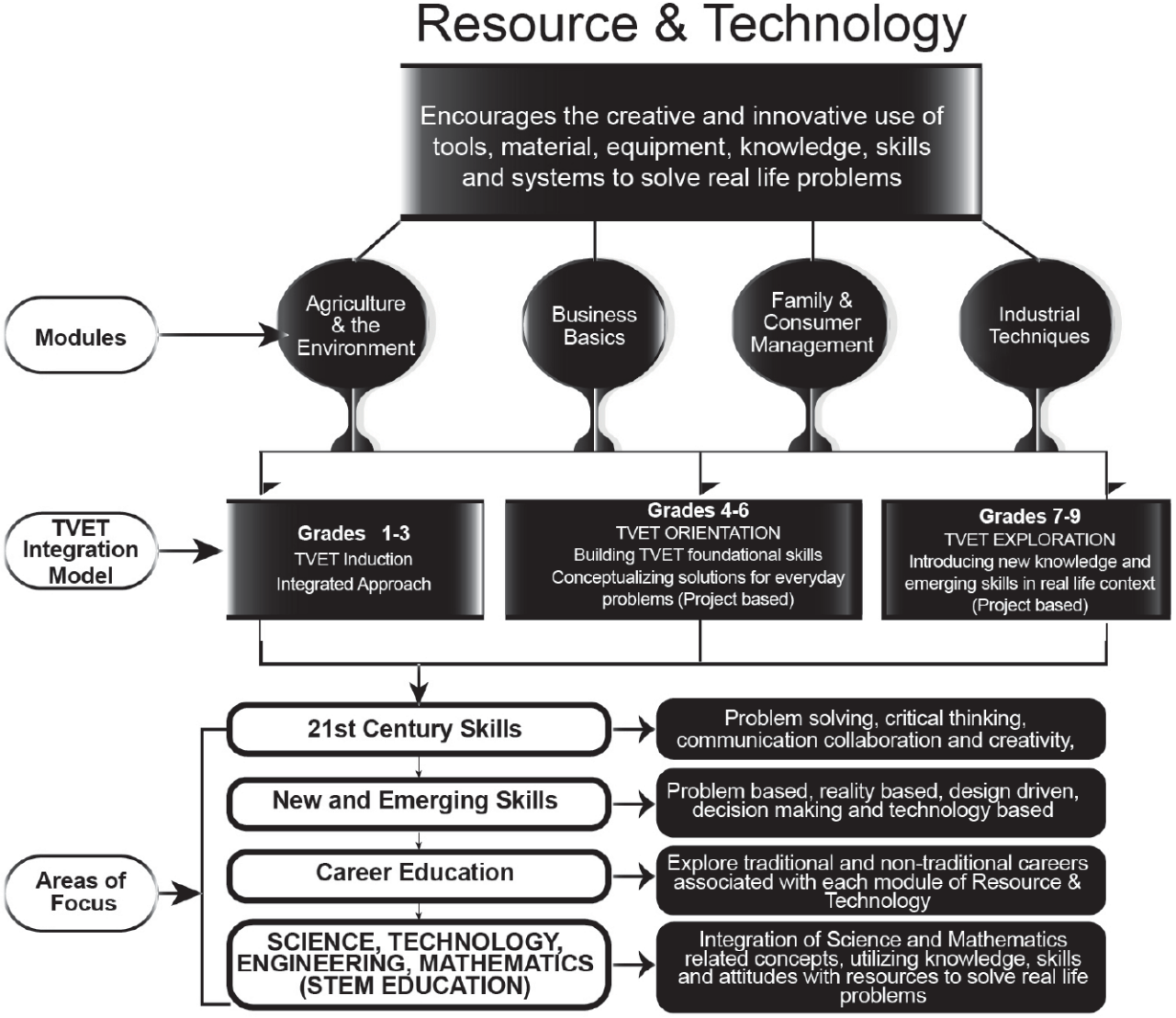
The project-based learning approach has been adopted to introduce content, skills and attitudes and is the instructional approach built upon authentic learning activities that engage student's interest and motivation. At all grades levels the content is presented using real life contexts resulting in practical outcome based activities. Students will have the opportunity to learn new knowledge and develop new and emerging Technical and Vocational skills.

The practical application of Science, Technology, Engineering and Mathematics (STEM) education is being emphasized to ensure that students at this early stage develop an understanding of the importance of integrating these knowledge and skills in the Techni-cal and Vocational programmes. **The 'E' Engineering Design Process**, a problem solving approach which is used in Resource and Technology is standard and prescriptive and is the methodology for teaching the subject. This should ensure that similar con-cepts are learned by all students in all schools irrespective of the nature of the projects selected.

The activities outlined are suggestions and are provided to stimulate further creative ideas for activities as each school context is different in terms of availability of resources and problems to be solved.

Resource and Technology is a single subject spanning the breadth of technical and vocational foundational competencies. Content is organized in four modules with each providing its own specialized knowledge and skills, which are integral to the understanding of how resources and technology are utilized in meeting needs and solving problems experienced on a daily basis.

Resource & Technology



Agriculture and the Environment

Explores the use of agriculture related technologies, skills and practices, and investigates their impact on agricultural production and the environment at large.

Business Basics

Explores the use of fundamental business principles and practices to organize resources and technologies in the creation of goods and services to satisfy human wants and needs.

Family and Consumer Management

Explores the use of resources and technologies to empower individuals and families, as consumers, to manage the challenges of living and working in a global society.

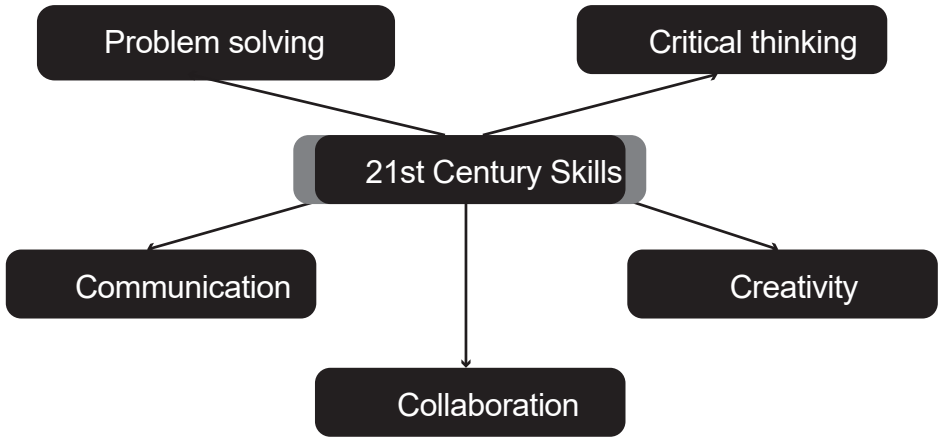
Industrial Techniques

Explores the use of fundamental industrial technologies, skills and resources to design, refine and create solutions to everyday human needs.

Technical and Vocational Education in Jamaica has embarked on a new era in the twenty-first century. New and emerging careers are being introduced at a rapid pace and most jobs require a technological background and an understanding of processes to create solutions to the many challenges experienced in the world. If Jamaica is to be a part of the high-tech global market place, the workforce must possess the requisite competencies. To achieve our goal of producing students with the desired technological competencies, attitudes and theoretical knowledge to participate in the international marketplace, technical and vocational education must be seen as the vehicle. We must begin by exposing our learners at the beginning grades to understand, appreciate and develop skills to create solutions to real life problems. It is for this reason that the Ministry of Education has integrated Technical and Vocational skills in the Grades one to three curriculum and the revised Resource and Technology programme is being introduced as a discrete discipline from as early as Grade 4 to provide students to use a range of materials and gain appropriate skills to use tools and equipment efficiently.

The emphasis of the Resource and Technology programme is on 'problem solving' which should unearth the potential of learners so that they can become originators of solutions rather than adapters of solutions. We also believe that an understanding of processes involved in creating a solution or system is critical to the outcome. As part of a global community we must ensure our students develop skills to conceive, plan, design and create solutions which can compete with others goods and services and meet the needs of the consumer. The opportunity must also be provided for learners to utilize available resources at their disposal to create solutions. This will result in greater appreciation and utility of our local and indigenous resources. Students will develop confidence in using them to create solution to everyday problems and assist in using foreign exchange to acquire those items we cannot produce locally.

The Resource and Technology programme is not gender-biased and is designed for learners of all ability levels and socio-economic groups. However, one of the most important features is that it encourages students to work collaboratively in search of solutions to everyday problems. This is a desirable focus that we believe should help students develop critical skills which will be reflected in their lives as they contribute to the productive sector.



Skills of the 21st Century Learner

The inclusion of Resource and Technology as a core subject in the National Standards Curriculum for Grades 4-9 can be justified as it:

- aims to meets the needs of students
- provides for progression to upper secondary
- reflects awareness of national needs

GRADE 7

RESOURCE & TECHNOLOGY

AGRICULTURE & THE ENVIRONMENT

PROJECT: 7.1

Grow Selected Crops in Soil-Based and Soilless Media Using Seedlings

AIM OF RESOURCE AND TECHNOLOGY

CONTENT OUTLINE FOR GRADE 7 PROJECTS

PROJECT 7.1

Grow selected crops in soil based and soilless media using seedlings

Introduction to Agriculture

- Definition of agriculture
- Some areas of agriculture
- Definition of soil
- Definition of soilless medium
- Some soilless media used for growing crops
- Importance of soil to agriculture (growing of crops)
- Composition of a typical soil
- Soil particle sizes and their effect on water-holding capacity
- Resources required for growing selected crop
- Growing period for some common crops (activity schedule)
- Growing of seedlings
    - o Structure of seeds
    - o Conditions necessary for germination of seeds
    - o Factors affecting viability of seeds
    - o Preparing medium for sowing of seeds
        - – Seedbed
        - – Seed-box
        - – Seed-tray
    - o Care of seedlings after germination
        - – Watering
        - – Shading
        - – Thinning out
        - – Fertilizing
        - – Controlling pest

PROJECT 7.2

Grow selected crops in a soil-based medium by direct-seeding.

Growing crop by Direct Seeding

- Identify seeds appropriate for direct seeding
- Factors which influence whether crops are established by seedlings or direct seeding
- Selecting site for growing of crop
- Resources required for successful crop production
- Prepare basic schedule of production tasks
- Land preparation
    - o Clearing
    - o Primary tillage
    - o Secondary tillage
- Layout of plot
    - o Measuring planting distance
    - o Lining out of plot
- Plant the seeds according to industry or enterprise standards
- Cultural practices for producing crops by direct seeding
    - o Weed control
    - o Moulding
    - o Fertilizing
    - o Staking
    - o Mulching
    - o Thinning out
    - o Pruning
    - o Irrigating

PROJECT 7.3

Rearing of Broiler Birds

Introduction to farm animals

- Animals and their economic importance
    - o Leisure
    - o Food
    - o Security & Companion
    - o Clothing
    - o Medicine
    - o Power
    - o Raw materials for industries

Classification of animals

- vertebrates and invertebrates
- Species and Breeds of animals
- Classification of farm animals based on types and purposes for which they are reared
    - o cattle – beef, dairy
    - o goats – meats, milk
    - o poultry – meat, eggs
    - o rabbit – meat, pelt and fur
    - o pigs – meat
- Traits of some common farm animals

Resources required for rearing farm animals

- Time
- Technical skills
- Housing/shelter
- Feed and water
- Specialized equipment
- Money

Growing broiler birds

- Prepare a basic income and expenditure budget
- Housing requirement

CONTENT OUTLINE FOR GRADE 7 PROJECTS

PROJECT 7.1

Grow selected crops in soil based and soilless media using seedlings

- Care of crop after seedling stage

o Prepare container or soilless media
o Prepare soil for accepting seedlings

  – Land clearing
  – Measuring and lining
  – Ploughing/digging holes

o Transplanting of seedlings
o Care of newly transplanted seedlings
o Cultural practices for maintaining crops in soil or soilless media

  – Irrigating or draining
  – Conserve moisture
  – Pruning
  – Weed control
  – Insect control
  – Disease control

o Harvesting of crop

- Record keeping
- Evaluate success of project against established goals

PROJECT 7.2

Grow selected crops in a soil-based medium by direct-seeding.

- Field sanitation and pest control
- Records keeping
- Harvesting technique appropriate to the crop grown
- Evaluating success of project through established targets such as yield, efficiency of production, quality of produce, profit

PROJECT 7.3

Rearing of Broiler Birds

  o Protection
  o Ventilation
  o Adequate space

- Material and equipment required
  o feeders
  o waterers
  o brooder
  o litter
  o feed
  o baby chicks
  o medication
- Prepare house, tools and equipment for broilers
- Prepare the brooding area
- Grow out processes
- Evaluation of project outcome against project goals

Classification of Resources Used in Growing Broiler Birds

- Human Resources
  definition of human resources
- Importance of human resources in agriculture
- Identify key personnel in broiler bird production processes
- Some key careers in the poultry industry
- Educational requirements for selected jobs in broiler bird production
- Classification of Non-human Resources used in broiler bird production

Natural Resources and Man-made Resources

Natural Resources used in broiler bird production

Man-made Resources used in broiler bird production

AT 1:
Explore a range of problem solving situations and develop ideas for solutions utilizing new technologies

STRAND 1:
CREATIVITY & INNOVATION

Students will be able to apply creativity and innovation in the solution of problems

AT 2:
Use the design process in executing solutions for an identified problem.

STRAND 2:
EXPLORING METHODS AND PROCEDURES

Students will be able to Explore Methods & Procedures in solving problems

AT 3:
Operate tools and equipment with increasing competency and appropriate safety and hygiene consideration

STRAND 3:
APPLYING SOLUTIONS

Students will be able to apply appropriate strategies in finding solutions to identified needs

AT 4:
Build skills relevant to the world of work and the areas of occupational interest

STRAND 4:
CAREER PATHWAYS

Students will developed awareness of a range of career pathways

STEM INTEGRATION - GROW SELECTED CROPS IN SOIL-BASED AND SOILLESS MEDIA USING SEEDLINGS

SCIENCE

- Definition of Seeds
- Definition of Seedlings
- The structure of seed
- Factors affecting viability of seeds
- Factors affecting viability of seedlings
- Conditions necessary for germination
- Soil/growing media necessary for plants
- Purpose of soil in plant growth
- Growing plants without soil
- Influence of Soil particles on water-holding capacity of soils
- Impact of soil particles on plant growth
- Conditions necessary for optimal plant growth
- Groups of chemicals used in crop production
- Importance of considering environment in the growing of crops.

MATHEMATICS

- Measurement of planting distance
- Calculate area occupied by each plot/cropping unit
- Calculate total area occupied by given cropping units
- Develop time schedule based on time projected for each phase of production.
- Calculate the quantities of resources needed for growing given crops
- Do calculation related to cost analyses of crops grown

WHAT IS BEING ASSESSED?

Knowledge and Skills Required to Grow Selected Crops In Soil-Based and Soilless Media Using Seedlings

TECHNOLOGY

- Competence in the use of simple and advance technology in growing crops, to include:
  - o Hand forks/spade/cultivator/weeder, garden fork, composting, planting containers, measuring devices, seed trays, irrigation facilities, shade house, hydroponic facilities
- Tilling soil with hand-held rotovator
- Skills and processes in crop production, to include:
  - o measuring, lining out, calculating, ploughing, moulding, planting, sowing seeds, thinning out, transplanting, fertilizing, irrigating, harvesting, ripening

'E' DESIGN PROCESS

- Identification of problem to be solved
- Problem statement created
- Ideas for solving problem generated
- Idea(s) of possible solution selected
- Selected solution(s) tested
- Chosen crop(s) grown
- Outcome of the project evaluated
- Presentation of results

ABOUT THE PROJECT

In this Project, students will learn about growing crops for food or ornamental purposes from seedlings, using soil or soilless media over a period not exceeding one (1) term. Through a problem solving approach students are expected to explore a range of available resources and select the most appropriate to be used to complete the project. With guidance from teacher and collaboration (group effort/work or team work) with peers, students are expected to explore the available technologies (suitable for crop production) ,as well as, environmentally-friendly practices to complete the project. Students will explore different soilless media for growing crops. Students should learn the knowledge and skills required for growing seedlings and to carry out the various agronomic practices necessary for successful execution of the project

GUIDANCE TO THE TEACHER

- The execution of the project utilizes the problem-based approach
- Planning and preparation are critical factors to delivering this programme
- Students should be encouraged to make decision on crops grown and resources used based on their environment, season of year, availability of resources, cost comparisons and intended use of produce
- Teacher and students should explore possible market/use of the produce from the project as a factor which determine choice of crop
- Research local, regional, and international use of soilless media for crop production
- Students should be encouraged to apply basic Agricultural Business principles and practices to this project
- Establish student groups that facilitate leadership development, team-work, and scheduling of duties
- Procure suitable and adequate resource in a timely manner
- Where possible, ensure sufficient size of the projects that allows for reasonable viability
- Promote/emphasize safe and hygienic practices at the worksite. Correct use of tools should be demonstrated by teacher before students are asked to use such tools
- Avoid projects holding over through major holidays as a precaution against praedial larceny
- As much as is possible, provide physical protection for the students' projects including secure fence to protect against animal damage
- Promote/reward the observance of practices which sustain and/or enhance the environment
- Promote a culture of technically-sound agricultural practices

Prior Learning

Check that students:

Are aware that plants and vegetables are used to sustain growth and economy

PROJECT TITLE: GROW VEGETABLES IN SOIL AND SOILLESS MEDIA

Agriculture and the Environment Attainment Targets:

STRAND 1: CREATIVITY & INNOVATION	STRAND 2: EXPLORING METHODS AND PROCEDURES	STRAND 3: APPLYING SOLUTIONS	STRAND 4: CAREER PATHWAYS
Students will be able to apply **Creativity & Innovations** in applying design principles to the use of available resources to **grow vegetables in soil and soilless media.**	Students will be able to Explore Methods & Procedures in developing a garden, and determine from a range of options the design and the plans to grow vegetables in soil and soilless media.	Students will be able to Apply Solutions in grow vegetables in soil and soilless media through the application of the design principles and basic crop growing practices.	Students will be able to demonstrate awareness of a range of Career Pathways related to conventional crop production and advanced crop production systems, which include direct agriculture-based careers/occupations, as well as, careers/ occupations associated with the supply of goods and services to grow vegetables in soil and soilless media.
AGRICULTURE AND THE ENVIRONMENT OBJECTIVES:	**AGRICULTURE AND THE ENVIRONMENT OBJECTIVES:**	**AGRICULTURE AND THE ENVIRONMENT OBJECTIVES:**	**AGRICULTURE AND THE ENVIRONMENT OBJECTIVES:**
• Create and apply the design principles to growing crops in a soil based and a soilless media • **Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribute to the learning of others.**	• Explore methods and procedures for effective production of vegetables in soil or soilless media • **Use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.**	• Apply design solutions and principles to the growing of vegetables • Evaluate success of project against established criteria such as yield, quality of produce, efficient use of resources. • **Use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems and make informed decisions.**	• Develop an awareness of career pathways related to vegetable production • Use appropriate digital tools and resources to plan and conduct career –related research, prepare documents and make presentations.

MATHEMATICS AT2

Students will:

- Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

SCIENCE

Students will:

Make predictions of what will happen based on scientific knowledge and understanding. Suggest and communicate how to test these predictions. Interpret data and decide whether results support predictions, and are sufficient to draw conclusions.

(Sc AT1, S1, G6)

Recognise the nature of water and understand its importance to life.

(Sc AT1, S2, G4)

Be aware of some key environmental problems and how to mitigate them (climate change, solid waste disposal, soil degradation.

(Sc AT1, S2, G6)

Classify living and non--living things, and understand the basis for doing so (feeding, moving, reproducing and growing).

(Sc AT2, S3, G5)

Know that foods are grown in different ways (organic, GM and non--organic).

(Sc AT2, S4, G4)

Explore what happens when some materials are mixed and how they may be separated (simple separation techniques).

(Sc AT2, S4, G4)

Appreciate the importance of scientific methods and be aware of safety procedures to be taken when using equipment and materials.

(Sc AT1, S1, G7)

Understand the nature of energy transformations (simple one/two--step energy transformations), the various types of energy sources and the importance of energy.

(Sc AT7, S6, G7)

Technology Standards

Students will develop an understanding of:

- the relationships among technologies and the connection between technology and other fields of study.
- the role of society in the development and use of technology
- the influence of technology on history.
- the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
- and be able to select and use agricultural and related biotechnologies.
- and be able to select and use information and communication technologies.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Introduction to the Project (Creativity and Innovation) Students will: • Use appropriate graphics/ communication medium , and specimen of actual growing media, expose students to the fact that crops are grown in traditional soil, but also in soilless media (e.g. YouTube video, charts, soil, sand, perlite, coir, water) • Discuss what is meant by soil based and soilless media • Discuss the importance of soil to crop production • Discuss the trend towards soilless media in modern vegetable production • Use graphic or word processing software to make a diagram/ list to compare the benefits of both soil and soilless media and share document with e-pals via class blog or email • Make a diagram to show the distinct composition of a typical) soil, using appropriate computer software, and make comparison with selected soilless medium • Conduct experiments to demonstrate how particle size of growing medium influence water-holding capacity • Examine samples of monocotyledonous and dicotyledonous plants to arrive at their different characteristics. • In assigned groups, develop ideas for growing crops in soil-based and soilless media from available resources	• Research and present findings on the use of soilless growing media for crops • Differentiate between crop production in soil and soilless media • Gather data / information through experimentations • Create and format document • Post comments and information safely and responsibly	Diagram shows evidence of understanding the concept Components of soil and their proportion correctly identified and illustrated Characteristics of monocotyledonous and dicotyledonous plants correctly identified
Project Design • Discuss the advantages and disadvantages of growing plants in soil • Explore the pros and cons of growing plants in a soilless medium • Identify materials that can be used as soilless medium to grow crops • Develop record keeping documents for use in the project • Discuss the benefits of using the following techniques to grow plants o Grow box o Hydroponics o Protected structures/Greenhouse • Identify and select plant seeds to be sowed in a nursery for planting in a soil base medium	• Research and present findings on the advantages and disadvantages of soil and soilless media for crop production • Identify appropriate resources for soilless crop production • Design a **virtual** soilless crop production operation from a given problem statement Design a **virtual** soil-based crop production operation from a given problem statement	Project Design meets set criteria for production of selected crops Samples of important records created

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Project Implementation • Accurately measure and construct seedbed or seedbox • Design and create a simple hydroponic system • Identify and select plant seeds to be sowed and planted in a soilless medium • Prepare soilless medium for planting o Carry out land preparation/container preparation for soil base medium using simple tools • Transplant seedlings/ time of transplanting o Correct depth o Time of planting o Correct depth o Planting distance o Planting density • Identify nutrients for soilless medium • Carry out cultural practices in a timely manner o Weeding o Moulding o Mulching o Watering/irrigating o Pesticide application o Fertilizing • Demonstrate proper field sanitation by:- o Keeping the surrounding free of weed and debris o Remove source of pest and diseases such as crop residue, infected plants o Wash your hands after handling diseased plant o Clean tools after each use • Select and use appropriate personal protective equipment • Carry out simple pest control management • Develop and keep accurate and appropriate records using appropriate software • Demonstrate appropriate harvesting techniques for the crop grown	•follow instructions • interpret a work plan • implement a work plan • perform related calculations • set up a simple hydroponic growing system • measure and utilize resources • demonstrate accepted cultural practices • transplant seedlings accurately • discuss nutrients needed by crops • identify disease and insect pests • treat disease and insect pests • use equipment and materials safely and effectively according to manufacturer' s recommendations and/or teacher's instructions • maintain field sanitation • keep simple related records • prepare and implement a safety plan • reduce and/or prevent pollution • work as a team • work in an environmentally safe manner • suitably label the crop unit • carry out harvesting and post - harvesting operations use spreadsheet and/or other software applications to analyze project outcome	Competencies in designing and setting up simple hydroponic system demonstrated Seedlings grown according to accepted standards Planting media prepared according to requirements Seedlings transplanted according to standards/ design Resources used appropriately/effectively Cultural practices carried out according to required standards and procedures Calculations done accurately Work carried out while observing health and safety rules Relevant records maintained Harvesting and post-harvesting procedures carried out according to accepted standards and market requirements

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Careers associated with Project content Conduct research online or offline in groups to investigate the different career paths in connection with vegetable production to determine how these jobs impact on lively hoods / economy and sustainability Discuss outcomes of research with class	• Investigate and make presentation on careers associated with soilless crop production • Navigate career content digitally on websites and storage devices	Research undertaken and presented which demonstrated understanding of careers in connection with the project Related career tree developed
Evaluation of Project Use spreadsheet or other software to design record sheets and keep accurate records of vegetable growing activities o material and equipment inventory o plant inventory o production method used o planting dates o date and amount harvested Use data collected on record sheets to evaluate success level of project outcome against key criteria	• Analyze basic records • Do basic cost analyses • Write a simple End-of-Project report • Calculate profit and loss (manually and with computer) • Create and format spreadsheet • Create and edit graphs and charts	Records give evidence and proof of successful implementation of project Records analyzed Cost analyses done Profit and loss calculations done Spreadsheet created from given scenarios/cases

Learning Outcomes

Students will be able to:

- ✔ Identify and explain at least eight (8) key terms
- ✔ Discuss the advantages and disadvantages of growing plants in a soilless medium
- ✔ Accurately measure and construct seed bed and seed boxes
- ✔ Identify and explain the conditions necessary for germination
- ✔ Select appropriate tools and demonstrate primary and secondary tillage
- ✔ Verbalize steps and demonstrate:
  - o Care of seedlings
  - o Transplanting
  - o Maintain field sanitation
  - o Prepare a grow box or hydroponic system
  - o Select and demonstrate the use of appropriate personal protective equipment
  - o Evaluate the project by comparing and contrasting the plant growth and yield in both system
- ✔ Define key terms: sexual reproduction in plants, asexual reproduction in plants, propagation, root stock, scion
- ✔ Select appropriate resources and use safely
- ✔ Plan and conduct research using a wide variety of electronic sources to gather information about growing vegetables in soil and soilless media

Points to Note

Students must be made aware of Health & Safety issues in connection with this project at the commencement of the Teaching and learning Teacher should encourage students to practice online safety and ethical behaviour.

Extended Learning

- Students can use methods learnt and apply them to their own gardens at home if they are able to do so.

Resources

- Vegetable seeds
- Seed trays
- Seed box
- Measuring cylinder
- Soil samples
- Filters
- Funnels
- Plastic bottles
- Irrigation materials
- Spraying equipment
- Chemicals (inorganic and organic)
- Plant samples
- Scrap book
- Markers
- Light source
- Garden tools
- Measuring tape
- computer
- internet
- Beakers
- Growing containers
- Soil-less medium.

Key Vocabulary

- seedling
- organic matter
- fungicide
- equipment
- nutrients
- transplanting
- disease
- pathogen
- pest
- thinning out
- moulding
- fertilizing
- computer
- internet
- soil
- vegetable seeds
- available resources
- soilless growing medium
- coir
- mulching
- irrigation
- weed
- insect pest
- perlite
- vermiculite
- grow-bag
- peat moss
- water
- harvesting
- fertilizer
- resources
- tool
- hydroponics
- hardening off
- germination
- seed
- cotyledon
- monocotyledon
- dicotyledon

Links to Other Subjects

- Maths: Measuring / calculations
- Science : Living processes
- Visual Arts: Designing; drawing
- Language Arts: Writing; Reporting
- ICT: Researching; spreadsheet/word processing/graphics applications;
- Civics: Environmental responsibilities;
- Culture

GRADE 7

RESOURCE & TECHNOLOGY

AGRICULTURE & THE ENVIRONMENT

PROJECT: 7.2

Grow Selected Crops in Soil-based Medium by Direct Seeding

There are four (4) key Attainment Targets within this Grade level for this project - **"Grow Selected Crops in Soil-based Medium by Direct Seeding**", as well as, associated Learning Objectives as shown in the following table:

AT 1: Explore a range of problem solving contexts and develop ideas for solutions utilizing new technologies	AT 2: Use the design process in executing solutions for an identified problem.	AT 3: Operate tools and equipment with increasing competency and appropriate safety and hygiene considerations	AT 4: Build skills relevant to the world of work and the areas of occupational interest
STRAND 1:	**STRAND 2:**	**STRAND 3:**	**STRAND 4:**
Students will be able to apply creativity and innovation in the solution of problems	Students will be able to Explore Methods & Procedures in solving problems	Students will be able to apply appropriate strategies in finding solutions to identified needs	Students will developed awareness of a range of career pathways

STEM INTEGRATION - GROW SELECTED CROPS IN SOIL-BASED AND SOILLESS MEDIA USING SEEDLINGS

SCIENCE

- Definition of Seeds
- Definition of Seedlings
- The structure of seed
- Factors affecting viability of seeds
- Factors affecting viability of seedlings
- Conditions necessary for germination
- Soil/growing media necessary for plants
- Purpose of soil in plant growth
- Growing plants without soil
- Influence of Soil particles on water-holding capacity of soils
- Impact of soil particles on plant growth
- Conditions necessary for optimal plant growth
- Groups of chemicals used in crop production
- Importance of considering environment in the growing of crops.

MATHEMATICS

- Measurement of planting distance
- Calculate area occupied by each plot/cropping unit
- Calculate total area occupied by given cropping units
- Develop time schedule based on time projected for each phase of production.
- Calculate the quantities of resources needed for growing given crops
- Do calculation related to cost analyses of crops grown

WHAT IS BEING ASSESSED?

Knowledge and Skills Required to Grow Selected Crops In Soil-Based And Soilless Media Using Seedlings

TECHNOLOGY

- Competence in the use of simple and advance technology in growing crops, to include:
  - o Hand forks/spade/cultivator/weeder, garden fork, composting, planting containers, measuring devices, seed trays, irrigation facilities, shade house, hydroponic facilities
- Tilling soil with hand-held rotovator
- Skills and processes in crop production, to include:
  - o measuring, lining out, calculating, ploughing, moulding, planting, sowing seeds, thinning out, transplanting, fertilizing, irrigating, harvesting, ripening

'E' DESIGN PROCESS

- Identification of problem to be solved
- Problem statement created
- Ideas for solving problem generated
- Idea(s) of possible solution selected
- Selected solution(s) tested
- Chosen crop(s) grown
- Outcome of the project evaluated
- Presentation of results

ABOUT THE PROJECT

In this Project students will learn about growing selected crops in a soil-based medium by direct-seeding.
This may involve any crop used for food or as ornamental which can be grown in one term. Through a problem solving approach students are expected to explore a range of available resources and select the most appropriate to be used to complete the project. With guidance from teacher and collaboration with peers, students are expected to explore the available technologies as well as environmentally friendly principles of crop production to complete the project. Students should learn the skills and knowledge required for growing the chosen crops while carrying out the various agronomic practices necessary for successful execution of the project.

Project 7.2 - Grow Selected Crops in Soil-based Medium by Direct-Seeding

GUIDANCE TO THE TEACHER

- The execution of the project utilizes the problem-based approach
- Planning and preparation are critical factors to delivering this programme
- Students should be encouraged to make decision on crops grown and resources used based on their environment, season of year, availability of resources, cost comparisons and intended use of produce
- Teacher and students should explore possible market/use of the produce from the project as a factor which determine choice of crop
- Research local, national, regional, and international importance of crop production
- Students should be encouraged to apply Agricultural Business principles and practices to this project
- Establish student groups that facilitate organizational structure, team-work, and scheduling of duties
- Procure suitable and adequate resource in a timely manner
- Where possible, ensure sufficient scale of the projects that allows for reasonable visibility/marketing potential
- Promote/emphasize safe and hygienic practices at the worksite. Correct use of tools should be demonstrated by teacher before students are asked to use such tools
- Avoid projects holding over through major holidays as a precaution against praedial larceny
- As much as is possible, provide physical protection for the students' enterprise including secured fence/gate
- Promote/reward the observance of practices which sustain and/or enhance the environment
- Promote a culture of technically-sound agricultural practices
- Deliberately promote the linkages between agriculture and other curriculum offerings

RANGE AND CONTENT

Key concepts, skills knowledge and attitudes students will learn in this project include:

- Technical approach to soil use and management
- To effectively select and use correct resources
- To apply the use of agriculture technologies in a given context
- To apply different cultural practices in agriculture

Students will develop knowledge and understanding by learning:

- Direct seeding principles
- Germination
- Fertilizer application
- Cultural practices
- Tillage
- Plot layout
- Ridge and furrow
- Pest management
- Harvesting practices and principles
- Post harvesting procedures

Prior Learning

Check that students:

- **Have some knowledge of crops grown in their community**
- **Understand basic use of hand tools**

ATTAINMENT TARGET 1:

At the end of this project, students will be able to apply Creativity & Innovations in applying design principles to the use of available resources to grow crops from direct-seeding

OBJECTIVES:

- Create and apply design principles to growing crops by direct seeding
- Develop a simple layout of the field
- Establish targets such as budget, expected yield and quality
- Evaluate efficiency and environmental impact of processes

ATTAINMENT TARGET 2:

At the end of this project, students will be able to Explore Methods & Procedures in developing a garden, and determine from a range of options the design and the plans to grow crops by direct-seeding.

OBJECTIVES:

- Investigate methods and procedures to be used in effectively growing crops by direct seeding
- Identify crops, tools and materials required after giving consideration to availability, cost, efficiency and environmental factors.

ATTAINMENT TARGET 3:

At the end of this project, students will be able to Apply Solutions in growing crops in a soil or soilless medium through the application of the design principles and basic crop growing practices.

OBJECTIVES:

- Use design solutions and principles to effectively grow crops by direct seeding while ensuring that sound agronomic practices as well as safe use of tools and materials are observed

ATTAINMENT TARGET 4:

At the end of this project, students will be able to demonstrate awareness of a range of Career Pathways related to crop production, especially crops grown in soil-based media, which include direct agriculture-based careers/occupations, as well as, careers/occupations associated with the supply of goods and services to create gardens.

OBJECTIVES:

- Demonstrate an awareness of career pathways/ occupations related to growing crops by direct seeding
- Demonstrate acceptable behaviour while working individually or as member of a team

MATHEMATICS AT2

Students will:

- Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

SCIENCE

Students will:

Make predictions of what will happen based on scientific knowledge and understanding. Suggest and communicate how to test these predictions. Interpret data and decide whether results support predictions, and are sufficient to draw conclusions.

(Sc AT1, S1, G6)

Recognise the nature of water and understand its importance to life.

(Sc AT1, S2, G4)

Be aware of some key environmental problems and how to mitigate them (climate change, solid waste disposal, soil degradation.

(Sc AT1, S2, G6)

Classify living and non-living things, and understand the basis for doing so (feeding, moving, reproducing and growing).

(Sc AT2, S3, G5)

Know that foods are grown in different ways (organic, GM and non-organic).

(Sc AT2, S4, G4)

Explore what happens when some materials are mixed and how they may be separated (simple separation techniques).

(Sc AT2, S4, G4)

Appreciate the importance of scientific methods and be aware of safety procedures to be taken when using equipment and materials.

(Sc AT1, S1, G7)

Understand the nature of energy transformations (simple one/two-step energy transformations), the various types of energy sources and the importance of energy.

(Sc AT7, S6, G7)

Technology Standards

Students will develop an understanding of:

- the relationships among technologies and the connection between technology and other fields of study
- the role of society in the development and use of technology
- the influence of technology on history
- the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving
- and be able to select and use agricultural and related biotechnologies
- and be able to select and use information and communication technologies

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Introduction to the Project (Creativity and Innovation) • Brainstorm possible crops that can be produced by direct seeding • Teacher led discussion on direct seeding vs use of seedlings • Explore with students the possible resources for executing the project and classifying these resources as natural or man-made • Explore possible design based on location and available resources • Explore environmental considerations for the project • Teacher guide students to establish realistic targets giving considerations to important variables such as resources and weather	• Classifying resources	Crops for direct seeding correctly selected Advantages and disadvantages of direct seeding correctly identified Selected resources categorized appropriately
Project Design • Select site for establishing plot • Identify seeds appropriate for direct seeding • Design simple layout of plot giving consideration to crops selected, area to be planted, planting distance used • Prepare basic schedule of production tasks giving consideration to resources selected and the safety and efficiency in using these resources.	• Calculate seeds required • Measure planting distance	Area for planting measured correctly Planting distance measured correctly Area to planted calculated Simple layout of plot done Seeds suitable for direct-seeding of the plot researched, documented and presented
Project Implementation • Establish crops selected according to design established while selecting and safely using the appropriate tool for each task • Select and establish a crop by direct seeding according the established guidelines • Carry out appropriate cultural practices with due consideration to safety and environmental protection • Keep related records accurately • Demonstrate harvesting technique appropriate to the crop grown • Use records to determine success of project against established targets such as yield, quality of produce, efficiency of production and profit	• Line out plot • Till soil using appropriate hand tools • Calculate resources required • Plant crop • Thin crop to required density • Identify need for water and Irrigate crop • Keep accurate records • Use tools for various cultural practises	land clearing practices correctly demonstrated Land tillage practices carried out according to required steps Appropriate tools selected for each tasks Plot laid out according to given specifications Seeds planted according to instructions/specification Selected cultural practices carried out according to instructions/industry standards Appropriate pest control measures implemented to required standards Plot maintained in a sanitary condition Safety and hygiene is correctly observed in the disposal of plant residue and other production refuse. Records kept accurately Harvesting and post-harvesting procedures carried out according to instruction/ acceptable practices

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Careers associated with Project content		• Career pathways described • Related careers identified • Related careers researched and presentation of findings made.
Evaluation of Project: • Calculate germination percentage • Calculate yield • Use established targets to evaluate success of projects	• Calculate profit or loss • Comparison between projected and actual income	• Germination rate correctly calculated • Yield calculated correctly • Records analysed and correctly interpreted

Learning Outcomes

Students will be able to:

- ✔ Explain the advantages and disadvantages of indirect and direct seeding
- ✔ Select seeds for direct seeding
- ✔ Select and use appropriate tools
- ✔ Explain and demonstrate land preparation techniques
- ✔ Explain the benefits to be derived from each cultural practice
- ✔ Select and use appropriate personal protective equipment
- ✔ Explain at least five (5) key terms
- ✔ Explain and demonstrate cultural practices used
- ✔ Demonstrate and explain pest control measures employed
- ✔ Harvest crop using appropriate techniques
- ✔ Carry out post-harvest management
- ✔ Evaluate project against pre-established targets

Points to Note

o Safety of students and environment must be emphasized at every stage of the project

o Students should be encouraged to explore and develop solutions to challenges encountered in the project

o Students should be encouraged to practise safe behaviour when using digital media or searching for information on the internet.

Extended Learning

The development of skills and better appreciation or the area may enhanced by the following:

Field trips

Research projects

Visits from resource personnel from related fields

Using data collected from project to determine inputs and outputs for a commercial size project

Resources

- Land
- Seeds
- Assorted garden tools
- Measuring tools
- Organic manure
- Inorganic Fertilizer
- Water hose
- Appropriate cutting tools
- Irrigation materials
- Pesticide
- Mulch
- Stake
- Lining out cord

Key Vocabulary

- Soil
- Direct seeding
- Disease
- Weeding
- Irrigation
- Fertilizer
- Field sanitation
- Moulding
- Clay
- Sand
- Pest
- yield
- Weed
- Planting material
- Seed
- Tool
- Pesticide
- Fertilizing
- Thinning out
- Germination
- Silt
- Loam
- Insect

Links to Other Subjects

- Biology & Integrated Science – germination processes, chemistry of elements in fertilizer, structure of insects
- ICT – Internet research, spreadsheet, prepare report, graphics, save documents
- Language Arts – record, explain, report, research findings, compose, edit
- Mathematics – measure, calculate, compute, estimate
- Social Studies – cultural importance of some crops

GRADE 7

RESOURCE & TECHNOLOGY

AGRICULTURE & THE ENVIRONMENT

PROJECT: 7.3

PROJECT TITLE: REAR BROILER BIRDS

AIM OF RESOURCE AND TECHNOLOGY

OVERVIEW OF PROJECT CONTENT GRADE 7

PROJECT 7.1	PROJECT 7.2	PROJECT 7.3
Grow selected crops in soil based and soilless media using seedlings	Grow selected crops in a soil-based medium by direct-seeding.	Rearing of Broiler Birds

STRANDS AND ATTAINMENT TARGETS

There are four (4) key Attainment Targets within this Grade level for this project - **"Grow Selected Crops in Soil-based Medium by Direct Seeding**", as well as, associated Learning Objectives as shown in the following table:

AT 1:
Explore a range of problem solving contexts and develop ideas for solutions utilizing new technologies

STRAND 1:
CREATIVITY & INNOVATION

Students will be able to apply creativity and innovation in the solution of problems

AT 2:
Use the design process in executing solutions for an identified problem.

STRAND 2:
EXPLORING METHODS AND PROCEDURES

Students will be able to Explore Methods & Procedures in solving problems

AT 3:
Operate tools and equipment with increasing competency and appropriate safety and hygiene considerations

STRAND 3:
APPLYING SOLUTIONS

Students will be able to apply appropriate strategies in finding solutions to identified needs

AT 4:
Build skills relevant to the world of work and the areas of occupational interest

STRAND 4:
CAREER PATHWAYS

Students will developed awareness of a range of career pathways

STEM INTEGRATION – REARING BROILER BIRDS

SCIENCE

- Economic importance of animals
- Vertebrates and invertebrates and their importance to agriculture
- Classification of animals based on purpose for which they are reared; age, sex.
- Nutrients supplied in a typical feed for broiler birds.
- Importance of environmental conditions to the performance of animals:
  - o Temperature
  - o Ventilation
  - o Moisture

TECHNOLOGY

- Competence developed in the use of simple and advance technology in growing broiler birds, to include systems for:
  - o Heating
  - o Watering
  - o Feeding
  - o Ventilating
  - o Lighting
- Skills and processes in broiler production, to include:
  - o measuring, calculating, feeding, watering, heating, maintaining litter, ventilating, managing temperature, medicating, marketing.

WHAT IS BEING ASSESSED?

Knowledge and Skills required to Rear Broiler Birds Successfully

MATHEMATICS

- Space requirements for a given number of birds calculated
- Resources required for a given number of broiler birds from day old to market (live) calculated:
  - o Brooder
  - o Feed and feeders;
  - o Water and waterers
  - o Medication
  - o Electricity/Gas
  - o Medication
  - o litter
- Measurement of input resources and products, temperature
- Development of basic budget
- Creation of activity schedule based on established standards.
- Records used to carry out appropriate analyses.

'E' DESIGN PROCESS

- Identification of problem to be solved
- Problem statement created
- Design process implemented
- Birds that are grown for meat
- Reasons for broilers being preferred birds for meat
- Ideas for solving problem generated
- Resources used/available for growing broiler birds
- Idea(s) of possible solution selected
- Possible growing schedule
- Plan of activities developed to test selected solution(s)
- Broilers grown observing industry standards and project design
- Outcome of the project evaluated
- Presentation of results

Students will develop key concepts and skills by learning:

- To select and group farm animals
- Design projects to grow given numbers of broiler birds from day one to readiness for slaughter, in different scenarios
- To clean the house in readiness for broiler production
- To set up and manage the brooding area and process
- To manage birds after the brooding process
- To manage health and sanitation

Students will develop key knowledge, understanding and attitudes by learning:

- Why animals are reared by humans
- The economic importance of farm animals
- What are vertebrates and invertebrates and why they are important to agriculture
- Types and purposes of farm animals
- The basic role of animal protein in the human diet
- What are broiler birds and why are they reared.
- Basic requirements of housing, tools and equipment needed for broiler production
- Essential principles and practices for growing broilers

Students will practice important values through:

- Valuing original ideas, demonstrating enterprise and innovation
- Friendship, care, compassion, cooperation, acceptance, belonging, sharing
- Developing self-confidence, optimism, perseverance, well-being
- Attain success, pursuing excellence
- Acting honestly, ethically, consistently
- Developing tolerance, respecting differences, encouraging diversity

ABOUT THE PROJECT

In this Project students will learn about:

- Different farm animals and the purposes for which they are reared
- The importance of farm animals to the human diet and clothing
- Some common animals reared on farms.

ABOUT THE PROJECT CONT'D

In this Project students will learn about:

- Selecting and using appropriate resources
- Day-to-day management of broiler birds
- Managing the environment and resources to ensure health and safety of the birds (and humans)
- Managing the economics of rearing broilers
- Creating and using records to evaluate performance of the project against established goals.

GUIDANCE TO THE TEACHER

- Planning and preparation are critical factors to delivering this programme
- Research local, national, regional, and international importance of broiler production
- Apply Agricultural Business principles and practices to this project
- Establish student groups that facilitate organizational structure, team-work, and scheduling of duties
- Procure suitable and adequate resource in a timely
- Where possible, ensure sufficient scale of the projects that allow for reasonable marketing potential
- Arrangements should be made to have the grown broilers processed for meat
- Organize market for the output of the broiler project
- Avoid projects holding over through major holidays as a precaution against praedial larceny
- Resources should include those for models of broiler production facilities
- As much as is possible, provide physical protection for the students' enterprise including secured fence/gate
- Promote/reward the observance of practices which sustain and/or enhance the environment
- Promote a culture of technically-sound agricultural practices
- Deliberately promote the linkages between agriculture and other curriculum offerings
- Research! Research! Research!

Prior Learning

Check that students:

Are aware of the purpose for rearing broiler birds

Understand the importance of 'caring' for broiler birds

ATTAINMENT TARGET 1:	ATTAINMENT TARGET 2:	ATTAINMENT TARGET 3:	ATTAINMENT TARGET 4:
Students will be able to apply Creativity & Innovations in applying design principles to the use of available resources in the process of rearing broiler birds.	Students will be able to Explore Methods & Procedures in developing and determining from a range of options the design and the plans to grow broiler birds.	Students will be able to Apply Solutions in rearing broilers birds through the application of the design principles and basic broiler growing principles and practices.	Students will be able to demonstrate awareness of a range of Career Pathways related to rearing broilers, which include direct agriculture-based careers/ occupations, as well as, careers/ occupations associated with the supply of goods and services to create gardens.
OBJECTIVES:	**OBJECTIVES:**	**OBJECTIVES:**	**OBJECTIVES:**
• Create and apply design principles to rear broiler birds • Research systems/methods of broiler production online or in storage devices	• Explore methods and procedures for effective rearing of broiler birds • Create electronic designs of broiler growing facilities	• Apply design solutions and principles in rearing broiler birds • Create computer graphics, spreadsheets, and other documents related to the broiler project	• Develop an awareness of career pathways related to rearing broiler birds • Research related careers online and in storage devices

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
STUDENTS WILL:		
Introduction to the Project • Research the economic importance of animals • Identify animals grown in their communities and group them according to economic importance • Discuss vertebrates and invertebrates and identify the importance of each group to agriculture • Compile a scrapbook of vertebrates and invertebrates that are of economic importance to agriculture, including brief description of the importance of each. • Classify animals based on: o Purpose for which they are reared o Age and sex	• Classify animals • Present findings of research	• Animals classified correctly based on the purposes for which they are reared • List created of common invertebrates that are of economic importance to agriculture • Animals are classified correctly based on: o species o breeds o age and sex
Project Design • Research the various types of structures used to house broilers • Discuss characteristics of a good poultry house • Evaluate available housing and equipment for broiler birds • Determine the number of broilers to be grown • Determine resources required for a given number of birds • Prepare a basic income and expenditure budget • Use spreadsheet to create simple income and expenditure template for broiler production • Develop soft/hard flow-chart of the schedule of activities for the growing of broiler birds • Calculate the number of feeders and waters needed for grow out of birds • Calculate the floor space required to grow birds to slaughter • Calculate feed and water need for the birds	• gather information • determine housing requirements for rearing broiler birds • prepare a simple broiler production budget • create relevant recordkeeping forms • Perform appropriate computation/calculation in broiler production • Use measurement instruments • engage the use of ICT in the rearing of broilers	• Available resources evaluated and selection made of those resources most appropriate for use in the broiler production project • Floor space required for a given number of birds calculated • Resources required for given production situation calculated • Flow chart portrays evidence of process involved in rearing broiler birds • Feed and water requirements calculated • Number of feeders and waterers calculated

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria

STUDENTS WILL:

Project Implementation

- Practice the importance of clean, comfortable environment to profitable broiler production, including:
- Remove 'old' litter
- Wash and disinfect floors and walls
- Wash and disinfect drop curtain
- Whitewash walls
- Remove and clean curtain
- Clean floor, walls and mesh to include removal of cobweb
- Clean feeders, waterers, and brooder
- Install brooding ring
- Install litter
- Install functional heat source
- Cover litter
- Calculate number of waterers and feeders to be used
- Install waterers and feeders
- Install curtains
- Prepare foot bath
- Install thermometer
- Start recordkeeping
- Use spreadsheet to design simple record template for broiler production
- Maintain accurate recordkeeping
- Remove brooding ring (as applicable)
- Distribute and install feeders and waterers according to industry standards
- Select feed form for appropriate age of birds (crumble and pellet)
- Feed and water the birds
- Basic interpretation of the feed label
- Manage the litter
- Adjust feeders and waterers according to industry standards
- Manage temperature and ventilation
- Monitor sanitation and hygiene of the growing environment
- Weigh birds throughout the growing period

- Prepare existing facilities to grow broiler birds
- Set up a brooding area
- Calculate and select required resources
- Install facilities
- Keep accurate records
- Maintain a clean and efficient workplace
- Work safely and maintain a safe workplace
- Dispose of culled and dead birds
- Work as a team
- Plan and manage time
- Operate equipment safely
- Access, utilize, and transmit data by internet
- Apply written skills in workplace situations
- Clean and store equipment

- House for broiler production cleaned according to instructions to the required standards
- Materials suitable for use as litter for broiler production are identified, and the use of such materials justified
- Litter in brooding-area/poultry house spread to correct depth
- Brooding area prepared according to the design brief
- Waterers and feeders installed/adjusted according to industry standards
- Requirements for given number of birds calculated
- Records interpreted/analyzed for basic determinations/decisions/conclusions
- Feed use and feed conversion ratio calculated using records
- Proper disposal of dead or culled birds evidenced

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
STUDENTS WILL: • insist on the use of the footbath • recharge footbath daily • keep litter loose and absorbent • maintain sanitation of feeders and waterers • monitor visitors to poultry house • institute rodent and wild-birds control measure • cull birds according to enterprise standards • dispose of dead or culled birds according to industry and enterprise standards		
Careers associated with Project content • Research careers related to broiler (poultry) production • Create a scrapbook of careers related to the poultry industry • Develop flowcharts showing the educational pathways to identified careers in the poultry industry • Create a 'Rich Picture' showing occupations and careers associated with the production of broiler meat.	• Identify careers related to broiler production	• Research on careers related to the poultry industry evidenced • Flow chart showed educational pathways to identified careers and occupations in the poultry industry.
Evaluation of Project • Use records to determine number of birds that died during the rearing process • Calculate mortality rate • Use weight-gain records to determine period of maximum growth • Use records to calculate period of maximum feed conversion • Evaluate performance of batch against established goals or industry standards • Use budget projections and actual income and expenditure to determine success of project.	• Calculate profit and loss • Perform basic Cost Analyses • Prepare electronic performance/ production charts • Develop and present end-of-project report	• Records used to determine the number of birds that died during the rearing process • Records used to calculate mortality rate • Maximum growth rate determined using records • Period of maximum feed conversion calculated using records • Flock/batch performance established using industry standards • Success of project determined by comparing projected and actual income and expenditure.

Learning Outcomes

Students will be able to:

- Classify common animals into vertebrate and invertebrates
- Identify some common vertebrate and invertebrates used for human food
- List and give examples of vertebrate and invertebrates that are of agricultural importance
- Outline the basic characteristics of mammal, birds, fish
- Identify classes of animals and define or describe members of each class
- Classify farm animals based on age and sex
- Explain at least five (5) key terms which are fundamental to the growing of broiler birds
- Design a project to grow broiler birds
- Demonstrate a knowledge of the housing requirements for broilers birds
- Identify/select resources to prepare broiler house for production
- Prepare the house and equipment to grow broiler birds
- Prepare for the arrival of day-old broiler chicks
- Maintain proper sanitation/hygiene in the broiler house
- Manage temperature and ventilation for growing broilers birds
- Install and manage the brooding area
- Manage the post-brooding processes of growing broiler birds

Points to Note

- The students may be made to work as established groups/teams

Extended Learning

Resources

- Record Sheets
- Feeders
- Waterers
- Brooder
- Litter
- Poultry House
- Computer
- Thermometer
- Baby Chicks
- Feed
- Scale
- Light
- Water
- Medication
- Charts
- Pictures
- Videos
- Models
- Texts
- Magazines
- Spreadsheet/word processing software
- Rake or Hay Fork

Key Vocabulary

- Broiler
- Litter
- Waterers
- Brooder
- Brooding Area
- Drop Curtain
- Proper Sanitation
- Ration
- Feeders
- Brooding
- Foot Bath
- Crumble
- Pellets

Links to Other Subjects

- Biology and Integrated Science: Classification of animals
- Visual Arts: design principles (layout, labels)
- ICT: create spreadsheet, labels, flow chart, graphs,
- Business Basics: create a simple budget, planning
- Mathematics: measure, calculate, weigh,
- English Language: research, document, report
- Science: sanitation and hygiene, classifying foods, classifying living and non-living things
- Social Studies: production and consumption of goods and services

GRADE 7

RESOURCE & TECHNOLOGY

FAMILY AND CONSUMER MANAGEMENT

CURRICULUM GUIDE

AIM OF RESOURCE AND TECHNOLOGY

The study of Resource and technology should enable students to become:

- Critical thinkers and problem solvers
- Confident, responsible and productive citizens
- Adaptable to changes in the world around them
- Aware of a range of future focused career options

OVERVIEW OF GRADE 7 SUBJECT CONTENT

Family and Consumer Management

TERM 1

The Healthy Way:
Design Process
Food groups
Food Nutrients
Kitchen Tools and Equipment
Weights and Measures
Hygiene
- Kitchen hygiene
- Personal hygiene

Kitchen Safety
Menu Writing
Menu Planning- Breakfast Planning

TERM 2

Fibre and Fabric:
Define terms related to fabrics
Diagram the relationship between fibres yarns and fabrics
Classification of natural fibres
Identification of fibre

Sewing Tools and Equipment
- Classification of sewing tools and equipment
- Uses and care of sewing tools and equipment

The Sewing Machine
- Parts of the Sewing Machine
- Use and Care of the Sewing Machine

Basic Stitches
Classify Basic stitches
Construct various basic stitches
Use and care

Methods of applying simple Surface Designing
- Embroidery , Appliqué, Painting, Printing, beading
- surface designs available for embellishing sewing projects

Career opportunities in Textile Industry

TERM 3

The Family and the Community:
Definition of the family
Characteristics of a healthy family.
Types of family seen in the Caribbean and other cultures
Roles and Functions
Family and Community Resources

Goals and Values
Definition of goals and attitude
Types of Goals
Goal setting
Definition of Values
Sources of Values
Formation of Values

Decision Making
Steps in the decision making process
Using the decision making process to make decisions

Communication
Methods of communicating
Barriers to effective communication
Use of technology for communication
Conflict Resolution

Career Awareness
Careers in Home Economics
Requirements for potential careers

STANDARDS FOR GRADE 7

There are four Strands and key Attainment Targets (AT) within this Unit.

OVERVIEW OF GRADE 7 SUBJECT CONTENT

AT 1:
Through a project based approach students will be able to apply creativity and innovation in the solution of problems.

STRAND:
CREATIVITY & INNOVATION

Explore a range of problem solving contexts and develop ideas for solutions utilizing new technologies

AT 2:
Through a project based approach students will be able to explore Methods and procedures in solving problems.

STRANDS:
EXPLORING METHODS AND PROCEDURES

Operate tools and equipment with increasing competency and appropriate safety and hygiene considerations

AT 3:
Through a project based approach students will be able to apply appropriate strategies in finding solutions to identified needs.

STRANDS:
APPLYING SOLUTIONS

Use the design process in planning the execution of solution for and identified problem

AT 4:
Through a project based approach students will develop an awareness of a range career pathways.

STRANDS:
CAREER PATHWAYS

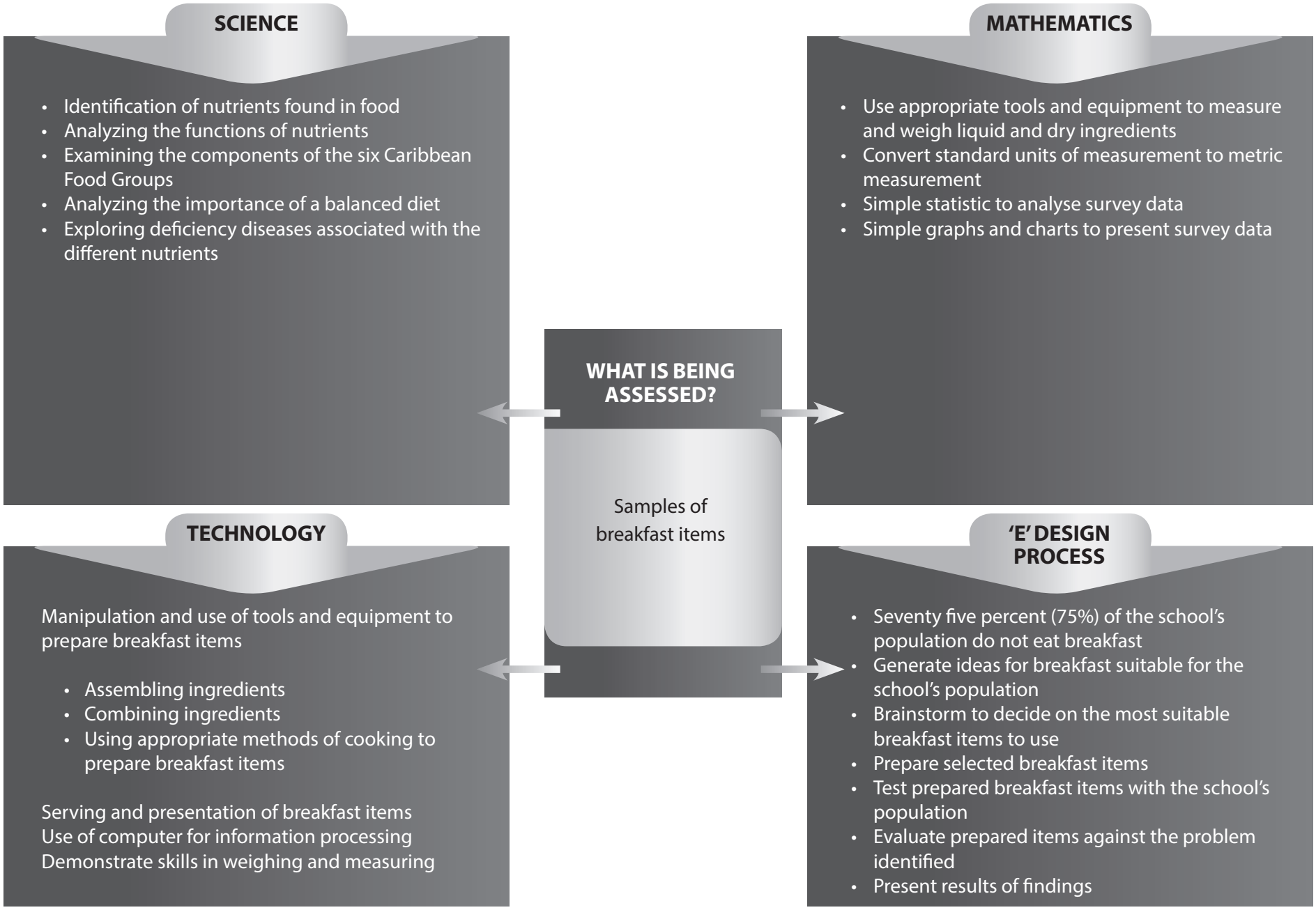
Build skills relevant to the world of work and the areas of occupational interest

Students will develop key concepts and skills by learning:

- Food groups
- Food Nutrients
- Kitchen Tools and Equipment
- Weights and Measures
- Hygiene
  - Kitchen hygiene
  - Personal hygiene
- Kitchen Safety
- Menu Writing
- Meal Planning- Breakfast Planning

ABOUT THE PROJECT

In this Unit students will learn about the importance of eating a healthy breakfast. They will use the design process to design a breakfast programme for their school to reduce the number of students who do not eat breakfast. The students will be given opportunity to explore various technologies in order to design, develop and make educational and supporting materials to reinforce concepts that are important for achieving the desired project outcome.


SCIENCE
• Identification of nutrients found in food
• Analyzing the functions of nutrients
• Examining the components of the six Caribbean Food Groups
• Analyzing the importance of a balanced diet
• Exploring deficiency diseases associated with the different nutrients
MATHEMATICS
• Use appropriate tools and equipment to measure and weigh liquid and dry ingredients
• Convert standard units of measurement to metric measurement
• Simple statistic to analyse survey data
• Simple graphs and charts to present survey data
WHAT IS BEING ASSESSED?
Samples of breakfast items
TECHNOLOGY
Manipulation and use of tools and equipment to prepare breakfast items
• Assembling ingredients
• Combining ingredients
• Using appropriate methods of cooking to prepare breakfast items
Serving and presentation of breakfast items
Use of computer for information processing
Demonstrate skills in weighing and measuring
'E' DESIGN PROCESS
• Seventy five percent (75%) of the school's population do not eat breakfast
• Generate ideas for breakfast suitable for the school's population
• Brainstorm to decide on the most suitable breakfast items to use
• Prepare selected breakfast items
• Test prepared breakfast items with the school's population
• Evaluate prepared items against the problem identified
• Present results of findings

Prior Learning

Check that students:

Can identify with the importance of eating healthy

PROJECT TITLE: THE HEALTHY WAY

STRAND CREATIVITY AND INNOVATIONS	STRAND EXPLORE METHODS AND PROCEDURES	STRAND APPLY SOLUTIONS	STRAND CAREER PATHWAYS
ATTAINMENT TARGET 1:	**ATTAINMENT TARGET 2:**	**ATTAINMENT TARGET 3:**	**ATTAINMENT TARGET 4:**
Through a project based approach students will be able to apply creativity and innovation in the solution of problems.	Through a project based approach students will be able to explore Methods and procedures in solving problems.	Through a project based approach students will be able to apply appropriate strategies in finding solutions to identified needs.	Through a project based approach students will develop an awareness of a range career pathways.

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING- use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:

- Classify foods into the six food groups used for meal planning in the Caribbean
- Explore the nutrients and their functions in the body
- Examine the principles of menu planning
- Demonstrate and practice good personal and kitchen hygiene
- Observe safety procedures in the kitchen
- Demonstrate competence in selecting, using and maintaining kitchen tools and equipment.
- Utilize weights and measures to demonstrate proper scaling and measurement techniques
- Plan and prepare a variety of breakfast menus/foods
- Apply menu planning principles to design a breakfast programme
- Determine the roles and functions of individuals engaged in the food service industry

SCIENCE ATTAINMENT TARGET:
Understand the importance of the life processes in plants and animals, their interdependence, their interaction with the environment, and how lifestyles determine health and wellbeing.

MATHEMATICS ATTAINMENT TARGET:
Use the correct units, tools and attributes to estimate, compare and carry out the process of measurement to given degree of accuracy.

TECHNOLOGY STANDARDS:
Students will develop the abilities to apply the design process

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
ATTAINMENT TARGET 1: CREATIVITY AND INNOVATION **Students will:** **WEEK 1** Read the scenario below and use the problem solving approach to brainstorm and arrive at solutions for the problem cited. **Scenario** At the last P.T.A. meeting held at your school, the Principal shared with the parents that there has been a nutrition related concern among students. He further indicated that students were not alert, listless, and aggressive and had short attention span. Teachers observed that this occurred during the morning session. Subsequently, a survey was conducted by the Guidance Department and the findings revealed that 75% of the school's student population do not eat breakfast. Working in groups, students will brainstorm and present creative and innovative ways to prepare and serve healthy breakfast at school. Decide on some strategies for providing breakfast for e.g., Porridge in a pouch. Record and present the strategies/ ideas to the class. **Strand 2: Explore Methods and Procedures** **WEEK 2** **Food Groups** Initiate a class discussion on eating habits. Identify and record their favorite and least preferred breakfast food items.	• Investigate • Research • Problem solving • Creativity • Explore • Describe • Critique • Plan • Design • Discuss • Critical thinking	Evidences of creative ways to prepare healthy breakfast presented. (To be used as portfolio entry)

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Using the Caribbean Food Group Chart, discuss how the chart provides a guide to good food choices for maintaining health which is an important part of healthy lifestyle practice.		
Set up a food display area with foods from all six food groups in no particular order. (Divide students into six groups and assign each a food group). Each group will be responsible for the following; 1. Selecting the foods that are representative of one of food group from the display. 2. From the assigned food group, make a list of foods that are suitable for breakfast 3. Design and make poster to include the following: - the health benefits of eating from the food group - nutrient content of the food group - benefits of nutrient/nutrients found in the food group **WEEKS 3 AND 4** **Food Nutrients** Watch video / animation on the different types of food nutrients, the functions, sources and deficiencies deceases. Discuss the video presentation using prompting questions such as: What are nutrients? How many food nutrients there are? What are the sources , functions and deficiency of each nutrient Use cards with various statements/facts about the nutrients provided by teacher to sort into different categories. Discuss each card and check placement.	• Discuss • Collate • Analyse • Create • Problem solving	Rubric used to assess poster depicting health benefits of eating from the food groups presented. (To be used as portfolio entry)

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Create revision materials on the different types of nutrients e.g. flash cards or mind maps. Identify breakfast foods that provide each of the nutrient Create a table with the different nutrients and list the breakfast foods selected at week 2, under the nutrients for which they contain the most nutrients.		
WEEK 5 **Kitchen Tools and Equipment** Brainstorm and define the terms tools and equipment Assemble all the available tools and equipment within the laboratory. Categorize them as either tools or equipment. Design and create an alphabet chart by aligning tools and equipment with the letters of the alphabet in groups. Use appropriate software to design and make a booklet/user manual outlining the selection, use, care and storage of selected tools and equipment used in food preparation. Demonstrate the use and care of selected tools and equipment Select the tools and equipment that would be needed to prepare a simple breakfast and prepare an equipment list. **WEEK6** **Weights and Measures** Watch video clip on weighing and measuring ingredients Discuss video clip in terms of how instruments are used to obtain accuracy	• Problem solving ,critical thinking, classify, Interpret, discuss • Research , explore, report Creativity, design, plan • Explore, demonstrate • Discuss • Design , • Creative • Classify	Written quiz on food nutrients

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Identify, discuss and demonstrate the use of measuring equipment, spoons cups, scale etc. Select a recipe for preparing a breakfast item and demonstrate/ practice measuring both dry and liquid ingredients. Convert the standard units of measure in the recipe provided to metric measurement.	• Accuracy • Calculate • Analyse • Measure • Collate	Rubric/checklist used to assess alphabet chart on tools and equipment presented. Rubric/ checklist used to assess booklet or user manual on the selection, use, care and storage of selected tools and equipment used in food preparation presented.
WEEK 7 **Personal and Kitchen Hygiene** Participate in an educational session facilitated by resource person addressing personal and kitchen hygiene. The importance of hygiene in achieving health must be discussed. Work in groups to develop and implement a hygiene awareness campaign for the school community by carrying out the steps below: • Design a slogan for the campaign • Collect offline/online pictures of resources needed to practice good personal and kitchen hygiene and mount them on charts • Design and make posters depicting good personal and kitchen hygiene • Design and make flyers using appropriate software to be distributed at the launch of the campaign Launch campaign by setting up a display and show how personal and kitchen hygiene can be done.	• Conduct electronic research • Plan • Design • Creative • Problem Solving • Research • Collaborate • Design • Creative • Develop campaign • Present • Discuss	Evidences of standard units of measurement converted to metric measurement presented. Rubric used to assess poster depicting good personal and kitchen hygiene presented. Checklist used to assess display on personal and kitchen hygiene presented.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
WEEK 8 **Kitchen Safety** Carry out a Kitchen Safety Scavenger Hunt. Set up the laboratory with several kitchen hazards (for example, paring knife in sink, cupboard door open, etc.); ask students to identify as many hazards as possible. Discuss why each could lead to a kitchen accident. • Watch a video on kitchen safety • Complete the activity 'What's the Problem' Discuss answers with peers when assignment is completed • Work independently or in peers, to research and make presentations on expanded topics in the area of kitchen safety. Possible topics: cuts, falls, fires, burns, poisons, care of utensils, etc. Present to class. Develop and share podcast on kitchen safety with members of the school community	• Discuss • Research • Analyse • Critical thinking • Brainstorming • Critical thinking	Written quiz for assessing kitchen safety rules Evidences of podcast on kitchen safety presented.
WEEK 9 **Menu Planning** Brainstorm to define menu Discuss the guidelines for writing menus View multimedia presentation on types of breakfast menus Observe and assess samples of different breakfast menus to note differences, similarities and inaccuracies. Write sample breakfast menus	• Design • Create • Analyze • Plan • Observe • Assess	Evidences of sample breakfast menus presented.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
STRAND 3: APPLY SOLUTIONS **Students will:**		
WEEKS 10 TO 13 Conduct interviews with classmates and school community to determine what are the preferred breakfast items, methods of preparation etc. Analyse the data and share the findings of the interview with the class. Use the findings from the survey to plan breakfast menus suitable for the student population for two weeks (ten Breakfast menus) bearing in mind the preferred breakfast items and nutritional component.	• Communicate • Creative • Research • Analyze • Describe • Critical thinking • Problem Solving • Decision Making	Evidences of findings of the interviews conducted presented. Evidences of menus for two weeks presented.
Make menu board to display breakfast menus according to specification Prepare and serve samples of the breakfast menus for one week and conduct a mini survey to ascertain feedback on the breakfast programme Evaluation: share the findings of the survey with the class and discuss their experiences with the project Attainment Target 4:	• Analyse • Taste • Sampling • Evaluate • Identify • Classify • Research	Rubric used to assess samples of breakfast items prepared.
WEEK 14 Conduct research to Identify and discuss possible career pathways in Food Service Industry and outline the roles and functions of each career. Present information on using selected graphic organizer.	• Research • Design • Create • Analyse • Present	Evidences of graphic organizers on career pathways presented.

Learning Outcomes

Students will be able to:

- Design posters
- Create food group classification charts
- Design and make booklets depicting safety in the use of technology
- Design and mount safety signs
- Create tools and equipment user manual
- Design and make alphabet charts, aligned tools and equipment
- Convert standard units of measure to metric measurement in recipes
- Design and make poster on personal hygiene
- Make menu boards
- Write different types of breakfast menu
- Design a breakfast programme
- Prepare different types of breakfast foods
- Conduct customer survey on breakfast product
- Identify related career pathway
- Develop podcast on kitchen safety
- Create blogs on the importance of eating healthy breakfast

Points to Note

A portfolio will be used as a major assessment for each student. As such, a compilation of the work done by students should be done and presented at the end of the term. Students are encouraged to take pictures of items that are perishable and those that may not feasible to enter into the portfolio.

A resource person such as a Public Health Inspector should be sourced to facilitate session on hygiene.

Extended Learning

Students can research modern technology being used in large food preparation.

Students should be encouraged to utilize the design process in solving daily needs and problems.

Advocate on the importance of eating a healthy breakfast
Design breakfast menus for restaurants, institutions and special groups

Resources

- Paper
- Tape
- Computer
- Internet access
- Multimedia projector
- Materials for making chart, safety signs and brochure , pictures, selected appliances
- Tools
- Materials for menu board
- Ingredients for preparing breakfast

Key Vocabulary

- Resource
- Technology
- Safety
- Design
- Design specification
- Evaluate
- Design brief
- Solution
- Podcast
- Blog
- Safety
- Weighing
- Measuring
- Standard unit
- Metric measurement
- Menu
- Meal planning
- Macro nutrients
- Micronutrients
- Caribbean Food Group Chart

Interview Guide

- Do you think that breakfast is important?
- How often do you eat breakfast?
- Where do you most often eat breakfast?
- If there is limited time in the morning at home, what do you do?
- Are you most likely to eat breakfast outside your home?
- When purchasing breakfast, what are you most likely to purchase?
- What is your favourite breakfast items?
- How much would you typically spend on breakfast?

Links to other subjects

There are opportunities in this project to link with , ICT , Social studies Mathematics, Science, Language Arts, Visual Arts

Language Arts:
Apply the reading process and strategies to achieve tasks.
Demonstrate competence in using various information sources including knowledge-based and technical texts to perform specific tasks.

Demonstrate competence in speaking to provide, distribute or find information

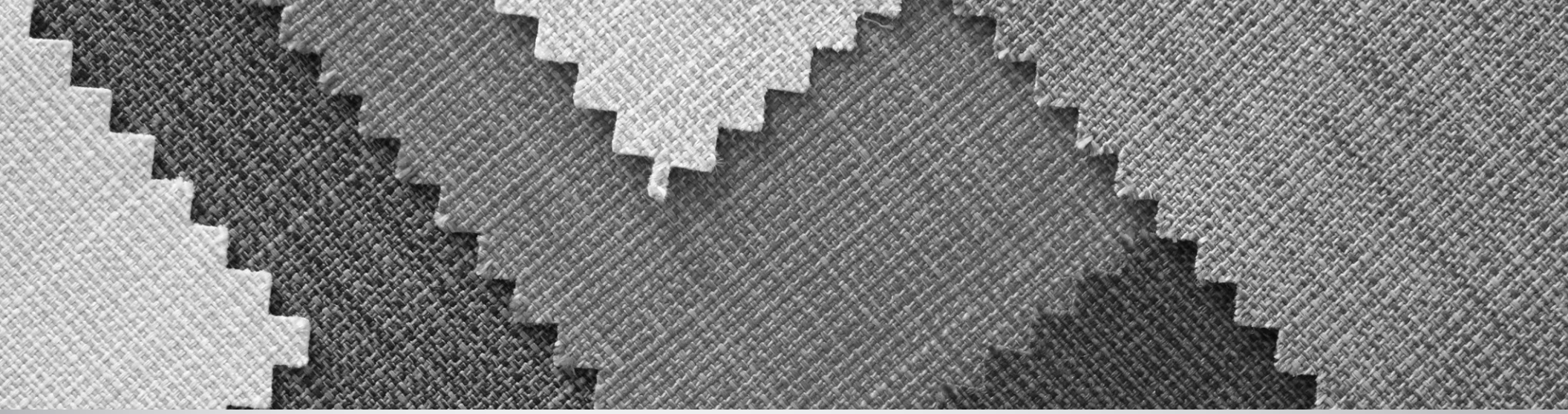
Mathematics
Measure time, temperature, volume and weight
Use inductive and deductive reasoning
Add subtract, divide, multiply whole, mixed numbers, fractions and decimals
Convert measurement units

Science
Measure time to complete task
Analyse the importance of healthy eating on the body
Apply scientific methods to solve problems
Apply and use laboratory technique safely
Measure the volume of liquid and solids

ICT
Use computer for information processing

Social Studies
Demonstrate awareness of local resources

Visual Arts
Apply the elements and principles of design

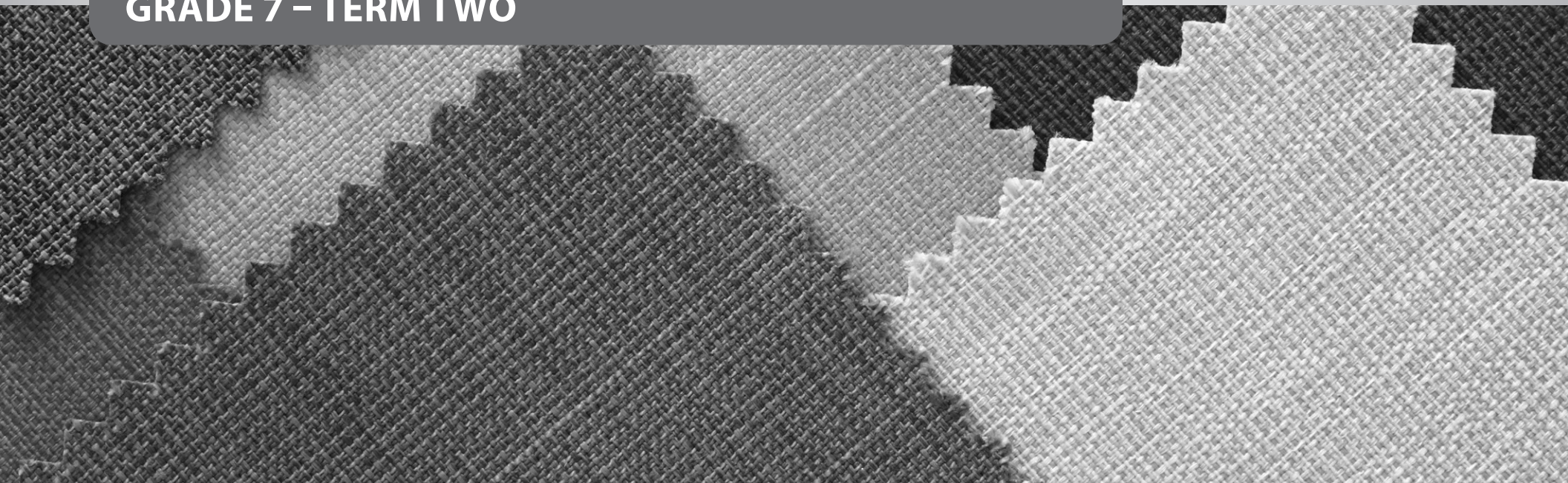


GRADE 7

RESOURCE & TECHNOLOGY

FABRICS IN EVERYDAY LIFE

GRADE 7 – TERM TWO



Fabrics in Everyday Life- Family and Consumer Management- STEM Mapping Grade 7 Term 2

SCIENCE

- Classification of materials used to make textile fibres.
- Analysing textile fibres using microscopic, burning and chemical test.
- Examining how fibres are made into fabric.
- Natural Fibres: Examining cellulosic and protein fibres.
- Exploring methods of applying surface designs: embroidery, appliqué, painting, printing, other methods,
  - Mixing dyes and paints for Surface Designs
  - Dying fibres to compare different absorption properties of fibres.
- Be aware of safety procedures when using tools and equipment.

MATHEMATICS

- Conversion of imperial measurement of fabric for personal or household article.
  E.g. - ¾ yd. of fabric to make a bag
  - 1 yd. to make a pair of cushion
  - measuring the length and width of fabric.
- Measurement used to construct articles
  - 5/8 inch for seam allowance
- Proportions used when mixing dyes or paints for surface designs
  - E.g. 1 cup water to a pack of dye
- Space used on fabric to apply surface design to made it uniform and balance
- Measure time to complete tasks.
- Idea of Tessellation: Balance of design/patterning of design

Product made from textile for personal or household use with a surface design

TECHNOLOGY

Transfer the knowledge of scientific principles for the:

- Manipulation and use of tools and equipment:
  - Cutting and sewing of articles/items using sewing tools and equipment.
  - Using the sewing machine
  - Caring for the sewing machine
- Printing, batiking and dying fabric to create prints and designs on fabrics.
- Application of embroidery stitches and appliqué to fabric.
- Use of computer for information processing.
- Demonstrate skills in measuring, cutting, stitching and other construction techniques in making textile article.

'E' DESIGN PROCESS

- Identify and define the problem:
- Generate ideas as to the type of articles to make.
- Brainstorm to decide the most appropriate fibre/ fabric to use and why.
- Test the fabric with different surface designs.
- Construct articles
- Evaluate the finished products/articles.
- Present the finished products/articles.

RANGE AND CONTENT

Range and content are project specific, and cover key concepts, skills, knowledge and attitudes students will learn in Clothing and Textile at Grade 7.

Fibres and Fabric:
Define terms related to fabrics
Classification of natural fibres
Identification of fibres

Sewing Tools and Equipment
- Classification of sewing tools and equipment
- Uses and care of sewing tools and equipment

The Sewing Machine
- Use and care

Basic Stitches
- Classify Basic stitches
- Construct basic stitches

Methods of Applying Simple Surface Designs
- Embroidery , Appliqué, Painting, Printing, beading
- surface designs available for embellishing sewing projects

Career Opportunities in the Textile Industry

ABOUT THE PROJECT

This unit focuses on developing an appreciation for the study of Clothing and Textiles. Students will develop an understanding of key concepts of textile fibres and practice skills associated with constructing textiles products. They will identify and classify natural fibres and explore tools and techniques necessary to construct textile products. Practical application of the knowledge and skills will be demonstrated in a project to reflect how textile products can be designed and embellished for personal and household use.

The Grade 7 Clothing and Textiles curriculum provides opportunities for students to develop their knowledge, skills, and attitudes for present and future applications in their personal life, local and international market. Students will learn to:

- understand textiles by conducting experiments, analyzing, designing and producing textile products/items for household or personal use.
- practice decision-making and problem- solving skills also think critically
- understand and apply surface designs to a variety of natural fabrics
- appreciate and understand the interdependence/integration of Science, Mathematics and Technology in everyday living/use and how they are in-cooperated in engineering a product/item.

Why is it important for students to study Clothing and Textiles? Clothing is an important part of a person's image. In addition, clothing forms a large part of personal and family expense. People who are informed about textiles and construction techniques will become more effective consumers when purchasing fabrics, clothing or household items. The Textile/Clothing/Fashion industry is an important component of any economy as well as, an area that can provide many opportunities for entrepreneurship or careers in the industry.

Student will use their creativity and innovation to produce an article from fabric that can be used by the individual, in the home or for industry. To enhance their textile products students will add an appropriate surface design.

The teacher must ensure that all students practice appropriate lab safety measures in using sewing tools and equipment and while doing the chemical and burning test to identify fibres/fabrics. Correct procedures should be written down, demonstrated and then fol¬lowed by the students when testing materials. Students should be taught to manage their surroundings to ensure their own and others' safety.

Organising a range of activities will give students an opportunity to examine, explore, explain, evaluate the topics being taught and enrich their knowledge and understanding fibres and fabrics in everyday life. This will help them to have a better understanding why fabrics and surface designs have been chosen, and will also inform their own designing and making of their fabric/textile product. The unit will also help students explore career opportunities in the textile/clothing/fashion industry and help them develop skills needed for future and 21st century employment.

PROJECT TITLE: FABRICS IN EVERYDAY LIFE

Prior Learning

Check that students:

- Are aware of textiles uses in apparel and home furnishings, Students' use products made from fabric in everyday life such as clothing and household article.
- They will also use their knowledge of principles and elements of designs from grade 6 to help them create and evaluate products.

STRAND CREATIVITY AND INNOVATIONS	STRAND EXPLORE METHODS AND PROCEDURES	STRAND APPLY SOLUTIONS	STRAND CAREER PATHWAYS
ATTAINMENT TARGET 1:	**ATTAINMENT TARGET 2:**	**ATTAINMENT TARGET 3:**	**ATTAINMENT TARGET 4:**
Through a project based approach students will be able to apply **Creativity & Innovations** to fabric selection, use and care.	Through a project based approach students will be able to **Explore Methods & Procedures** in solving problems relating to textiles/ clothing fabrics	Through a project based approach students will be able to **Apply Solutions** to develop textile/sewn products.	Through a project based approach students will be able to develop awareness of a range of Career Pathways in the Textile Industry.

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas, information and understandings for a variety of purposes.

DESIGNING AND PRODUCING - Use technology to design and produce multimedia products to demonstrate their creative thinking.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - Use technology to develop a logical process for decision making and problem solving.

OBJECTIVES:

Students will:

- Define terms and concepts associated with fibres and fabrics
- Identify the sources, processing, characteristics, and uses of natural fibres
- Examine natural fibres/fabrics using different methods of fabric identification techniques - (microscope, burning, visual, tactile)
- Identify small tools and equipment used in constructing sewing projects
- Manipulate the tools and equipment in constructing sewing projects
- Identify the parts of the sewing machine and their functions
- Classify basic stitches and select and construct various types of stitches
- Employ various methods for creating simple design on fabrics – printing, embroidery, appliqué, painting
- Explore careers related to the Textile/clothing/fashion Industry
- Evaluate textile/sewn product against project rubric.

SCIENCE STANDARDS

AT 3: Energy and Matter: Students should explore:

- A range of matter, energy and forces, in everyday situations and also from a scientific perspective.
- The structure of materials and explore their properties
- Energy forms and how energy change affects materials.
- Understand physical and chemical changes and know that chemical changes take place through the re-arrangement of atoms.

MATHEMATICS STANDARDS:

AT 2: Measurement: Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

- Measure length, mass, time, temperature, volume, capacity using appropriate instruments
- Perform conversions within and across related units.

AT 5: Data Handling and Probability: Collect, organize, interpret and represent data and make inferences by applying knowledge of statistics and probability.

- Design and conduct simple experiment, to collect data, determine simple probabilities a draw appropriate conclusion
- Use fractions and percentages to describe probability
- Interpret a probability given as a fraction or percentage

TECHNOLOGY STANDARDS:

- Develop an understanding of the attributes of design and engineering design **(Design - Standard 8 and 9)**
- Develop the abilities to apply the design process. **(Abilities for a Technological World - Standard 11)**
- Develop an understanding of and be able to select and use construction technologies **(The Design World - Standard 20)**

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: **STRAND 1: CREATIVITY AND INNOVATIONS** **WEEK 1** Use their dictionaries/TABLETS/ research online or offline to find definition of 'textiles'. Write in the KWL grid statements of things they currently know about textiles. Identify and make a list of all the textiles products they come in contact with on a given day, from the time they awake in the morning until they return to bed. In groups, identify a problem with the textile products	• Communication of items used daily • Create project ideas • Report(verbal and written) • Explore • Create a multimedia presentation • Record/document ideas for textile product	

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: they come across daily and brainstorm to come up with creative and innovative ideas/ways to improve the textile products used for personal, household or as gifts. In groups decide on a set of textile products to make and decorate/embellish for the project. Use suitable software to create designs and instruction sheets for the textile products. Place in portfolio. Present project ideas to the class using an electronic medium such as a multimedia presentation		
STRAND 2: EXPLORE METHODS AND PROCEDURES **WEEKS 2 AND 3** Explain a number of terms related to textiles/ fabrics (e.g. fibres, yarn, fabric and textile, staple fibres, filament fibres, natural fibres, regenerated, synthetic etc.) using samples. Label samples and place in the portfolio. Distinguish between natural plant and animal fibres: • Plant sources: cotton, linen, ramie, hemp, others. • Animal sources: wool, silk, angora, camel's hair, mohair, other. Research online or offline an assigned fibre for source, advantages, disadvantages, and end users. Present the research to the class through a commercial, poster, or multimedia presentation format. Evaluate fibre and textile materials by observing carefully the structure and behaviour of natural fibres under the microscope, when chemical is applied and as it burns. Document observation as the fabric approaches the flame and when it is out of the flame and also the odour as it burns. Observe safety rules while burning fabrics and work in a safe well-ventilated area. Highlight findings on the checklist. Report findings to the class and compare results.	• Research • Examine • Explore • Investigate • Observe • Critique • Evaluate • Report • Create movie or video	Identification of fibres: Conduct burning and microscopic test Rubric for identifying fibres Fibre burning chart Sample fabrics file contains sample from all categories of natural fibres is neatly mounted and accurately labelled. Rubric to mark fabric file. Peer Assessment

Students will:

Examine a variety of natural fabric samples and determine suitable apparel and household uses. For example Cotton – corduroy, flannel, denim, terry towel; Wool – crepe, worsted; Silk - chiffon, organza;
Linen –handkerchief, table cloth.

Visit a fabric or clothing store or watch a video to examine the fibre content. Collect mount and label samples of natural fibres for portfolio or create a fabric sample movie/presentation using TABLET or other source and share with class.

WEEK 4
SEWING TOOLS AND EQUIPMENT

Classify sewing tools and equipment as cutting tools, measuring tools, marking tools, other. (measuring equipment - measuring tape, sewing gauge, hem gauge, other; cutting equipment - shears, pinking shears, seam ripper, other); marking equipment - tracing paper and wheel, tailor's chalk, fabric marking pencils, other).

Assign one or two sewing tools/equipment to individual students by writing the name of the tool/s on strips of paper and allowing students to take a strip. (Strips can be placed under the student's desk before class). Students examine the tools assigned to them and create groups (group themselves) based on the classification of sewing tools and equipment. In these groups select the tools and equipment from the storage or display area. Conduct in class research about the use and care of the tools/equipment assigned. (Research can be done from text books, teacher handout or online. Students can also be timed to go to the library and return.) Set up a display of the tools and equipment in their category and do presentation such as an oral presentation or create a podcast in which they discuss and demonstrate the use and care of each tool and equipment. (Students may use teacher approved online video clips to enhance their presentation.)

- Classify sewing tools
- Use and care of tools safely
- Research
- Create podcast or multimedia presentation

Rubric: display organized and oral presentation with accurate information; effective presentation, evidence of research; organization and group cooperation.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
WEEK 5 **THE SEWING MACHINE**		
Using the sewing machine and diagrams, identify and label the parts of the sewing machine. Describe the function of each part of the sewing machine. Describe and demonstrate procedures for operation of the machine. Include: winding the bobbin, threading the machine and bobbin, replacement of the needle, presser foot, and slide plate, use of the hand wheel and the movement of the feed dogs, use of the presser foot, recognizing the proper stitch and tension, stitch length and backstitching, use of different machine stitches, resolving machine problems. Practise operating the sewing machine by constructing samplers of various machine stitches. Mount the sample in portfolio.	• Operate sewing machine • Sew sample stitches	Crossword puzzle to identify the parts of sewing machine and or Sewing Machine Bingo to see if students understand and know the parts and function.
WEEK 6 **BASIC STITCHES**		
Classify stitches as temporary and permanent. Watch video clips of how each of the stitches is worked. Create step by step instructions guide on how to work basic stitches Demonstrate how to work basic stitches, record/video themselves working basic stitches and post it on a class wiki. Construct sample of basic stitches i.e. basting stitch, back stitch, hemming stitches, decorative stitches etc. Mount samples in portfolio.	• Construct basic stitches	Hand stitches samples should contain at least one stitch from each category, stitches should be neat and clean, of the correct length and nicely presented.
WEEK 7		
Explore different methods of applying surface designs on fabric such as embroidery, appliqué, spatter paining and block or finger	• Explore • Apply	Surface designs sample guidelines followed for applying surface designs and are aesthetically pleasing.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
printing and embellishment. Compile these in portfolio. Illustrate the different methods of the surface designs mentioned on fabrics. Display design on bulletin board in classroom.	• Print • Paint • Design • Illustrate/ demonstrate	
STRAND 3: APPLYING SOLUTIONS **WEEKS 8 TO 10**		
Design a product to meet a specific purpose, choosing appropriate materials, by applying the knowledge, skills and understanding developed during the evaluation of fibre activities. Work in groups to create samples of items from fabric for the individual and the home. Items may include but not limited to drawstring bag, tray clothes, pantry towel, aprons, blender cover, and cushion. Mount surface design on the items/products. Designs such as printing, painting, embroidery, appliqué as well as using the (CAD) computer-aided design to decorate items/products. Examples of projects to embellish may include: pencil case, pillow, tool or cooking apron, pillowcase, gift bag, tote bag, sweat band, boxer shorts, towels, (dance, skating, gymnastics, Halloween costumes), vest, tie, moccasins, runners, and others). Demonstrate the appropriate safety procedures for hand sewing and disposing of fabric cuttings and inks/dyes used for painting or printing. Set up a display to present items/products at a school's open day or plan and participate in a craft fair. Display information learnt about fabrics and the items created for different uses in society and items/products to the school community using a multimedia presentation where possible.	• Construct articles • Decorate articles • Setup product display • Embellish articles	Project pieces are well constructed, attractive, usable, marketable and presentable. Rubric for grading surface design

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
STRAND 4: CAREER PATHWAYS **WEEK 11** Conduct online/offline research and review in groups the roles and functions of individuals engaged in textiles career. Use appropriate software to design brochure to present information to the class. Create an email with the brochure as an attachment to other members of the class. Communicate and collaborate with peers in other countries using a class wiki about the types of textiles occupation in their country.	• Conduct electronic research • Design brochures • Create and send emails • Communicate online	Brochure contains information on at least 6 careers in the textiles industry, the information is accurate, clearly communicated, organized and attractively presented

Learning Outcomes

Students will be able to:

- ✔ Use textiles terms /terminologies correctly
- ✔ Identify and select fibres and fabrics according to types
- ✔ Predict fabric or product performance based on a knowledge of fibres
- ✔ Select and use fabrics based on characteristics
- ✔ Develop career interest in and an appreciation for textiles.
- ✔ Use/manipulate and care basic sewing tools and equipment
- ✔ Create textile articles for the individual, home
- ✔ Apply simple surface designs to textiles products/articles
- ✔ Use basic stitches in constructing articles and simple clothing repairs
- ✔ Produce marketable textile articles/products through a project
- ✔ Select green and eco textiles products that have minimal environmental impact.
- ✔ Post and upload concepts associated with fibres, fabric on the internet.
- ✔ Communicate and collaborate with peers about the textile industry

Points to Note

- Teacher will create a multimedia presentation on the advantages and disadvantages of fibres.
- Room must be well ventilated when students are doing burning test on fibres. Remove paper and other flammable materials from the work area.
- Use a candle in a solid container made of stainless steel, glass or aluminium (plate, saucer cup or candle holder or empty milk cans)
- Recognise some of the dangers associated with internet use and demonstrate safe online behaviours.
- Recognise and acknowledge the owners or creators of digital materials and encourage others to do so
- Demonstrate respectful, responsible and clear online communication and encourage peers to do so
- Follow guidelines to promote healthy use of ICT tools

Extended Learning

- Create and design on a variety of materials such as natural, regenerated or synthetic fabrics.
- Students will apply their understanding of fabrics and their properties when designing and making textile products.
- Students can work in teams, teach others, assess each other negotiate, and work well with people from diverse backgrounds.
- Complete a project as gifts for special periods i.e. Christmas, Valentine's Day etc.
- Explore entrepreneurial opportunities by making their projects into kits. Determine the selling price and sell their projects within the school or community.

Resources

- Scissors
- Fabric
- Tape measure
- Poster board
- Pencil
- Matches
- Microscope
- Paper
- Marker
- Glue
- Books and related literature
- Pictures
- Internet
- Computer
- Speakers
- DVD/CD player
- TABLET

Key Vocabulary

- Fabric
- Fibre
- Yarns
- Textile
- Culture
- Natural fibres
- Appliqué
- Embroidery

Links to other subjects

This project utilizes concepts taught in:

Language Arts

- Applying the reading process and strategies to directions or tasks that are short, with limited categories of information, directions, concepts and vocabulary.
- Adapts listening strategies to utilize verbal and non-verbal content of communication
- Demonstrate competence in speaking to, provide, distribute or find information.

Mathematics

- Mentally adds, subtracts, divides and multiply whole numbers. (measurements and calculations)
- Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.
- Measure length, time, temperature, volume and capacity.
- Perform conversions within and across related units.
- Collect, organize, interpret and represent data and make inferences by applying knowledge of statistics and probability.
- Design and conduct simple experiment, to collect data and draw appropriate conclusion.

Science

- Applies and uses laboratory techniques safely in testing fabrics/fibres
- Describes and explains the chemical reactions during the burning of fabrics/fibres
- Uses computers for information processing
- Explore a range of matter, energy and forces, in everyday situations and also from a scientific perspective.
- Examine the structure of materials and explore their properties
- Analyze how energy change affects materials. Understand physical and chemical changes and know that chemical changes take place through the re-arrangement of atoms.

Visual Arts

- Applying the concepts/principles taught about printing and painting

GRADE 7

RESOURCE & TECHNOLOGY

THE FAMILY AND THE COMMUNITY

GRADE 7 – TERM THREE

SCIENCE

- Procreation and reproduction as a means of continuation of human species/family.
- The study of genetics – traits are passed on from one generation to another.
- Scientific terms related to the family: reproduction, chromosomes, cell division, and cell formation.
- Lifestyle related issues as a result of stress: mental health hypertension, diabetes, uncontrolled emotions.
- Characteristics of a healthy family.
- Safety precautions when using tools and equipment.

TECHNOLOGY

- Safety precautions to be followed when using materials and equipment.
- Use appropriate software to present findings from the research and to create flyer on characteristics of a healthy family.
- The use of multimedia presentations to encourage family commitment
- Script writing and mini dramatization.
- Audition for roles and test props including construction of costumes
- Use of recording devices to capture plays and play back for class discussion and critique.

A theatre piece to share information about family living, communication and conflict resolution

MATHEMATICS

- Graphical representation of data using pie charts, graphs.
- Measurement –
  The dimension of posters, brochures etc., used for advertising

  Area of stage for presentation
- Ratio: number of persons participating in the play vs the area of the stage.

'E' DESIGN PROCESS

- PROBLEM: Family and community rivalry as a result of poor communication.
- Generate ideas on a list of activities to increase family and community.
- Conduct research on common causes of family and community rivalry.
- Brainstorm to choose the best solution to share information about family living, communication and conflict resolution.
- Use drama to present information in classroom setting. Conduct a role play/ theatre piece to inform communities about the issues and possible solutions to the problem.
  Evaluate role play by:
- Discussion with students about what was learnt during the theatre presentation.
- Conduct a debriefing session with communities to assess the impact of the presentation.

The aim of this project is for students to be able to utilize and effectively manage personal resources of talent, time, energy, and money, and make effective decisions in order to promote, nurture and support good relationships within the family and the community. Through the planning and implementation of a family or community based activity, they will access community resources for the optimum benefit of the family.

Duration: 11 weeks (at 1 hour per week)

RANGE AND CONTENT

Students will develop knowledge and understanding by learning:

The Family and the Community
Definition of the family
Characteristics of a healthy family.
Roles and Functions
Family and Community Resources

Goals and Values
Types of Goals
Goal setting
Definition of Values
Sources of Values
Formation of Values

Decision Making
Steps in the decision making process
Using the decision making process to make decisions

Communication
Methods of communicating
Barriers to effective communication
Use of technology for communication

Conflict Resolution
Steps in resolving conflicts

Career Awareness
Careers in Home Economics
Requirements for potential careers

ABOUT THE PROJECT

In this unit students will learn about family and family living. They will explore family roles and functions, goals and values, decision making, communication and conflict resolution. Students will analyse each topic using real life scenarios and write and perform skits, role-plays and dramatizations to illustrate the concepts. As a project the students will plan, organize and perform a theatre piece (play) to share information with the community about good family living, how to communicate effectively in families and resolve conflicts. The intent is to give students the tools wherewith they can make responsible choices and take ethical decisions/actions when dealing with practical problems within their lives as individuals and as members of families and communities. Students will also explore careers in the field of theatre arts.

Sample stereotyping questions:

- Where do you think these stereotypes come from?
- How do stereotypes hurt people?
- What can we do to avoid stereotypes?
- Can you think of a common stereotype in your country about another group of people?

Guidelines for using **The Jigsaw method**

The Jigsaw method is a group activity in which each group member will number themselves from 1 to 4 and choose one of the topics, assigned by the teacher. All the students with similar number will go together in a power group where together they will study the assigned topic thoroughly and create a concept map on the topic to take back to their group. After about half an hour the students will return to their original groups and take turns teaching each other the topic they studied in the power group using the concept map as a guide. Take a 10 point quiz on all three topics at the end. A quiz can be taken individually or in groups.

Prior Learning

Students live in some form of family and experience family relationships
Students learnt previously how to conduct a research and present the findings.

PROJECT TITLE: THE FAMILY AND THE COMMUNITY

STRAND CREATIVITY AND INNOVATIONS	STRAND EXPLORE METHODS AND PROCEDURES	STRAND APPLY SOLUTIONS	STRAND CAREER PATHWAYS
ATTAINMENT TARGET 1:	**ATTAINMENT TARGET 2:**	**ATTAINMENT TARGET 3:**	**ATTAINMENT TARGET 4:**
Through a project based approach students will be able to apply **creativity and innovation** in the solution of problems	Through a project based approach, students will be able to **Explore Methods & Procedures** in identifying and solving family and community problems.	Through a project based approach students will be able to **apply appropriate solutions** in taking action in implementing solutions to life's problems	Through a project based approach students will develop the ability to analyze **Career Pathways** within family and community services

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas, information and understandings for a variety of purposes.

DESIGNING AND PRODUCING - Use technology to design and produce multimedia products to demonstrate their creative thinking.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - Use technology to develop a logical process for decision making and problem solving.

OBJECTIVES:

Students will:

- Recognize the Family as the basic unit of society.
- Explore family roles, functions and characteristics.
- Recognize personal , family and societal goals and values
- Demonstrate verbal and nonverbal behaviours and attitudes that contribute to effective communication
- Determine and manage the role of decision making and problem solving in conflict
- Determine individual and family responsibility in relation to environmental trends and issues
- Understand the principles and elements of play writing and performance
- Define personal career possibilities and practice the skills related to each.
- Use technology to develop a logical process for decision making and problem solving
- Evaluate project outcome

MATHEMATICS ATTAINMENT TARGETS:

AT 2: MEASUREMENT - Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.

AT 5: DATA HANDLING AND PROBABILITY - Collect, organize, interpret and represent data and make inferences by applying knowledge of statistics and probability.

SCIENCE ATTAINMENT TARGET:

AT 2: Living Things and Life Processes

Students should learn practically about the structures and functions of the major organs and systems in living things and the scientific basis of how life is maintained and perpetuated. They should also learn the scientific basis of how to maintain health and wellbeing.

TECHNOLOGY STANDARDS:

Students will develop an understanding of:

- and be able to select and use information and communication technologies.
- the attributes of design.
- engineering design.
- the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
STRAND 1: CREATIVITY AND INNOVATIONS **WEEK 1**		
Working in groups students will analyse the problems, situations and incidences in their community. Decide on a problem or crucial issue and brainstorm to find creative and innovative ways to solve, resolve or reduce individual, family and community related problems. Create a timeline using appropriate software where available for the planning and implementation of the solutions. Scenarios like the one below may be used to introduce the problems.	• Analyse issues • Decide on solutions to problems • Take positions on issues • Plan solutions to problem • Create a document • Conduct electronic searches • Analyse data	Assess timeline for creativity, innovation realistic etc. Assess correct information presented, neat presentation, easily read, size of the bars) Written test on the family to show a clear understanding of the concepts taught. Dramatization organized, informative and interesting

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Scenario: **Midday News Headline:** Sister Stabs Sister. Information reaching our news team is that two sisters were involved in an argument which turned deadly after weapons were drawn, leading to serious injuries. According to police reports, a knife was used to stab the younger sibling. The injured sister was rushed to the hospital however, she succumbed to her injuries. The community reported that these were usually loving sisters who got along well. What do you think caused the tragedy? What can be done to prevent this from happening to you or other families? Note: The major issues in the scenario above are family relationships and conflict resolution. As a result the students could decide to use theatre/play to sensitize the community about the issue and provide strategies and solutions to the problem using drama.	• Research information • Design using graphics • Identify problems • Employ social drama techniques • create document • Create and format multimedia presentation	

EXPLORE METHODS & PROCEDURES
WEEKS 2 AND 3
The Family

Discuss the importance of the family as a basic unit in the society. Research online/offline and analyze a variety of definitions of the family and formulate a definition based on the Caribbean experience. Conduct survey in their community to investigate different forms/ types of family living within in the community. Use spreadsheet software to present findings from the survey. Collect online/ offline pictures of the different family forms and make a poster to be displayed at the play Discuss the characteristics of a healthy family and create a flyer using appropriate software to display at the play.	• Debate • Capture images, audio and video with a digital camera or other image capturing devices • Cooperate • Create database	Rubric for assessing role-play. Role-play should incorporate the roles and functions of the family Script for stereotype scene should be informative and convincing.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: Discuss the roles and functions of the family and create a multimedia presentation for example a short video/ digital story to encourage family members to be committed to their roles and functions in their family. Create a list of activities which promote family traditions and can result in increased family unity. Working in groups students will write the script, for the scene on the family, for the play and do a mini dramatization, in class, depicting the issues. Students may be assigned sub topics such as family roles, types of families etc. for the in class dramatization. Use recording devices to capture the play and play back for class discussion and critique.	• Use web mapping service application • Create posters	Community resources directory should be readable, informative and attractive.
WEEK 4 **Community Resources** Discuss the local and national community resources available to families. In groups visit different community facilities, e.g. health centres, counselling centres etc. and present an oral report on the services provided by each institution. Create a directory of community resources available to families using appropriate database software and prepare a poster to display at the play. Directory should contain addresses and contact information i.e. phone numbers, email address etc. include a web mapping service application of the area showing the location of the various resources.	• Create brochure on short term, intermediate and long term goals	Assess brochure for creativity and correct information.
WEEK 5 **Discrimination And Stereotype** Watch a movie or video clip that depicts discrimination and stereotype and use the practical reasoning process to arrive at moral positions about the stereotype and prejudices		

After watching the movie students will answer the following questions:

- What are the stereotypes in the movie clip?
- How do stereotypes hurt people?
- If you were the individual or belong to the group that has been stereotyped how would you feel?
- What should be done about Stereotype?

Students will read an article on how to prevent stereotyping and create a list of various strategies to recognize and prevent prejudices.

Write and perform a script to discourage stereotypes

WEEK 6
Goals and values

In groups of three students will complete a worksheet entitled, "Things I want and "Things I don't want". Collate information on a spread sheet or graph and present to the class.
Students will listen to a story or watch a video presentation on how to make choices and set goals for their future. In their groups students will demonstrate how to use a graphic organizer (branching tree) to assist in making choices. They will also dramatize the relationship between goal setting and achieving their future dreams.

Write the narration for a scene on goals values and for the play and have students audition for parts in the scene

Communication
In groups, apply a variety of listening and observation skills/ strategies to interpret information. Then, monitor and adjust

- Use communication skills that demonstrate respect.
- Resolve conflicts
- Listen to others
- Dramatize solutions to conflicts
- Develop skits
- Capture images, audio and video with a digital camera or other image capturing devices

Skits demonstrated creative problem solving strategies; gives a clear and persuasive presentation to the class; was entertaining

strategies to interpret information (e.g., attends and listens carefully; elaborates; paraphrases information; makes connections both within and beyond presentation; processes information and ideas by drawing pictures, using graphic organizers, and taking notes).

Use technology to inform and/or enhance communication. (e.g., print, internet, visual display or audio technology).
Develop the narration for a scene on effective verbal and non-verbal communication

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WEEK 7
Decision making

Conflict resolution
Discuss the steps for working out conflicts
Describe a variety of conflicts that commonly occur at school or in families. List these on the board.(Or Allow students five minutes to write one hurtful incident that has happened to them, then share with class) *Example of conflict: Alice is not talking to her best friend because she believed he spread a gossip about her*. *Wane is angry with his sister because she borrowed his money and did not return it*.

Select two or three of the conflicts and discuss how the Steps for Working out Conflicts can be applied to each situation.

Develop skits dramatizing the hurtful situations and ways to resolve them allow about 15 to 20 minutes to develop the skits. Use recording devices to capture the play and play back for class discussion and critique.

Stage a mini playwright competition for writing the scene for

conflict resolution and select the winner from the competition as the writer for the class play.

STRAND 3: APPLYING SOLUTIONS
WEEKS 8 TO 10

Have a guest speaker from the drama department or a play house present on the elements of a play. (Careers in theatre could be discussed here too).

Visit a theatre and watch a pantomime or roots play (or watched a play on a DVD in class) and identify and discuss the plots, characters, theme, spectacle - costume, props etc.

Use story boarding to outline the class play in cooperating all the scenes practiced in previous classes.

Put on a play to teach families how to resolve conflicts. Include scenes for family and family relationships, family roles and functions, goal and values, communication, decision making and conflict resolution.

Identify characters, have auditions and select roles for the play. Select other team members such as props manager, stage manager, lighting etc.

Rehearse for the play (rehearsal may have to be done outside of class time i.e. after school. At least one dress rehearsal should be held)

Plan, organize and perform the play at school, at a PTA meeting or at a community event. Record the play and post online.

- Plan, Organize
- Implement and
- Evaluate a play

Play should show planning organization and effectively implemented. The content should address the family and community issues, must be interesting, entertaining and informative.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
After the play have a debriefing session in which students discuss their experiences with the play, say what they learnt and do final evaluation.		
STRAND 4: CAREER PATHWAYS **WEEK 11**		
Using a graphic organizer e.g. T-chart to list as many careers as possible in theatre arts and outline the roles and functions of each position.		Prepare a report on the role of various career professionals in theatre arts

Learning Outcomes

Students will be able to:

- Resolve family, workplace, and community issues and concerns
- Function effectively as members of a family, community and society
- Develop awareness of how individuals contribute to home, community and society in productive work
- Discover and clarify individual aptitudes, interest, attributes and link them to career options
- Understand their roles and functions as members of families
- Make sound decisions about the use of family resources
- Communicate effectively in families
- Effectively handle conflict in school and home
- Plan organize and implement a play
- Understand the job roles and functions of theatre artists.
- Communicate using various ICT technologies.

Points to Note

Definition of the term family.

Given the various configurations of families in today society, creating a contemporary definition of family can be difficult, the definition of family takes on different meaning depending on the context from which it comes, and as such there is a trend away from having stereotype or fixed definitions of the family. Instead of focusing on the definition of family have students identify those characteristics that make for a healthy/happy family irrespective of definition, form or type.

Conflict Resolution

The steps for working out conflicts
Whenever you are faced with a conflicting situation:

STOP : before you lose control of your temper and make the conflict worse

SAY: what you feel is the problem. What is causing the disagreement? What do you want?

LISTEN: to the other person's ideas and feelings

THINK: of solutions that will satisfy both of you.

If you still cannot agree, ask someone else to help you work it out
N.B. There are many short video on line that can be used to help students analyze and resolve conflicts.

Example of conflict: Alice is not talking to her best friend because she believed he spread a gossip about her.

How to use the steps for working out conflicts to resolve the conflict above

Alice would need to stop (pause to reflect) and define the problem clearly by Saying what she feel is the problem. What is causing the disagreement? What she wants? She may write the answers to the questions

If Alice values the friendship and want it to continue, she may decide to talk and LISTEN to her ideas and feelings and decide on (think) a solution that will satisfy both of them. Hopefully the will be able to resolve the conflict. If not Alice could ask the schools guidance counsellor to help them work it out.

Extended Learning

Investigate family forms seen in other societies.
Audition for parts in national pantomime or roots play.
Write plays and sell to play houses
Create intervention plans for other community problems

Resources

- Printing paper,
- Internet
- Computer
- Multimedia devices
- Community facilities
- Props
- costumes

Key Vocabulary

- Family, Gender bias, Goals, Resources, Values, Decision making
- Stereotype
- Prejudice
- Discrimination
- Play, plot, scene, characters

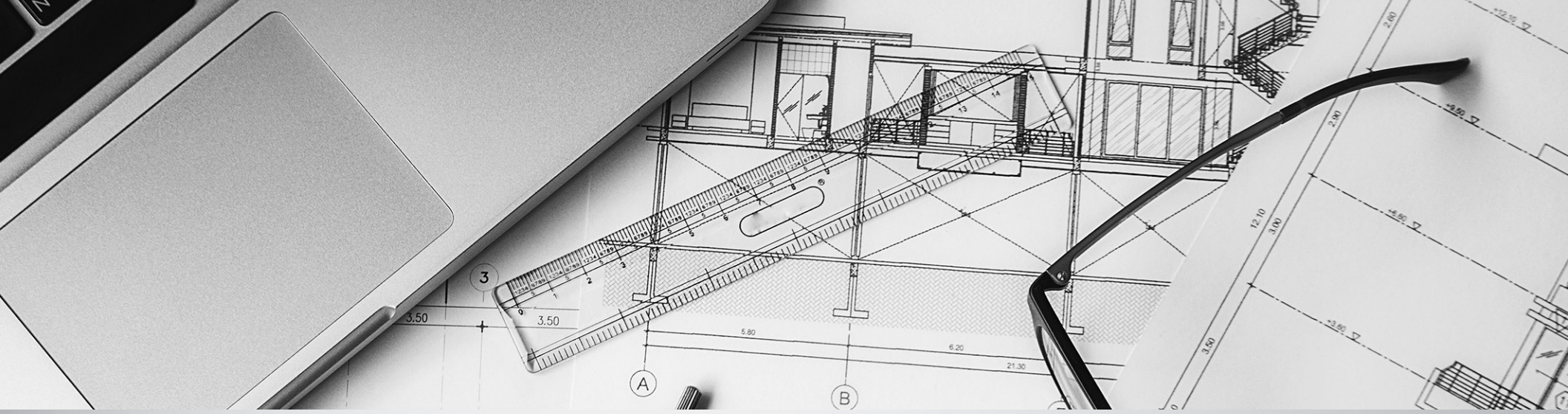
Links to other subjects

Language Arts: Demonstrate competence in speaking and advocating on behalf of families.

Performing Arts: Create and perform plays

ICT: Demonstrating competencies in using a variety of multimedia/audio-visual equipment

Business Education: Applying business principles in costing the play.



GRADE 7

RESOURCE & TECHNOLOGY

INDUSTRIAL EDUCATION

CURRICULUM GUIDE

AIM OF RESOURCE AND TECHNOLOGY

The aim of Resource and Technology at this level is to use the principles of Science, Technology, Engineering and Mathematics (STEM) infused with the Technical Vocational standards to foster students' awareness of foundational technical skills and their relationship to future careers and occupations. In a project-based format, students use the design process for problem solving in a range of technology based design contexts. The aims of Resource and Technology at this level are to enable students to become:

- Critical thinkers and problem solvers
- Confident, responsible and productive citizens
- Adaptable to changes in the world around them
- Aware of a range of future focused career options

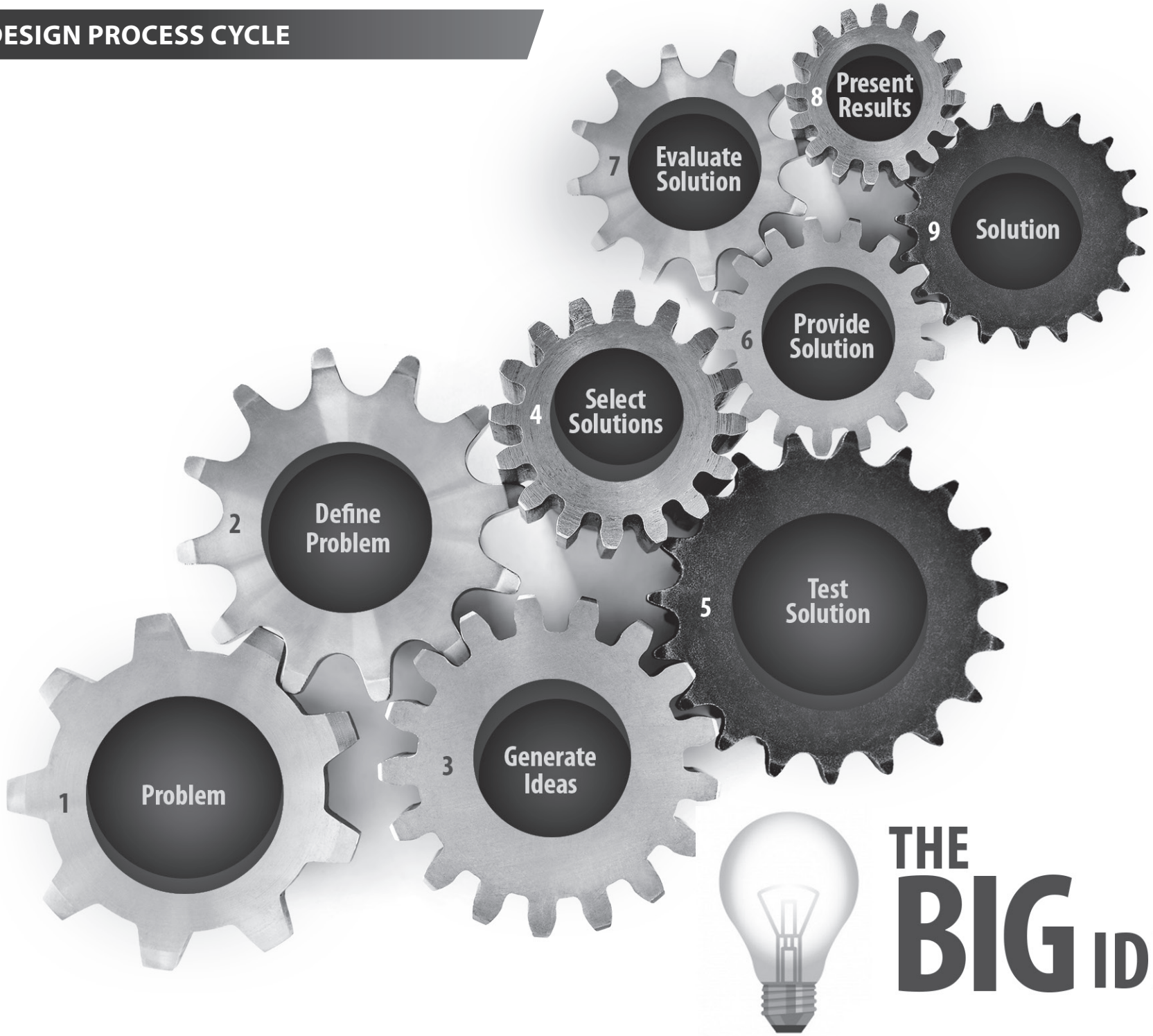
GUIDANCE TO THE TEACHER

Project-Based Approach

This curriculum will employ a 'project-based' approach in which students learn through the completion of assigned tasks. The aim is to give students a more active engagement in their learning and to promote a deeper understanding of the content being studied. The curriculum suggests activities that are centred on a design innovation; in which students conceptualize their own designs and choose suitable materials and processes by evaluating what is available, affordable and usable. Through the project design process students should become aware of how the Science, Technology, Engineering and Mathematics (STEM) concepts, principles and techniques are connected to (and used in) the development of their product or solution. Students should not be limited to a particular concept, but should be encouraged to brainstorm all possibilities and use the recommended processes outlined in this curriculum to create the product. The students will, therefore, be guided through the design process to analyse a situation, problem or need; design a workable solution, and construct, modify or implement the solution. Additionally, students should be encouraged to evaluate the design, based on established standards and market trends, and make modifications where necessary. Students will be encouraged to practice safety, give due regard for the environment. Teamwork is an essential skill; therefore, the students should be encouraged to work effectively in teams as the activities are designed to simulate the work environment. Teacher and students should explore career opportunities associated with the skill sets being developed and explore ways to market their products and/or skills, and also to make meaningful associations with the business community.

The development of competencies in the use of tools and equipment, as well as practising safe working habits, is important and must be emphasized throughout every activity. It is recommended that students be guided in brainstorming a range of solutions to the outlined problem or need, and as a class, shortlist no less than three (3) possible solutions for development and construction.

DESIGN PROCESS CYCLE



THE BIG IDEA

OVERVIEW OF GRADE 7 SUBJECT CONTENT

Industrial Techniques

TERM 1
Unit 1

Exploring Resource and Technology

- What are resources
- How important are resources to everyday life
- Classification of Resource
  - **o Human**
    - Skilled. semi-skilled, unskilled, professional
    - The importance of human resources
    - Identifying and working with human resources
  - **o Non-human**
    - Renewable resources
    - Non-renewable resources
    - Resource conservation
- What is Technology?
  - **o Classification of technology**
    - Simple technology
    - Advanced technology
  - **o The impact of technology on modern society**
  - **o Advantages and disadvantages of technology**
  - **o Safety in the use of the resource and technology**

TERM 2
Unit 3

Communication through graphics and designs

- Elements of design
- Principles of design
- Design drawing types
  - **o Sketches**
  - **o Working drawings**
  - **o Presentations drawing**
- Design Drawing Styles
  - **o Orthographic**
  - **o Pictorial**
    - Perspective
    - Isometric
    - oblique
- Developing and communicating design
- The Design Process
  - **o Identify problem or need**
  - **o Generate ideas**
  - **o Select solution(s)**
  - **o Test solution(s)**
  - **o Make the product or solution**
  - **o Evaluate product or solution**
  - **o Present results**

TERM 3
Unit 5

Energy and Sources of Electricity

- Definition of energy
- Classification of energy
  - **o Renewable**
  - **o Non-renewable**
- Sources of energy
- Electrical energy
  - **o Production**
  - **o Storage**
  - **o Distribution**
- Basic electrical circuits
  - **o Elements /components of electrical circuits**
  - **o Types of circuits**
- Basic electrical measurements and calculations
  - **o Voltage**
  - **o Current**
  - **o Resistance**

Roles of forces, velocity and gravity in design solution

Industrial Techniques

TERM 1
Unit 2

Introduction to tools and equipment

- Discovering tools and their purposes
- Power systems
  - **Hand**
  - **Pneumatic**
  - **Electric**
  - **Hydro/heat**

- Classifications of hand tools
  - **Layout tools**
  - **Cutting tools**
  - **Boring and drilling tools**
  - **Percussion tools**
  - **Abrading and scraping**
  - **Holding devices**
  - **Finishing tools**

- Introduction to power tools
  - **Portable power tools**
  - **Stationary power equipment**
  - **Safety in using tools and equipment**

Maintenance of tools and equipment

TERM 2

- The Design Brief
  - **Situation**
  - **Functions**
  - **Resources**
  - **Technology**
  - **Safety, health and environmental**
  - **Concerns**

Unit 4

Selecting and working with resources

- The properties and use of :
  - **Wood**
  - **Metals**
  - **Plastics**
  - **Composite materials**
  - **Smart materials**

- Waste Handling and Management
  - **Disposal**
  - **Recycling**
  - **Health safety and the environment**

GRADE 7

RESOURCE & TECHNOLOGY

INDUSTRIAL TECHNIQUES

TERM 1 | PROJECT 1

Pet Housing and Feeding Unit

WHAT IS BEING ASSESSED?

Pet Housing and/or Feeding Unit

SCIENCE

- Apply Scientific investigative Principles
- Know and apply safety procedures during practical activities
- Classification of matter and materials
- Examine properties of matter and materials
- Examine principles of resource conservation

TECHNOLOGY

- Measure and layout the work correctly
- Selecting material according to purpose
- Accurately calculate the required materials and associated time
- Plan and sequence the work activities in a logical order, using a variety of ICT media
- Formulate audio/visual presentations of project
- Use hardware and software tools to conduct research
- Identify and describe careers related to technology

MATHEMATICS

- Understand and use units of measurement
- Perform conversions within units of measurement
- Calculate perimeter and area of figures
- Construct (using appropriate instruments):
  - Lines and line segments
  - Perpendicular and parallel lines
  - Line bisectors

ENGINEERING

'E' Design Process

Define problem *by exploring the contexts within which the problem exists*

Generating ideas *by examining the problem and desired solution*

Select solutions *based on exploration of resources, efficiency, and cost among other factors*

Test the solution *by examining model, checking online sources, or analysing research findings*

Provide/produce solution *focusing on safety, accuracy and efficiency*

Evaluate solution *against the original/modified problem, plan or design*

Present results *clearly and accurately using ICTs where necessary*

PROJECT 1

Title: Pet Housing and/or Feeding Unit

Duration: 12 Weeks (at least 1 hr. per week)

Associated Units: Unit 1 - Exploring Resource and Technology
Unit 2 - Introduction to tools and equipment
Unit 3 - Communicating through graphics and designs (limited introductory aspects)
Unit 4 - Selecting and working with resources

"THE BIRDHOUSE PROJECT"

Description of the Project

The 4-H club at Green Acres High school has decided to embark on a fund raising venture to help students purchase material and equipment for their practical exercises. They have approached the local hardware which placed an order for 100 birdhouses, based on growing demands from the people of the recently built housing scheme. The task for the students is to derive simple, innovative and practicable solutions that will appeal to the customers and utilize eco-friendly material that is safe for the animals that they will house

This project should involve the use of whatever materials are at the students' disposal, bearing in mind that the solution must be cost effective and environmentally safe. This activity is intended to expose students to the possibilities that exist in the field of designing and environmental protection, while developing student's basic manipulative skills when the processes of cutting, fitting and overall assembly of the solution are carried out. It is also expected that students will begin to realize or see the direct link between scientific principles, mathematical calculations, technological infusion and the application of research in determining basic solutions to everyday tasks, problems or needs.

ABOUT THE PROJECT

In this project students will design and create a housing and/or feeding unit for a pet. The students are expected to explore a range of locally available and environmentally friendly resources and choose the most appropriate material for the project. Student will then select the most appropriate technology to complete the project. It is anticipated that the students will be introduced to the available resources from which they can choose. Through guidance from the teacher and with peer collaboration, students are expected to explore the available technologies at their disposal as well as the principles of design and construction of projects in order to complete the assigned task. Ultimately, the choice of material(s) will also determine the type of tools students will use for completion of each project tasks. Problem solving skills should be emphasised and students should be assessed based on their competencies in the selection of resources and technology, the ability to conceptualise and design, the ability to use tools and equipment and observation of standard safety and environmental practices in the working environment. It is also anticipated that students will develop competency in working in groups, as well as in product development and marketing. While developing the necessary skills to justify and articulate the science and math principles utilized in their designs and construction of their final project solutions preferably in a real life context.

During the teaching and learning process, teachers and students should explore associated career choices, entrepreneurial opportunities and the infusion of information and communication technologies. It is recommended that competency based education and training (CBET) methodologies be employed in the teaching and learning process.

RANGE AND CONTENT

Students will develop knowledge and understanding by learning:

1. The standard health and safety procedures in the work environment.
2. Classification of resources.
3. Classification of common physical technology.
4. Categorizing and selecting appropriate material to provide solution to problems
5. The importance of technology in the development of projects or ideas.
6. Existing and emerging careers in project development.
7. Career and Entrepreneurial opportunities associated with the development of the project.
8. Classification or types of hand and power tools.
9. Standard procedures and practices:
    a. Care and maintenance of tools and equipment.
    b. Use of tools and equipment.
    c. Safety in the work environment
10. Sources of power for tools and equipment.
11. Basic drafting and designing principles.
12. Assembly and fitting procedures and principles.

PROJECT TITLE: PET HOUSING AND FEEDING UNIT

Prior Learning

Check that students:

- Have some knowledge and understanding of materials
- Understand basic uses of hand tools

STRAND 1 CREATIVITY AND INNOVATIONS	STRAND 2 EXPLORE METHODS AND PROCEDURES	STRAND 3 APPLY SOLUTIONS	STRAND 4 CAREER PATHWAYS
Conceptualize and produce design solutions for the project. Evaluate the products based on cost, quality and efficiency in production/assembly	Undertake tasks with increasing competence in the use and care of tools and equipment. Identify materials and resources required after giving consideration to quality, efficiency, safety and environmental factors.	Create designs to communicate ideas for the solution as well as evaluate and modify designs based on critiques and group discussions. Apply a sequenced approach to the development and construction of project.	Demonstrate acceptable behaviour in working individually and in teams. Demonstrate awareness of career choices/occupations regarding activities.

ICT ATTAINMENT TARGETS:

DESIGNING AND PRODUCING - Use technology to design and produce multimedia products to demonstrate their creative thinking.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING - Use technology to develop a logical process for decision making and problem solving.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:

Students will:

- Design a solution based on the problem or concept
- Evaluate designs using the design process
- Modify designs if necessary after evaluation exercises
- Demonstrate freehand sketching principles in the drawing of design solutions
- Create simple two dimensional sketches or drawings of the proposed project
- Identify available resources and materials to carry out the given tasks
- Select appropriate resources best suited to complete assigned tasks by conducting basic analyses of their physical/chemical properties.
- Justify the choice of selecting particular resources to be used in the completion of the project
- Differentiate appropriate resources with consideration to project needs/ problem.

OBJECTIVES CONT'D:

Students will:

- Demonstrate competence in the care and maintenance of hand tools and powered equipment.
- Select the appropriate hand tools to be employed in the completion of tasks.
- Select appropriate portable power tools that may be employed in the completion of the task.
- Apply appropriate safety practices in the execution of the sequence of work
- Use hand tools and portable power tools safely, accurately and efficiently.
- Carry out basic calculations of the quantity of material needed to complete the project.
- Apply appropriate dimensions/measurements for the project solution.
- Assemble components in a logical sequence to complete the project.
- Use appropriate information and communication technologies (ITC's) to illustrate design and construction processes.
- Estimate accurately the cost required to complete project.
- Conduct online research of similar projects developed to include the outcomes of the development of said projects.
- Compare finished product with other products with respect to cost, value and quality.
- Justify the choice of materials and resources with due diligence for the environment as well as the animals the project is designed for.
- Connect technological applications in society to the design and construction of the tasks
- Identify career pathway associated with completing this project.
- Work individually and or in groups to undertake the project or activity.

SCIENCE STANDARDS:

Students will use scientific knowledge to select appropriate experimental methods.
Understand the scientific process, and the impact of air and water on the environment, and on our everyday life.
Understand the importance of energy in our everyday life, and the need for grouping things.

MATHEMATICS STANDARDS:

Students will use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.
Students will explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

TECHNOLOGY STANDARDS:

Students will develop an understanding of the role of society in the development and use of technology.
Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
Students will develop an understanding of and be able to select and use manufacturing technologies.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
PLANNING		
• Examine the stated problem, need or scenario and brainstorm to identify possible solutions by: ✔ Exploring the human, non- human, renewable and non-renewable resources available to produce the project solution ✔ Discussing the technologies and selecting the most appropriate and efficient technologies that are available. Using the Internet to conduct research in order to outline current and emerging trends in technology for completing similar tasks. ✔ Exploring the range and classifications of tools needed to complete the project or solution.	• Conceptualize solutions through group discussions and exploration of material and resources • Organize work activities for accuracy and efficiency of production • Use search engine • Calculate required materials, resources and associated costs with respect to proposed solutions	Group/peer interaction/activities observed to ascertain effectiveness of teamwork and group dynamics among students. Questioning techniques used to determine students' ability to plan effectively. Rubric used to quantify and qualify students' competence in planning and logistics.
DESIGNING		
• Create design drawings using a systematic approach and outlining the proposed solution using: ✔ Orthographic sketches or ✔ Pictorial sketches • Insert a table in a word processing application to create a material list of the resources needed to complete the project. Save the document in a properly labelled folder for further retrieval and updating. This folder will be used for adding other portfolio items. • Use the Internet to search for key terms such as 'careers in drafting', 'careers in design', and 'careers in engineering'. Student will cite the sources of information found on the internet. After which discuss careers in drafting, design and engineering and associate the careers discussed with the design and construction of the project.	• Read and interpret drawings • Design and draw solutions to problem • Insert tables • Save file in folder • Use search engine • Research • Cite sources • Conceptualize designs and implement flow of work toward desired outcome	Students observed individually or in groups as they execute designing and drafting exercises as well as critique or justify designs. Rubric used to prove students' designing and drafting skills meet competency standards.

Students will:

- Critique the proposed designs of the pet housing and feeding unit in peer groups and class discussions and justify their designs culminating in a re-modelling or revision where necessary.
- Measure and layout the parts or components of the design solution and make modifications where necessary as they evaluate their own progress.

EXECUTING

- Execute practical operations with tools provide. Use image capturing device to record each step then later transfer images to folder on computer.

Steps:

- Indicate dimensions or points on material where cuts or other processes will be done using appropriate measuring, marking and layout tools
- Make the necessary cuts in the material, avoiding unnecessary wastes.
- Assemble the parts/components (without fasteners or adhesives) to verify accuracy of the dimensions or cuts made.
- Evaluate assembled project and make modifications if/where necessary
- Re-assemble or finish the project using the necessary fasteners and adhesives.
- Apply the necessary finishes or finishing to the assembled project painting, spraying or by any other appropriate method of applying finishing materials.
- Students will compile a portfolio of the designs/modifications made to indicate increasing competence.
- Use images captured to create a document outlining the steps taken. Each image should have a suitable caption and a description of the process or step that was applied at each stage.

- Capture images
- Transfer images between devices
- Measure and layout accurately and efficiently
- Calculate accurately with respect to cost, time and material
- Assembly components accurately, efficiently and safely
- Modify processes and practices to increase efficiency and accuracy of production
- Collaborate effectively with supervisors and peers
- Insert illustrations

Students observed individually or in groups as they execute tasks:

- ✔ Using tools and equipment
- ✔ Practicing health, safety and environmental protection habits
- ✔ Evaluating and modifying as work progresses
- ✔ Finishing given tasks to approved standards

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria

Students will:

EVALUATING

- Test project for accuracy and workability.
- Evaluate project against design criteria
- Observe the rules and procedures of working within the environs of the classroom/lab alongside their peers.
- Discuss the importance of efficiency of operations, quality assurance, aesthetic appeal, patent of design and product marketing.
- Evaluate solution against original or modified design
- Critique process and make recommendations
- Assess finished product and redesign as is necessary to modify solution
- Test solution for accuracy, durability and market readiness

Rubric (observation, checklists and/or Rating Scales) used to qualify students' competence in:

- ✔ Finishing and decoration
- ✔ Evaluating, critiquing and modifying work individually or in peer groups
- ✔ Finishing given tasks to approved standards

Learning Outcomes

Students will be able to:

- ✔ Understand the importance of resources in everyday life.
- ✔ Know the differences between the types of resources.
- ✔ Appreciate the importance of resource conservation in sustaining development.
- ✔ Choose appropriate technology to suit particular situation, problems or needs.
- ✔ Assess the impact of technology to the development of modern society.
- ✔ Appreciate the importance of safety in the use of technology.
- ✔ Appraise the alignment of safety programmes within the working environment to established standards.
- ✔ Demonstrate safety procedures in the use and maintenance of tools and equipment.
- ✔ Differentiate between types of tools
- ✔ Manipulate tools to carry out given tasks in practical operations
- ✔ Use inventory control systems to manage material, tools and equipment.
- ✔ Demonstrate basic understanding of symbols and conventions on working drawings
- ✔ Layout design of project to reflect original or modified project plans
- ✔ Evaluate projects against design criteria
- ✔ Conduct online research for new technologies

Use ICTs to create and manage portfolio to illustrate work done

Points to Note

Teacher/ Instructor must emphasise the design process in the development and construction of project.

It is important that safety is reinforced throughout every activity.

Students should be encouraged to demonstrate appreciation for the protection of environment.

Students should be exploring a wide range of ICT's in the development of designs and project ideas.

It is important to highlight career development and entrepreneurship in the development and marketing of projects and ideas.

Students should be encouraged to practise safe behaviour when using digital media or searching for information on the internet.

Extended Learning

Student will demonstrate understanding or appreciation if they can:

The development of skills and attitudes can be further augmented by the following:

- ✔ Educational excursion
- ✔ Research projects
- ✔ Site visits
- ✔ Use of resource personnel in the related fields (subject matter experts)
- ✔ Design and construction of scaled models (especially of ideas too large to be constructed in real-life)

Resources

- Blank paper
- Hand tools
- Power tools
- Lumber/sheet metal
- PVC plastic
- PPE
- Computers
- Drawing tables
- Internet access
- Fasteners

Key Vocabulary

Design, construction, modelling, drafting, conservation, inventory, marketing, product development, technology, safety, accidents, resources, power, career, occupation, environment, maintenance, dimension, assemble, fasteners, adhesives, evaluate,

Links to other subjects

The elements of this project and the associated units may be linked with the following subject areas and attainment targets:

MATHEMATICS : A.T. 2 – Measurements
A.T. 3 - Geometry

VISUAL ARTS: A.T. 1 – Create and Develop
A.T. 2 – Plan and Design

SCIENCE: A.T. 1 – Exploring Science and the environment

INFORMATION AND COMMUNICATION TECHNOLOGY:
A.T. 2 – Designing and Producing
A.T. 3 - Research, Critical Thinking, Problem Solving And Decision Making
A.T. 4 - Digital Citizenship

GRADE 7

RESOURCE & TECHNOLOGY

INDUSTRIAL TECHNIQUES

TERM 2 | PROJECT 2

Personal Items Holder or Container

SCIENCE

- Apply Scientific investigative Principles
- Know and apply safety procedures during practical activities
- Classification of matter and materials
- Examine properties of matter and materials
- Examine principles of resource conservation

TECHNOLOGY

- Measure and layout the work correctly
- Accurately calculate the required materials and associated time
- Plan and sequence the work activities in a logical order, using a variety of ICT media
- Formulate audio/visual presentations of project
- Use hardware and software tools to conduct research
- Identify and describe careers related to technology

WHAT IS BEING ASSESSED?

Personal Items Holder or Container

MATHEMATICS

- Understand and use units of measurement
- Perform conversions within units of measurement
- Calculate perimeter and area of figures
- Construct (using appropriate instruments):
  - Lines and line segments
  - Perpendicular and parallel lines
  - Line bisectors

ENGINEERING

'E' Design Process

Define problem *by exploring the contexts within which the problem exists*

Generating ideas *by examining the problem and desired solution*

Select solutions *based on exploration of resources, efficiency, and cost among other factors*

Test the solution *by examining model, checking online sources, or analysing research findings*

Provide/produce solution *focusing on safety, accuracy and efficiency*

Evaluate solution *against the original/modified problem, plan or design*

Present results *clearly and accurately using ICTs where necessary*

PROJECT 2

Title: Personal Items Holder or Container

Duration: Weeks 9 (at 1 hr. per week)

Associated Units: Unit 2 - Introduction to Tools and Equipment
Unit 3 - Communicating through Graphics and Designs
Unit 4 - Selecting and Working with Resources

ABOUT THE PROJECT

In this project students will be exposed to a diverse range of materials along with their associated properties and characteristics, while exploring the principles and elements influencing final product design and output. Students are expected to create designs, and through a method of probing and inquiry, develop their designs to construct a personal item holder or container. The tasks they perform will be done through the application of proven problem solving techniques geared towards using a range of locally available and environmentally friendly resources. Also critical to the completion of these tasks is the utilization of the most appropriate technological applications accessible to the students. Through careful monitoring and supervision by their teachers, students' competencies in conceptualizing designs, using tools and equipment and careful observance of standards of safety and environmental procedures in the work environs will be acutely facilitated.

Students' communication and interpretive skills will be further developed and nurtured in a student centred and inquiry based teaching and learning environment. As students discover the various jobs and careers associated with structural design and construction, it is anticipated that students will make the necessary linkages with what is done in order to complete this project and the tasks performed by professionals in the real world of work.

RANGE AND CONTENT

Student will develop key concepts and competencies in

1. Understanding the importance of health and safety when working with resources.
2. Exploring properties and uses of materials.
3. Categorising and selecting appropriate resources to provide solutions to problems/needs.
4. Understanding the differences in tools and equipment.
5. Developing competencies in the use of appropriate tools for the execution of relevant tasks.
6. Applying verbal and nonverbal skills in creating and analysing solutions.
7. Application of the design process in planning and executing tasks.
8. Analysing the environmental impact on the use of materials and resources.
9. Exploring waste management and its impact on the environment.
10. Application of finishes (aesthetic appeal).
11. Comparing modern practices to traditional (previous) practices.
12. Develop awareness of (emerging and existing) career opportunities associated with the development of the project.

Prior Learning

Check that students:

- Have some knowledge and understanding of materials
- Possess basic knowledge of the uses of hand tools

PROJECT TITLE: PERSONAL ITEM HOLDER OR CONTAINER

STRAND 1 CREATIVITY AND INNOVATIONS	STRAND 2 EXPLORE METHODS AND PROCEDURES	STRAND 3 APPLY SOLUTIONS	STRAND 4 CAREER PATHWAYS
Create unique designs of the personal item holder based on specific elements and principles of design. Explore technological applications in the design and construction of solutions.	Identify materials and other resources required to execute the construction of the proposed solution. Gather and integrate data and images suitable for improving the proposed project.	Follow a logical/systematic flow in the execution of necessary tasks to complete/construct the personal item holder. Evaluate the outcome of the personal item holder against established standards in terms of quality, cost and functionality.	Discuss career opportunities that are associated with the design and construction of the personal item holder. Collaborate effectively in teams/ groups and simulate real world work environments.

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING- use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:

Students will:

- Apply appropriate safety practices in the execution of the sequence of work
- Identify available resources and materials to carry out the given tasks
- Examine the various methods used to safe guard how personal items are secured in the home, school or other live/working environments
- Select types of materials best suited for constructing item holders by analysing physical/chemical properties
- Outline the methodology to be applied in the execution of the given tasks
- Select the appropriate tools and equipment to be used to undertake the task
- Use hand tools safely and correctly in executing the various processes or operation in completing the project tasks
- Examine the range of construction processes to be used to accomplish the task
- Illustrate the process to be employed in the design and construction of the required project

OBJECTIVES CONT'D:
Students will:

- Compare various chemical and physical properties of the selected materials used to construct the project.
- Justify the choice of selected materials based on their properties
- Identify/list the range of tools that are appropriate for the construction of the given project
- Create unique design of the personal item holder based on the core principles and elements of design
- Create two and three dimensional sketches or drawings of the proposed project
- Identify the design principles to be utilized in order optimize the use of space, form, function and aesthetic value of the holder
- Prepare a list of hand tools and machines to be used at each stage of operation in the design and construction of the project
- Assemble the components in an effective and efficient manner
- Evaluate product against established design criteria
- Identify career pathway associated with completing this project.
- Work individually and or in groups to undertake the project or activity.

SCIENCE STANDARDS:
Students will use scientific knowledge to select appropriate experimental methods.
Understand the scientific process, and the impact of air and water on the environment, and on our everyday life.
Understand the importance of energy in our everyday life, and the need for grouping things.

MATHEMATICS STANDARDS:
Students will use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.
Students will explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

TECHNOLOGY STANDARDS:
Students will develop an understanding of the role of society in the development and use of technology.
Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
Students will develop an understanding of and be able to select and use manufacturing technologies.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
PLANNING		
• Conduct a research to develop safety guidelines to be observed when using tools and materials at varied stages of project's execution. Create a safety chart on the computer incorporating images, text and colour. • Investigate and present an orally report on the classification of materials by highlighting the origin and structure and properties/characteristics of the materials. Types of materials to be examined wood, metal, plastic and smart materials. Use internet to conduct further research on the classification of materials. Create a multimedia presentation to illustrate information gathered from research. • Explore with a number of personal and domestic items utilized in the home and classify the items using a method of grouping to be determined through group discussions (for example, texture, use, shape or quantity of items). • Explore or examine various methods of storing personal and domestic items at different locations in the home, with regard to the type of material(s) from which the containers are constructed. • Take a number of items to class and select the most appropriate materials to make the container or holder base on the shape, size, use and material composition of the items selected. From the methods of storing personal and domestic items make a list of the most suitable type(s) of materials to make a holder/ container for the selected items.	• Create and format documents • Conduct electronic search • Create and format multimedia • Conceptualize solutions through group discussions and exploration of material and resources • Calculate required material, resources and associated costs with respect to proposed solutions • Organize work activities for accuracy and efficiency of production • Probe a range of available resources • Categorize materials and choose the most appropriate	List of personal items found in the home (for example in the bathroom, bedroom and kitchen) hygienic significance Research shows evidence of classification and properties of materials using both online and offline resources

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
DESIGNING		
• Select a category of personal items used in the home and ask students to suggest the most suitable method and type of material(s) to store or display items in a safe and communally hygienic manner. • Research the items selected giving consideration to material, purpose, size, shape and factors relating to environmental and scientific warnings. • Create freehand sketch design(s) of personal item holder/ container with emphasis on how the items will be stored in a safe and hygienic manner or displayed for ease of access by users. • Design and complete all drawings in two and three dimensional formats utilizing both manual and digital methods to formulate or conceptualize design (use of computer aided drafting and designing software and hardware tools). • Represent sketches and drawings of their designs on plain uncoated paper, grid sheet or digital templates with correct annotations to be determined by the students	• Conceptualize designs and implement flow of work toward desired outcome • Design and draw solutions to problem • Use hardware and software • Use digital drafting tools • Read and interpret drawings	Designs created adhering to the principles and elements of design
EXECUTION		
• Select an existing personal items holder/container and ask student to critique their design, highlighting specific principles and elements of design, students will make notes of their observations. • Use electronic or online sources to conduct research on other designs. Create a typed report of designs found in the research, including images as well as detail of the design elements used. Identify and outline the main considerations of existing	• Measure and layout accurately and efficiently • Calculate accurately with respect to cost, time and material • Conduct electronic search • Type report • Represent ideas	Working drawings developed to specify appropriate width, length, height and any other main dimensions critical for the project's complete construction Develop and create a project profile which will highlight key or main stages to complete the project to include for example sketches, working drawings, design specification sheet

designer's work/products with emphasis on specific principles and elements important to the creation of those designs. Students should closely scrutinize/analyse the number of components/parts, shape and size, colour and texture, and the type of material(s) infused in the item's design.

- Present information on how the principles and elements of design aids in the functionality and output efficiency of a product (Audio/visual presentations).
- Develop a process flow sheet/chart to track their future progress of work/tasks to signal coverage of points of completion and outline the steps/stages and processes that are necessary/ required to create/construct a fully functional item holder/ container.
- After consultation with teacher, students will decide on the type of material(s) they will use to construct the holder/ container. To justify their selection students will create a multimedia presentation highlighting the specific benefits of the material(s) selected based on the materials physical and chemical properties.
- Determine the shape, size and the number of items the holder/ container will store or display by developing a design specification table of the project's width, height, length, colour, range/type of materials and capacity (to be done based on project functionality/purpose).
- Construct the project in an agreed time (set deadline) determined by both the teacher and students. The teacher will help students select the best tools (manual and portable) to be used at different stages of constructing the project relating to basic operations for: measuring and layout; cutting and modifying; and application of finishes

- Assemble components accurately, efficiently and safely
- Modify processes and practices to increase efficiency and accuracy of production
- Collaborate effectively with supervisors and peers
- Conduct electronic search
- Type report
- Use hand tools safely and efficiently
- Apply finishes skilfully and evenly

Make the item holder/container within the prescribed time and according to the specifications developed using a range of hand and portable tools in a safe manner

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: • Discuss and probe the various career pathways that are aligned and associated with the design and construction and fabrication of materials industry guided by the teacher and use of electronic databases or other online sources. • Join and assemble all the parts/components of the personal item holder/container by an approved method using hand tools and other fastening adhesives and fittings • Apply finishing material(s) such as paint or other surface protection material by using the appropriate tools or equipment giving due consideration to health and safety practices as well as environmental standards.		
EVALUATION • Compose a diagrammatic reflective journal highlighting the most impactful information identified and skills utilized to complete the proposed personal item container and holder. The journal should include design sketches and drawing and actual photograph of the complete project. Through peer to peer evaluation students will assess each other work and suggest two ways of improving a future design. • Mount or display completed projects in a designated area of the classroom/lab/school and perform peer group critiques based on pre-established criteria with a view for students to suggest at least one design change to improve the function or aesthetic merit of the other individuals'/group project. Capture Image of projects, post to class blog, allow students to post critiques and rate projects based on a given rubric.	• Evaluate solution against original or modified design • Critique process and make recommendations • Assess finishes product and redesign as is necessary to modify solution • Test solution for accuracy, durability and market readiness • Post comments	Rubric (checklists and/or Rating Scales) used to qualify students' competence in using of hand tool and quality of work based set of preset criteria agreed on by teacher and students

Learning Outcomes

Students will be able to:

- Demonstrate how the properties of a material can be manipulated to improve effectiveness and efficiency as well as the quality of the product.
- Appreciate that design principles and function can improve the functionality of a project.
- Identify and use basic hand and portable tools safely.
- Carry out basic operational processes such as cutting and measuring.
- Represent designs on paper and digital platforms.
- Develop basic two and three dimensional drafting skills.
- Perform basic estimates of quantities of material needed for completion of solution based on design specifications.
- Recognize the discrete stages in the construction of a project/product.
- Construct/assemble solution to meet design criteria/specifications.
- Begin to make informed project assessment/evaluation.
- Use online and offline resources to investigate existing designs
- Collaborate online to critique projects
- Capture and upload images of projects

Points to Note

Determine the number of students to be engaged in the activities (whether major task will be done individually or in groups).

Identify limitations with respect to size and overall capacity of the project.

Range and availability of resources to be used.

Safety of students working with materials, tools and among peers.

Channelling/honing students' creative ability in design tasks.

Collaborative/peer group interactions among students.

Students should be encouraged to practise safe behaviour when using digital media or searching for information on the internet.

Extended Learning

Investigate what are composite materials and how they are used in the small project construction, building and general construction fields.

Improve on the existing design of project.

Developing a care label and/or user manual for the project, based on the type of material used and function of item.

Resources

- Material for example: wood, plastic, glass
- Hand and portable tools
- Internet
- Multimedia devices
- Paper
- CAD software
- Computer
- Books
- Adhesives and fasteners
- Finishing materials

Key Vocabulary

Characteristics
Drafting
Two dimension/ three dimension
Properties
Physical
Chemical
Software
Adhesive
Modify
Finish
Finishes
Environment

Links to other subjects

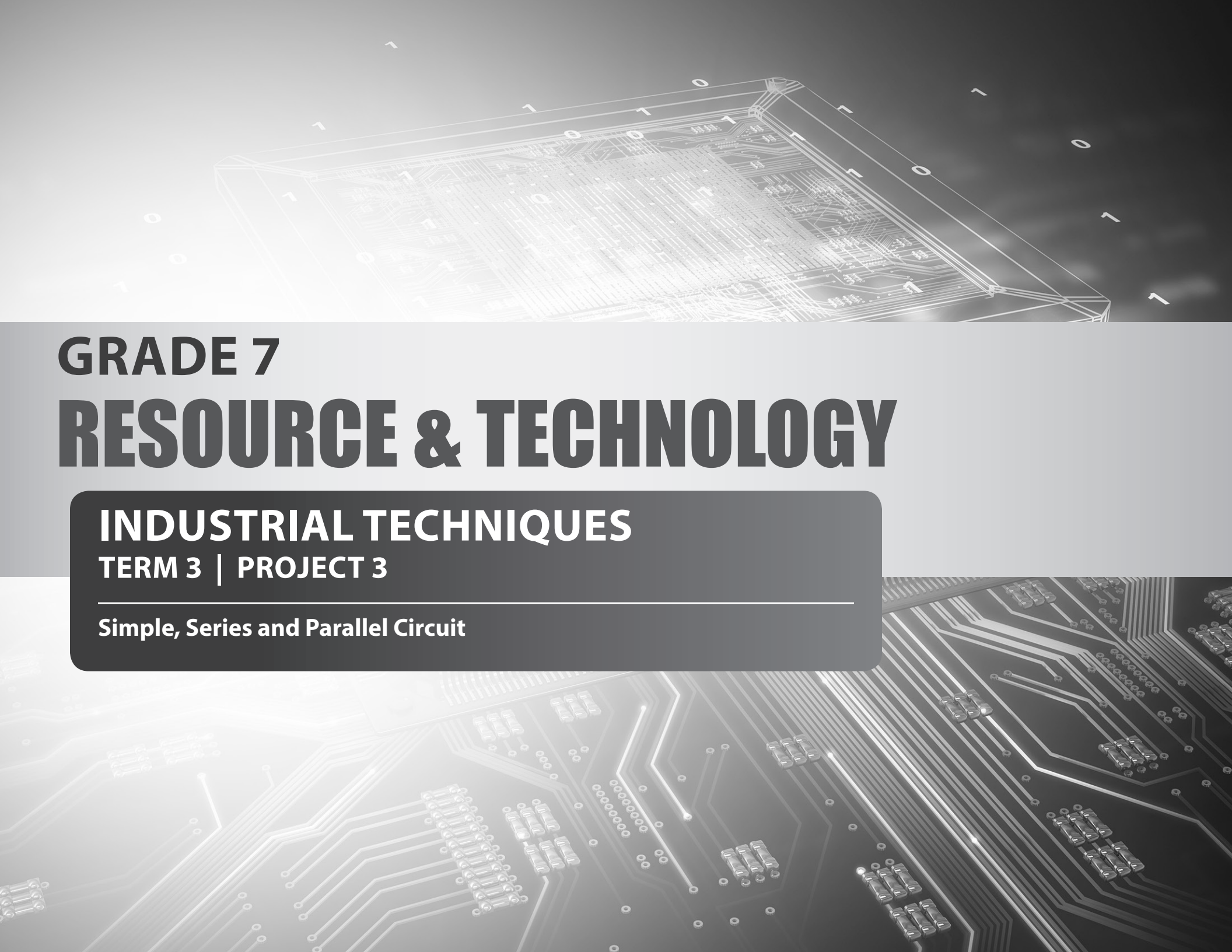
The elements of this project and the associated units may be linked with the following subject areas and attainment targets:

MATHEMATICS : A.T. 2 – Measurements
A.T. 3 - Geometry

VISUAL ARTS: A.T. 1 – Create and Develop
A.T. 2 – Plan and Design

SCIENCE: A.T. 1 – Exploring Science and the environment

INFORMATION AND COMMUNICATION TECHNOLOGY:
A.T. 1 – Communication and collaboration
A.T. 2 – Designing and Producing
A.T. 3 - Research, Critical Thinking, Problem Solving And Decision Making
A.T. 4 - Digital Citizenship



GRADE 7
RESOURCE & TECHNOLOGY

INDUSTRIAL TECHNIQUES
TERM 3 | PROJECT 3

Simple, Series and Parallel Circuit

SCIENCE

- Apply Scientific investigative principles
- Demonstrate and apply safety procedures during practical activities
- Examine properties of matter and materials
- State an example of each form of energy (chemical, electrical, thermal, light, sound etc.)
- Identify the energy conversions occurring in some devices (e.g. flashlight, radio, iron, motorcar etc.)
- Distinguish between renewable and non---renewable sources of energy
- Identify two advantages and two disadvantages of renewable and non-renewable sources of energy
- Evaluate the importance of alternative energy to Jamaica and the Caribbean
- Describe ways in which alternative energy is harnessed

WHAT IS BEING ASSESSED?

Creation of a Simple Circuit

TECHNOLOGY

- Measure and layout the work correctly
- Accurately calculate the required materials and associated time
- Plan and sequence the work activities in a logical order, using a variety of ICT media
- Formulate audio/visual presentations of project
- Use hardware and software tools to conduct research
- Identify and describe careers related to technology

ENGINEERING

'E' Design Process

Define problem *by exploring the contexts within which the problem exists*

Generating ideas *by examining the problem and desired solution*

Select solutions *based on exploration of resources, efficiency, and cost among other factors*

Test the solution *by examining model, checking online sources, or analysing research findings*

Provide/produce solution *focusing on safety, accuracy and efficiency*

Evaluate solution *against the original/modified problem, plan or design*
Present results *clearly and accurately using ICTs where necessary*

MATHEMATICS

- Interpret and use units of measurement
- Perform conversions within units of measurement
- Compare two quantities using ratios;
- Divide a quantity in a given ratio;
- Identify quantities in proportion.
- Construct (using appropriate instruments):
  - Lines and line segments
  - Perpendicular and parallel lines
  - Line bisectors

PROJECT 3

Title: Simple Series Parallel Circuits

Duration: 9 Weeks (1 hr. per week)

Associated Units: Unit 1 - Exploring resource and technology
Unit 2 - Introduction to tools and equipment
Unit 3 - Communicating through graphics and design
Unit 5 - Energy and Sources of Electricity

ABOUT THE PROJECT

In this project students will design and create electrical circuits. The students are expected to explore a range of locally available and environmentally friendly materials and select the most appropriate technology to complete the electrical circuit. It is expected that the students will be introduced to available resources or materials and components of their choice and the available technology at their disposal highlighting the principles of design and construction of electrical circuits. Problem solving skills should be emphasised and students should be assessed based on their competencies in the selection of resources and technology, the ability to conceptualise and design basic electrical solutions; the ability to use tools and equipment and to observe standard safe and environmentally conscience practices in the learning/working environment. It is also anticipated that students will develop competency in working in groups, as well as in product development.

During the teaching and learning process, teachers and students should explore associated career choices, entrepreneurial opportunities and the infusion of information and communication technologies in electrical technology field. It is recommended that the design process and competency based teaching and assessment methodologies be employed in the teaching and learning process as students apply the principles of energy, work and current flow.

RANGE AND CONTENT

Student will develop key concepts and competencies in

1. Safety precautions when working with electricity
2. Definition and classification of Energy (Renewable and Non-Renewable)
3. Key terms and concepts related to energy, work, conductors, control devices and circuit design
4. Type of energy sources
5. Basic Electrical circuits: Series and Parallel
6. Open and closed circuits
7. Conductors and insulators
8. Circuit design and functionality
9. Production, Storage and Distribution of Electrical Energy
10. Possible Careers in the Energy and Engineering sectors

Prior Learning

Check that:

- Students are familiar with the materials required for circuits
- Students have a basic idea of the concept of electricity and energy

PROJECT TITLE: SIMPLE SERIES PARALLEL CIRCUIT

STRAND CREATIVITY AND INNOVATIONS	STRAND EXPLORE METHODS AND PROCEDURES	STRAND APPLY SOLUTIONS	STRAND CAREER PATHWAYS
Select from a range of alternatives, the most appropriate designs for the circuit Explore electrical circuit technological applications as a viable solution to a number of problems/needs.	Apply safety procedures with regards to working with electricity and circuits. Create designs for electrical circuits as a solution for a range of problems/situations/needs. Use tools and equipment with increasing competence and skill when constructing simple circuits.	Interpret a design brief for the circuits Select appropriate materials and tools to construct the circuits Identify parts of a circuit. Perform independent tasks required to complete the electric circuits.	Discuss /identify jobs associated with working with electricity and circuitry. Work collaboratively in teams and simulate real world work environments.

ICT ATTAINMENT TARGETS:

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

RESEARCH, CRITICAL THINCKING, PROBLEM-SOLVING AND DECISION MAKING- use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:
Students will:

- Define the term circuit
- Identify the types of circuits
- List the basic components of the circuit
- State the properties of energy
- Name types of energy sources
- Draw simple diagrams to illustrate the layout of the circuits
- Differentiate between an open circuit and a closed circuit
- Use basic hand tools to construct circuits
- Select the appropriate tools to make the circuit
- Identify instrument(s) to test electrical quantities in any given circuit
- Identify the most appropriate materials to construct the circuit

OBJECTIVES CONT'D:
Students will:

- Compare materials used as conductor and insulator
- Calculate the quantity of materials required for construct the circuit
- Manipulate tools to cut, connect and terminate electrical components
- Demonstrate appropriate safety precautions associated with the construction of circuits
- Conduct testing of electrical quantities at different points in the circuit
- Critique the assembly of circuits for neatness, accuracy and functionality using a prescribed checklist.
- Explain how electrical energy is generated and distributed to end user
- Identify career pathway associated with completing this project.
- Work individually or in groups to undertake the project or activity.

SCIENCE STANDARDS:
Students will use scientific knowledge to select appropriate experimental methods.
Understand the scientific process, and the impact of air and water on the environment, and on our everyday life.
Understand the importance of energy in our everyday life, and the need for grouping things.

MATHEMATICS STANDARDS:
Students will use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degree of accuracy.
Students will explore paths, geometric shapes and space and make generalization about geometric relationships within the environment.

TECHNOLOGY STANDARDS:
Students will develop an understanding of the role of society in the development and use of technology.
Students will develop an understanding of the role of troubleshooting, research and development, invention and innovation, and experimentation in problem solving.
Students will develop an understanding of and be able to select and use manufacturing technologies.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria

Students will:

PLANNING

- Observe a basic picture of a simple circuit and ask if they know what it is? What it represents? Give clues as necessary
- Demonstrate an electric circuit using Jamaican coins or any other object of a similar size. Guide students if needed to: choose a member from the group to be the battery, to form a circle, join hands and pass coins around in the circle. Ask students to explain the human model: battery (pump- power source), wires (conductor –flow of charged particles), coins (charged particles)
- Explain that the circle represents a circuit or a path. (Note: The word circuit comes from the Latin circuitus, which means "to go around.") . An electric circuit therefore is a continuous path of charged particles.
- Brainstorm a range of possible solutions and derive a concept for the application of a simple circuit by:

✔ Exploring the human, non- human, renewable and non-renewable resources (for example load, conductor or source) available to construct simple circuit

✔ Discussing the accessibility of simple construction technologies and selecting the most appropriate and efficient technological method readily available. Using the Internet to conduct research in order to outline current and emerging trends in technology for completing virtual circuit design

✔ Exploring the range and classifications of tools and equipment needed to complete electrical circuits. Given a list of hand tools students will research the names of each tool using both online and offline source, write a brief description of the tools identified and include the tool's main use. Student will classified the range of tools based on their use(s) under the following headings/ groupings: measuring, cutting, striking, holding and boring tools. Select one tool from each of the tool groups and produce a labelled drawing of each tool selected.

- Observation of components
- Explore range of available material to be selected to complete assigned task
- Discuss with peers and supervisors the best approach to complete assigned tasks
- Use search engines
- Organize for efficient use of time and resources
- Plan work schedules

Outcome of research undertaken demonstrates understanding of current and emerging trends simple circuit technology

Students will:

✔ Compile a list of safety guidelines to be observed, when using hand tools and materials at varied stages of the project's execution and final evaluation. Students will collaborate to create two charts highlighting:

A. A list of safety guidelines to be observed using tools and materials
B. A list of procedures to be observed for personal and environmental safety

- Shown a number of pictures and images illustrating the following forms of energy: mechanical, chemical, radiant (solar), electricity, sound, heat and nuclear. Students will research the sources of energy that are classified as renewable and non-renewable using offline and online sources. At the end students will compile a list of the above-mentioned sources and write brief description of each source investigated.

- Classify the following actions/circumstances according to potential and kinetic energy sources: Water behind a dam, truck rolling down a hill, water falls, a parked motor vehicle on a hill, wound clock spring, gasoline or sugar can, clock hands moving, moving car and flexing muscles. Use a table to represent the information as shown below eg.

Potential Energy	Kinetic Energy
a. Water behind a dam	a. Falling water

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: **DESIGNING** • Create design drawings using a systematic approach to develop proposed simple circuit solutions using: ✔ Schematic diagram ✔ Simple line diagram The sketches should include all the proposed components to be used to create the simple circuit • Create a material/component list of the resources needed to complete the electrical circuit based on the proposed schematic or line diagrams • Discuss careers in electricity and electronics Technology, and engineering concepts. Use the internet to conduct research then type a report on existing and emerging careers in electricity and electronics technology. Associate the careers discussed and researched with the design and construction of electrical circuits. • Discuss and critique circuit designs in peer groups and justify their designs culminating in a re-modelling or revision of the circuit's components where necessary.	• Design circuits to solve problems or needs • Draw simple schematic diagrams for electrical circuits • Read and interpret drawings • Conduct electronic search • Type report • Compute • Calculate electrical values and material needs	Design drawings created meets set criteria for the proposed simple circuit Outcome of research undertaken demonstrates understanding of careers in connection with project
EXECUTING • Students will execute practical operations with tools provided. Steps: - Measure and layout the parts or components of the electrical circuit and make modifications where necessary as they evaluate their own progress. - Indicate dimensions and other processes that will be done using appropriate measuring, marking and layout tools and equipment.	• Read and interpret drawings • Measure and layout components according to schematic diagram • Assemble components parts accurately and safely • Evaluate work as assembly progresses	Observations indicate students' competence in: ✔ Using tools and equipment ✔ Practicing health and safety tasks in working with chemicals (wet-cell batteries) ✔ Evaluating and modifying as work progresses ✔ Finishing given tasks to approved standards

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will: - Assemble the parts/components according to schematic drawings/diagrams. - Evaluate assembled simple electrical circuits and make modifications where necessary. - Assemble the parts/components according to schematic diagram of series and parallel circuits - Students will compile a portfolio of pictures and/or diagrams on the production, storage, and distribution of electricity. Students should create a digital portfolio to represent the information	• Modify as is necessary to achieve desired results • Record progression of work activities • Collaborate with teammates and supervisors	
EVALUATING • Test circuit for accuracy and workability. • Evaluate circuit against design criteria using a rubric with establish criteria such as: - Correctness of the drawn circuit - layout and measurement - Connecting and terminating components • Observe the rules and procedures of working within the environs of the classroom/lab alongside their peers. • Discuss the importance of efficiency of operations, quality assurance.	• Analysis of finished products discuss possible alternatives to design and workflow • Predict outcomes • Modify as is necessary following careful evaluations	Rubric (checklists and/or rating scales) demonstrates students' competence in: ✔ Planning and execution ✔ Evaluating, critiquing and modifying work individually or in peer groups Complete programme to acceptable standards

Learning Outcomes

Students will be able to:

- Explain the importance of energy in everyday life.
- Recognise the difference between the types of energy
- Differentiate between non-renewable and renewable energy
- Identify the sources of energy
- Choose appropriate technology to suit particular situation, problems or needs.
- Assess the impact of modern technology to the development of project solutions
- Explain the importance of safety in the use of technology as well as working with electricity.
- Follow safety procedure in the use and maintenance of tools and equipment as well as working with electricity.
- Differentiate between types of circuits :
    - Simple
    - Series
    - Parallel
- Choose appropriate tools to assemble electrical circuits
- Manipulate basic hand tools with increasing efficiency and skill to assemble electrical circuits.
- Read and interpret symbols and conventions of schematic diagrams.
- Layout design of circuits according to schematic diagrams.
- Evaluate assembled circuits against design criteria.
- Research current and emerging careers in electrical technology and electronics then present finding in a typed report.

Points to Note

It is important that safety is reinforced throughout every activity.

Teacher must emphasise the design process in the development and construction of electrical circuits.

Students should be encouraged to demonstrate appreciation for the protection of the environment.

It is important to highlight career development and entrepreneurship in the development and marketing of projects and ideas.

Students should be encouraged to practise safe behaviour when using digital media or searching for information on the internet.

If students are holding the copper wire on both ends of the battery it could burn the tips of the fingers.

Students should never experiment with electricity from a wall outlet because it could be fatal.

Extended Learning

The development of skills and attitudes can be further augmented by the following:

- ✔ Educational excursion
- ✔ Research projects
- ✔ Site visits
- ✔ Use of resource personnel in the related fields (subject matter experts)
- ✔ Design and construction of scaled models.

Resources

- Electrical Components
- Hand tools
- Electrical Multi Meter
- Switches
- Electrical Cable
- Computers
- Internet access
- Cardboard
- Personal protective equipment

Key Vocabulary

Design, construction, conservation, inventory, technology, safety, accidents, resources, power, career, occupation, environment, maintenance, dimension, assemble, evaluate, circuit, parallel, series, voltage, schematic, insulator, conductor, load, motor, solar, resistance, current, electricity, distribution, generator, energy, transformer, wiring, electrocution.

Links to other subjects

The elements of this project and the associated units may be linked with the following subject areas and attainment targets:

MATHEMATICS : A.T. 2 – MEASUREMENTS

VISUAL ARTS: A.T. 1 – CREATE AND DEVELOP
A.T. 2 – PLAN AND DESIGN

SCIENCE: A.T. 1 – EXPLORING SCIENCE AND THE ENVIRONMENT
A.T. 3 - ENERGY MATTERS

INFORMATION AND COMMUNICATION TECHNOLOGY:
A.T. 2 –DESIGNING AND PRODUCING
A.T. 3 - RESEARCH, CRITICAL THINKING, PROBLEM SOLVING AND DECISION MAKING
A.T. 4 - DIGITAL CITIZENSHIP

GRADE 7
RESOURCE & TECHNOLOGY

BUSINESS BASICS
GRADE 7 UNITS OF WORK

BUSINESS BASICS CONTENT OUTLINE

TERM 1	TERM 2	TERM 3
Unit 1: **Inventions in Resources & Technology used in Business Environment** • Definition of terms e.g. resources, technology, human resources, non-human resources, • Inventors and innovators of business machines • Safety practices employed in the use of machines • Relationship between resources and technology • Role of resources and technology in business operations • Types of resources and technology utilized in the business environment • Classification of resources • Classification of technology • Difference between human and non-human resources • Advancements/improvements made to business resources • How machines work • Calculation timelines for the development of various office equipment and tools Conversion of time lines/ century, decade, years etc. • Ordering elements in historic sequence	**Unit 1:** **Safety Management in the Business Environment** • Importance of safety procedure when using equipment/material • Effects of air pollution • Environmental factors • Natural disaster • Calculation of distance using units of measurement (centimeter, meter) for safety zones, machines etc. • Conversion of unit of measurement • Definition of Safety Management • Reasons businesses adopt Safety Management Systems • Occupational Health and Safety (OHS) Legislation • Benefits of OHS • Procedures for handling injury in the workplace • Documents used to manage safety in a business • Personnel /agencies designated to manage/ promote safety in the workplace and community • Careers associated with safety management	**Unit 1:** **Resources used in Production** • Definition of terms production, land (natural resources), Labour (human resources), capital resources, enterprise, goods, services • Factors of Production (natural resources, human resources, capital resources, enterprise) • Types of renewable and non-renewable resources used in businesses • Classification of human resources (unskilled, semi-skilled, skilled, professional) • Types of capital resources employed in businesses (Fixed capital, working capital) • Types of energy • Conversion of unit of measurement • Consumer arithmetic (fraction percentage, mark-up

TERM 1	TERM 2	TERM 3
Unit 2: **Safety and Hygiene in the Business Environment** • Definition of terms – safety , hygiene, hazards, personal hygiene • Importance and benefits of a safe and hygienic environment • Safety and hygienic signs and symbols to safeguard against hazards • Importance of personal hygiene in a business environment • Maintaining personal hygiene in a business environment • Impact of personal hygienic in a business environment • Observe rules and procedures for working collaboratively • Importance of safety procedure when using equipment/material • Effects of air pollution on the business environment • Environmental factors on the business environment • Natural disaster on the business environment • Calculation of distance using units of measurement (centimetre, meter) • Conversion of unit of measurement	**Unit 2:** **Utilizing Resources and Technology to Create Products** • Role of an office in a business • Types of tools and equipment used to perform office functions • Types office stationery (materials) • Function/Purposes/Uses of resources (tools, materials and equipment) • Guidelines for safe handling and hygienic use of materials, basic tools and equipment i • Calculation of total cost, General • Consumption Tax (GCT) and discount	**Unit 2:** **Protection and Conservation of Business Resources** • Definition of terms: conservation, protection, ergonomics, office layout, discarded, recycle/ reuse, waste • Standards for establishing an office environment to ensure increased productivity and protection of employees • Features of an ergonomically friendly business office • Appropriate furniture and equipment to create an ergonomically friendly business environment • Advantages and disadvantages of an ergonomically friendly business environment • Appropriate layout of an ergonomically friendly business office • Conservation methods employed in the business environment, • Methods of reducing, reusing and recycling discarded materials in a office environment • Economic benefits of practising conservation in the business office

GRADE 7
RESOURCE & TECHNOLOGY

INVENTIONS IN RESOURCES AND TECHNOLOGY USED IN BUSINESS

TERM 1 | UNIT 1

INTEGRATING STEM IN THE R&T LESSON

SCIENCE

- Inventors and innovators of office equipment and tools
- How office machines work (energy/forces)
- Safety practices employed by businesses
- Technological advancement in machines
- Careers of inventors of machines

MATHEMATICS

- Calculation timelines for the development of various office equipment and tools
- Conversion of timelines/ century, decade, years etc.
- Ordering elements in historic sequence

Evolution of Resource & Technology used in Business Environment

Design an equipment/ tool that could be used in a Business to improve efficiency

TECHNOLOGY

- Calculating, converting, cutting, stapling, manipulating
- Presenting, designing

'E' DESIGN PROCESS

- Identify problem that exist in using any office equipment
- Brainstorm to create solution to problem
- Conduct research to identify suitable equipment and tools make recommendation to solve existing problem
- Make or redesign a product
- Evaluate the efficiency or productivity of equipment and tool to a business
- Present the findings

ABOUT THE UNIT

The unit introduces students to the resources and technology invented for use in the business environment. They will examine the definitions of the terms resources and technology in a business context and identify the types utilized in business. Additionally, they will explore the advancements that have been made and evaluate new features and functions as well as the skills and knowledge that are required to utilize modern equipment. Students will also develop an understanding of the relationship between resources and technology and their contribution to business activities. They will use their creative and innovative abilities to suggest developments to resources that will satisfy needs or solve some basic problems experienced by businesses.

RANGE OF CONTENT

What are the key concepts, skills and knowledge students will learn in this subject?

- Definition of terms e.g. resources, technology, human resources, non-human resources,
- Relationship between resources and technology
- Role of resources and technology in business operations
- Types of resources and technology utilized in the business environment
- Classification of resources
- Classification of technology
- Difference between human and non-human resources
- Advancements/improvements made to business resources

GUIDANCE TO THE TEACHER

A clear distinction should be made between the terms resources and technology. The definitions given in 'Points to Note' section should be adhered to. Focus should be paid to the resources that are used in the business environment and students should be guided to see the relationship between resources and technology. A scenario could be developed to introduce the content for example an individual has decided to set up a business but is unaware of the basics resources and technology that are needed to conduct business operations. The stages of the design process should be utilized to present the content so that students develop the skills of problem solving, planning and evaluating.

If students are asked to conduct an interview, a protocol should be developed with teacher's guidance. The content could include the following:

- ✔ heading (a statement on why the interview is being conducted)
- ✔ title and name of the interviewee
- ✔ date of the interview
- ✔ instructions to the interviewer (opening statements)
- ✔ key questions to be asked (approximately 3-5)
- ✔ space provided for recording the interviewer's comments.

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- date of the interview
- instructions to the interviewer (opening statements)
- key questions to be asked (approximately 3-5)
- space provided for recording the interviewer's comments.

Teacher and students should simulate an interview to ensure that students acquire the appropriate skills for the exercise

UNITS OF WORK | **GRADE 7** | **TERM 1 4 HRS (8 x 30 MINUTES)**

PROJECT TITLE : UTILIZING RESOURCES AND TECHNOLOGY IN BUSINESS

Resource & Technology Standard:

Prior Learning

Check that students are aware of:

- Tasks that are performed in the office environment
- Some basic resources that are required to operate a business
- Definition of business

STRAND 1: CREATIVITY & INNOVATION	STRAND 2: EXPLORING METHODS AND PROCEDURES	STRAND 3: APPLYING SOLUTIONS	STRAND 4: CAREER PATHWAYS
Students will: Create a business solution to satisfy a need or solve a problem Select the appropriate resources to be used in a business from a range of resources	Students will: Gather information about resources and technology that are used in a named business	Students will: Explain the process or steps involved in selecting appropriate resources and technology in a business Categorize resources appropriately	Students will: Identify skills and resources utilized by different occupations Observe rules and procedures of working within a group Participate in group activities Utilize technological applications

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING- use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:

Students will:

- Identify resources and technology that have been invented and utilised in business environment.
- Define terms resources, technology, skills, attitude, human resources, non-human resources, simple resource, traditional resource, advanced resource, invention
- Categorise resources utilized in business (human, non- human)
- Create a timeline to show the development of office equipment and tools.
- Demonstrate the safe use of simple and advance office equipment and tools.
- Discuss advancements made to resources and technology in the business environment which have contributed to efficiency and productivity.
- Differentiate between simple and advanced resource and technology.
- Identify new skills, knowledge and attitudes that are associated with the introduction of modern resources and technology in the business environment.

OBJECTIVES CONT'D:
Students will:

- Explain the scientific process of how machines work
- Discuss the relationship between resource and technology
- Explain how resources and technology are used to produce goods and services
- Evaluate the product to determine its ability to enhance efficiency and productivity.
- Create a new product or redesign an existing equipment or tool to enhance efficiency in a business activity.
- Make presentation on model created

SCIENCE
AT3 Energy and Force – Grade 5
Understand how simple machines work

TECHNOLOGY
T&S Standard 5
Student will develop an understanding of the effects of technology on the environment.

MATHEMATICS
AT1 Number Representation – Grade 6
Use mathematical tools to solve problems involving decimals and fractions and interpret the display correctly.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
View pictures, or video presentation of an environment where business activities are conducted or conduct a tour of the school's office Make a list of the activities observed and the equipment and tools being used to solve problems in a business. Categorize the resources identified in pictures, or during tour under the headings: human and non- human eg. Human resource are individuals engaged in productive activity in the business	• Observe and record • Categorize resources	Resources correctly categorized
Conduct research using internet sources or textbooks and prepare a glossary to define the terms resources and technology, human and non- human resources, simple, traditional and advanced resources innovation, skills and attitude	• Research to gather information and define terms	Glossary of terms
Conduct a research on the use of simple and advanced machine: • Identify the inventor of each machine • Collect pictures or samples and descriptions of generations of business equipment e.g. telephone, computers, typewriters. • State the functions and features of each • How they work eg. (paper scissors, stapler, paper punch and advanced machines e.g. telephone, photocopiers, risographs) • Identify the careers associated with each machine Present findings using various media to enhance the presentation.	• Create and present multimedia presentation	Inventions of business tools and equipment and their functions and features
Create a classification table showing simple and advanced resources and technology used in business	• Classify resources and technology	Classification table showing simple and advance resource and technology

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Students will:		
Calculate the difference in time periods of the developments of selected equipment or machines using information gathered from the research. Convert time periods from centuries or decades e.g. First generation telephones were invented in 1876; second generation 1926. Students tell the number of centuries or decade e.g. half a century or 5 decade.	• Subtract and classify time periods • Calculating, converting, cutting manipulating	Calculation of time periods
Practice the use of selected tools and equipment that are available and observe safety procedures while using resources.	• Research to gather information • Practice safety in the use of resources	Present information on how machines work
Show how identified machine has contributed to greater efficiency and productivity in the office eg. Scissors versus guillotine, typewriter versus printer	• Compare and contrast machine	Efficiency in productivity of machine clearly outline
In groups, conduct an interview with an employee in a business or within the school/community to Identify materials, tools and equipment required to perform business related tasks. Identify also the employee's career , skills, knowledge, attitudes and values associated with the tasks OR conduct a research using textbook, internet sources and identify business related careers, skills, knowledge attitudes and values, materials, tools and equipment required to perform career related tasks	• Construct questions and conduct Interview • Research to gather information • Create and format multimedia presentation	Resources and the skills, knowledge and attitudes utilized by businesses correct definition of resources and technology

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
In groups students examine an existing tool or equipment used in the office environment. Recommend a feature that can be added to the resource to enhance efficiency and productivity or design an equipment or tool that you would recommend to solving the problem identified.	• Create solution • Conduct research • Select appropriate resources	Appropriate feature or design added to enhance efficiency and productivity

Learning Outcomes

Students will be able to:

- ✔ Understand the importance of resources and technology to the business environment
- ✔ Differentiate the classes of resources and technology
- ✔ Demonstrate an understanding of the concept, role and application of resources and technology business environment
- ✔ Understand that human being possess different skills, attitudes, abilities, interests, aspirations, and values
- ✔ Understand the effects of resources and technology on the business processes (efficiency, productivity and careers)

Points to Note

Resource is anything that can be used to produce or create goods and services to satisfy human wants and needs

Technology is the use of knowledge, skills, tools and materials and equipment to solve practical problems or to satisfy a need).

Classification of inventions Resources
Human Resources is the physical and mental efforts of workers and involves knowledge, skills, attitude, values

Non-human or resources tangible or physical items that can be used to produce goods and services. They can be created by man or nature.
Non-human resources in used business are referred to as materials, tools and equipment

Tool: any object designed to do a specific kind of work to which force must be applied manually e.g. such stapler, guillotine, calculator, paper punch

Extended Learning

Have students:
Conduct interview with relatives or friends who are employed in businesses to determine the following:

- Jobs or tasks they perform
- how jobs/tasks are performed
- skills, knowledge and attitudes required to perform tasks using the resources.

interview an adult or family member who works in a business in the community to find out:

- modern tools and equipment have been introduced in their workplaces over the last three to five years
- How their job tasks have been made easier with the introduction of these modern equipment?

Browse and search the internet or textbooks to identify the advancements that have been made to tools and equipment over the last ten years

Points to Note

Equipment any electrical or electronically powered device used to perform complex business related tasks e.g. computer, photocopier ,

Materials any tangible item used with a tool or equipment to create a end product e.g. bond paper , envelopes, folders, treasury tag

Classification of technology

Simple technology: the use of knowledge, skills, and simple tools to solve practical problems or to satisfy a need.

Advanced technology: the use of knowledge, skills and advanced/complex tools and equipment to solve practical problems or to satisfy a need.

Developments in business resources and technology (writing)

feathers → **pens** → **manual typewriter** → **electronic typewriter** → **computer**

Career is a chosen line of work or job performed by a individual as a means of earning a livelihood.

Extended Learning

Resources

Magazines illustrating pictures of resources used in a business, or samples of resources e.g. paper punch, guillotine, envelopes, internet, video presentation, laptop, projector, internet sources, resources persons, field trip

Key Vocabulary

Resources, technology, human resources, non-human resources, tools, equipment, materials, business, simple technology, advanced technology, career, skills and attitude

Links to other subjects

The elements of this project and the associated units may be linked with the following subject areas and attainment targets:

Link with Social Studies Grade 7

Attainment Target 2, 'Diversity, sustainability and interdependence.'

Link with Language Arts: Grade 4-6;

Reading for Information

Link with Social Studies in Grade 1

Attainment Target 1 – The physical environment and its impact**)**

Link with Visual Arts in Grade 3

Attainment Target 1 – Create and Develop

Link with ICT in Grade 7

Attainment Target 2 – The Application of ICT and ICT Careers

GRADE 7

RESOURCE & TECHNOLOGY

SAFETY AND HYGIENE IN THE BUSINESS ENVIRONMENT TERM

TERM 1 | UNIT 2

INTEGRATING STEM IN THE R&T LESSON

SCIENCE

- Features of safety and hygiene found in the working environment
- Impact of diet, exercise, cleanliness and rest on maintaining good health

MATHEMATICS

- Types of geometrical shapes - triangle, rectangle, regular and irregular polygons
- Characteristics of regular and irregular polygons - measurement of size, length, width and congruent
- Classification of polygons - regular and irregular
- Construct safety sign using various shapes and colour

Health & Safety in the Business Environment

Design appropriate safety signs and symbols for a selected manufacturing or service type business

TECHNOLOGY

- Manipulating tools and equipment for cutting, measuring, punching holes, and pasting etc.
- Designing shapes, blending of colours for emphasis, painting, laminating of signs etc.

'E' DESIGN PROCESS

- Identification of problem presented in scenario/ case study or video
- Brainstorming to identify key issues of unsafe or unhealthy practices
- Recommend solutions to connect practices
- Select appropriate solutions
- Evaluate possible solutions
- Present findings.

ABOUT THE UNIT

In this unit students will understand the importance of maintaining a healthy and safe working environment. They will identify workplace hazards and strategies implemented to protect employers, employees and clients against potential risks. They will be able to interpret safety signs and symbols usually displayed in businesses to ensure the safety of individuals. Additionally, students will be taught the importance of maintaining proper personal hygiene and its impact on employee relationships and business efficiency and outputs.

RANGE OF CONTENT

What are the key concepts, skills and knowledge students will learn in this subject?

- Definition of terms – safety , hygiene, hazards, personal hygiene
- Importance and benefits of a safe and hygienic environment
- Safety and hygienic signs and symbols to safeguard against hazards
- Importance of personal hygiene in a business environment
- Maintaining personal hygiene in a business environment
- Impact of personal hygienic in a business environment
- Observe rules and procedures for working collaboratively

GUIDANCE TO THE TEACHER

A scenario introducing the concept of health and safety should be developed. The focus could be on a company having to pay out large sums of money to compensate employees/clients for injuries received on the job due to unsafe and unhygienic practices e.g. spills on floor, faulty structure creating damages, tripping over trailing flex cords electrical cords or a picture illustrating unsafe and unhealthy practices in a business environment. The stages of the design process should be explored so that students develop an understanding of how to identify problems, provide solution, plan solution and evaluate solutions against problem/s identified in the scenario.

A tour should be conduct of the school environment, business, or community to provide them with real life experiences of occupational health and safety practices.
Guidelines for Completing Project:
Students could be asked to do the following:

1. Prepare a scrapbook of safety signs and symbols usual displayed in a business. Students should select a particular business; manufacturing or service oriented and design safety signs and symbols that would be appropriate for that business. A glossary of all sign and symbols should be included. Signs and symbols should be designed using the appropriate geometrical shapes.

2. Develop guidelines to inform employees/employers how to maintain good personal hygiene. Include pictures or samples of articles that should be used to maintain good personal hygiene.

UNITS OF WORK | **GRADE 7** | **TERM 1 5 HRS (10 x 30 MINS)**

Prior Learning

Check that students:

- are aware of safety practices in their environment
- explain the meanings of some safety signs and symbols

UNIT TITLE: SAFETY AND HYGIENE IN THE BUSINESS ENVIRONMENT

Resource & Technology Standard:

STRAND 1: CREATIVITY & INNOVATION	STRAND 2: EXPLORING METHODS AND PROCEDURES	STRAND 3: APPLYING SOLUTIONS	STRAND 4: CAREER PATHWAYS
Students will:	Students will:	Students will:	Students will:
Select the appropriate safety solutions applicable to their business idea conceived.	Gather information necessary to safeguard against risks and hazards in the business environment	Create visual images of appropriate safety and hygienic symbols and manual	Utilize technological applications to complete given tasks Observe rules and procedures for working collaboratively

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

RESEARCH, CRITICAL THINCKING, PROBLEM-SOLVING AND DECISION MAKING- use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:

Students will:

- Define the following key terms: safe, healthy, hygiene, hazards, danger, threat
- Identify unsafe and unhealthy workplace practices
- Identify the features of a safe and hygienic working environment
- State the benefits of maintaining safe and hygienic practices in a business environment
- Discuss the risks associated with an unsafe and unhygienic business environment
- Design safety symbols/signs appropriate for the business environment using various geometrical shapes
- Explain the term 'personal hygiene'
- Discuss the importance of maintaining personal hygiene in the business environment

OBJECTIVES CONT'D:
Students will:

- Suggest strategies for maintaining personal hygiene in the business environment
- Discuss the effects of natural and environmental factors on the business environment

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SCIENCE STANDARDS
AT 2 Grade2
Students will understand the need for taking care of the body, cleanliness and diet
Students will know the effects of air pollution and ways of reducing it

MATHEMATICS
AT. Grade 4
Students should be able to make and explore geometric shapes, polygons, non-polygons and compound shapes and apply knowledge of their properties to problem solving situations

TECHNOLOGY STANDARDS
Standard 8
Students will develop an understanding of design

Standard 11
Students will develop the ability to apply the design process

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Read and discuss scenarios/case study of a company having to compensate workers for damages and injuries received on the job or view pictures of unsafe or unhygienic practices during productive activity Make recommendations for corrective measures in both instances Use dictionary or any other source to define terms presented in scenario/case study healthy, safe, damage, risk, hazard threat, danger etc.	• brainstorm for possible solutions to problems • Examine and analyse situation against standards	Related terms correctly defined * Proposed standards for ensure a healthy and safe environment

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Conduct tour of school premises/business in community and record any unsafe or unhygienic practices observed. Use image capturing device to create digital entitled 'unhygienic practices in my environment' Respond to questions posed regarding the safety and hygienic practices observed in the environment and people in the school or business e.g. Are there garbage disposals? Are they adequate? Evaluate the level of safety in the school environment and the risks associated with each Conduct research online or read textbook and make recommendations to improve unhealthy and unsafe practises observed in the school environment	• Research, interpret and record recommendations to existing problems • Conduct online search for kinds of information	Strategies to maintain safety and health
View power point presentation/video recording or pictures of safety signs and symbols displayed by businesses to ensure a safe and hygienic environment Explain the meaning, purpose, relevance, shapes and colour coding of each sign/symbol Discuss the geometric shape used for each safety signs/symbol viewed and classify shape e.g. regular and irregular polygons	• Encode and decode signs and symbols	Use appropriate safety signs Classification of polygons
Select the appropriate signs and symbols that should be displayed in businesses producing particular goods and services e.g. a business that manufactures stationery use shapes of regular and irregular polygons to design appropriate safety signs/symbols for specialized businesses e.g. manufacturers of stationery, chemicals. Signs and symbols should be created using the appropriate geometrical shapes and according to dimensions Create a glossary of safety signs and symbols	• Provide appropriate solutions • Research and compile terms	Matching of signs with appropriate goods and services Glossary of terms

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Listen to a case study illustrating how poor hygiene impacts staff and client relationship. Discuss the case study and in groups recommend strategies to maintain personal hygiene at the workplace Conduct research online or textbook to define personal hygiene Collect containers or samples of resources used in personal care and outline instruction to use articles.	• Differentiate between right and wrong • Plan, design and create hygiene kit	Collection of resources for personal hygiene
Create brochure, bulletin or poster giving tips on: - the importance of maintaining good personal hygiene - how to maintain personal hygiene in the office Appropriate graphic should be used	• Research and design	Appropriate brochure, bulletin or posters created

Learning Outcomes

Students will be able to:

- ✔ Recognise potential safety and health risks
- ✔ Develop health and safety systems to safeguard against risks and illnesses
- ✔ Use technology to create and format document
- ✔ Create appropriate signs and symbols to ensure health and safety of individuals
- ✔ Apply good personal hygiene to maintain health and well being

Points to Note

Standards for maintaining safe and hygienic business environment

Practice good housekeeping

Store tools and materials appropriately and safely

Label containers

Provide natural and mechanical ventilation

Develop and maintain machinery and tools schedule

Extended Learning

Students could be asked to:

- observe and interpret safety signs, symbols and gadgets in the school and community e.g. silence zone, pedestrian crossing, fire hydrants
- create labels providing warning e.g. poison, fire for use at home or school

Points to Note

Provide adequate lighting

Acquire and use correct tools, equipment and furniture

Proper disposal of waste

Display safety signs and symbols at appropriate location

Extended Learning

Resources

Internet access, computer, case studies, textbooks, magazines, field trips, video recording of interview, resource personnel, waste paper, markers, crayons, scissors, cartridge paper, measuring tools, paper punch and glue

Key Vocabulary

safety, hygiene, hazard, risk, threats, personal hygiene, unhygienic

Links to other subjects

Link with Science Grade 7 AT1 Exploring Science and the Environment
"Appreciate the importance of scientific methods and be aware of safety procedures to be taken when using equipment and materials"

Link with Physical Education Grade 7 AT3 Healthy, Safety & Wellbeing
"know how to take account of their own safety and that of others during physical activity"

Link with Information Technology Grade 7 AT2 The Application of ICT and ICT Careers
"Recognise issues of risks and safety while operating the computer system ".

INTEGRATING STEM IN THE R&T LESSON

SCIENCE

- Importance of safety procedure when using equipment/material
- Effects of air pollution
- Environmental factors
- Natural disaster

MATHEMATICS

- Calculation of distance using units of measurement (centimeter, meter)
- Conversion of unit of measurement

Develop a health & safety policy for their school, clearly outlining how health and safety will be managed

TECHNOLOGY

- Manipulation of tools and equipment to perform the following skills and processes:

  measuring, keyboarding

'E' DESIGN PROCESS

- Identify potential hazards
- Brainstorm and present possible solutions
- Conduct research (OHS) and list reasons why businesses should develop safety management system for implementation
- Evaluate recommendation to determine its suitability to reduce potential hazards
- Present findings

ABOUT THE UNIT

In this unit students will learn about the systems that are employed by the management of a business to safeguard against risks or hazards. They will identify the potential hazards or risks such as air pollution, disasters, ventilation and handling of tools and equipment. In addition, students will identify personnel designated to promote safety in various sectors and conduct research to identify the roles performed by the various individuals. Specific strategies used to respond to potentially dangerous situations when working with resources will also be learnt

RANGE OF CONTENT

What are the key concepts, skills and knowledge students will learn in this subject?

- Definition of Safety Management
- Reasons businesses adopt Safety Management Systems
- Occupational Health and Safety (OHS) Legislation
- Benefits of OHS
- Procedures for handling injury in the workplace
- Documents used to manage safety in a business
- Personnel /agencies designated to manage/promote safety in the workplace and community
- Careers associated with safety management

GUIDANCE TO THE TEACHER

A review of unit 3, term 1 should be done to ensure students understand the concepts related to health and safety for example risks, hazards. At least two guest presenters from agencies that provide support in safety management should be invited to provide information on their role in managing safety as well as the skills and qualification needed for entry into the career. Presenters may be invited from ODEPM, Fire department, police, National Environmental Protection Agency (NEPA) and other organizations.

Guidelines for completing Project

Students could conduct a research to determine if a safety management system is implemented in their schools before attempting the project.
If one exists, they should review same and make recommendation to improve system where necessary. Appropriate application software should be used to present information.

Prior Learning

Check that students can:

- Define key terms associated with safety e.g. risk, damage, hazard
- Explain the meanings of safety and hygienic signs and symbols displayed in the businesses

UNIT TITLE: SAFETY AND HYGIENE IN THE BUSINESS ENVIRONMENT

Resource & Technology Standard:

STRAND 1: CREATIVITY & INNOVATION	STRAND 2: EXPLORING METHODS AND PROCEDURES	STRAND 3: APPLYING SOLUTIONS	STRAND 4: CAREER PATHWAYS
Students will:	Students will:	Students will:	Students will:
Brainstorm possible solutions to avoid damages to workers and equipment	Demonstrate an awareness of safe and hygienic use of tools and equipment	Explain procedures that are used by businesses to prevent potential hazards	Demonstrate an awareness of a range of occupations associated with safety management in businesses
Select from a range of alternatives the most appropriate strategies to respond to potential hazards in businesses.	Gather information about strategies and procedures that are used by various agencies/organization that ensure safety in the business environment.		Observe rules and procedures of working within a group
			Utilize technological applications

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

RESEARCH, CRITICAL THINKING, PROBLEM-SOLVING AND DECISION MAKING-use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:

Students will:

- Define the term Safety Management and Occupational Health and Safety (OHS) and risk assessment
- Discuss reasons why businesses adopt a Safety Management System
- Identify different types of Safety Management strategies
- Calculate distance using millimetres, centimetres, decimetres, and metres of safety zones in a laboratory
- Outline the procedure for handling injury/damage in the workplace
- Develop documents to be used to manage safety in a business
- Identify designated personnel responsible managing health and safety issues in the workplace
- Discuss the role of personnel and agencies to ensure safety in the business environment

OBJECTIVES CONT'D:
Students will:

- Identify careers that are associated with safety management in the business environment
- Design a health and safety management policy for a school

SCIENCE
AT1 Exploring Science and the environment – Grade 7
Students should
- Appreciate the importance of scientific methods and be aware of safety procedures to be taken when using equipment, tools and materials.
- Know the effects of air pollution and ways of reducing it.

TECHNOLOGY
Standard 5
Student will develop an understanding of the effects of technology on the environment.

MATHEMATICS
AT1 Number Representation – Grade 5
Estimate and measure distance, and use these to solve Related problems involving conversion between units of measurements (millimetres, centimetres, decimetres and meters)

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
View a picture(s) online or off line tutorials of workers in a laboratory, office, construction site, hairdressing parlour or conduct a tour of Technical & Vocational Laboratory and conduct risk assessment. Make a list of the possible risks observed and tell what would happen if the risk/hazard occurs In groups conduct research on the impact of risks e.g. air pollution and make recommendations to reduce them	• Research and collate information • from different sources	Assessment of potential hazards or risks

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Conduct a research online or interview a business in the community and record a list of at least four safety management systems that are implemented to ensure safety of property, equipment and personnel in an organization in relation to the risk identified In groups outline at least three reasons why businesses adopt Safety Management Systems and formulate a definition for the terms Safety Management and Occupational Health and Safety (OHS). Each group will make a presentation on one aspect (ethical, legal and financial)	• Research for information • Construct questions to find out • information • Draw conclusions • Research and summarize • information • Formulate definition	Systems to ensure safety in a business Correct definitions
Collect and create a display of samples of documents e.g. brochures, posters or manuals used by businesses to manage safety	• Research and analyse information	Appropriate safety management sample document
In groups conduct an interview with personnel from agencies responsible for managing health and safety in business organizations or research online and make a presentation on the role of agency in managing health and safety in the environment and the activities performed. Use a recording device to capture presentation and playback for discussion NB Agencies could include Fire Services, Red Cross, St. Johns Ambulance, National Environmental Planning Agency (NEPA) , Ministry of Health	• Construct relevant questions to • solicit information • Listen attentively, • summarize information	Role and function of health and safety agencies

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Conduct research online or read textbooks and make a list of the careers that are associated with safety management and the skills and attitudes that are required in business environment	• Conduct research, analyse • information and present findings	Careers (persons) responsible for managing safety and the necessary skills and attitudes
Using the guidelines for occupational health and safety (OHS) conduct visit to a Technical and Vocational Laboratory and use measuring devices (tape measure, ruler) to determine the safety zone for equipment. Convert measurement into various units of measurement (millimetres, centimetres, decimetres and metres.	• Calculate and measure distances	Conversion of imperial measurement to metrics
View video, or picture depicting hazardous waste disposal practices. List various sources of waste pollution observed, their effects, and determine solutions on how these can be alleviated.	• Listing and brainstorming	Identifying pollution and suggesting corrective measures
Write a Health and Safety Policy for their school, describe how health and safety will be managed Outline the responsibilities of school administration, academic, administrative and ancillary staff, students and parents in managing safety Guidelines should include training programmes, safety resources, safety poster, students insurance, sample document to report injury etc.	• Research for information • Collaborate with teammates • Plan and organize	Guidelines to manage health and safety in school to include the responsibilities of the various categories of the school population

Learning Outcomes

Students will be able to:

- Describe workplace procedure for managing health and safety
- Identify and report hazards
- Discuss ways in which workers can participate in Occupational Health and Safety
- Adhere to workplace policies and procedures
- Demonstrate a responsible attitude when performing tasks
- Contribute to health and safety practices at home, school and community
- Respond to hazards, incidents and emergencies

Points to Note

Risk Assessment – a process to identify potential hazards and analyse what could happen if hazard occurs

Potential environmental hazards in business

- Natural hazards such as flood, fire, earthquake, hurricane
- Physical hazards such as equipment breakdown, dangling electrical cords, cords and cables unsecured, wet floors and slippery surfaces
- Stock piled too high or over-stacked shelves
- Manual hazards such as lifting heavy loads
- Environmental hazards such as noise, lighting, uneven floors, excessive dust and heat
- Psychological hazards such as fatigue, harassment, stress
- Spill of hazardous chemical
- Electrical surges & outages

Impact of Hazards on Business operation

Lost sales and income
Increased expense
Customer dissatisfaction
Injury to employees and customers
Business failure

Safety Management provides a systematic way of protecting the organization against undesired damages and risks ensure worker safety and to protect equipment from damage

Extended Learning

Observe activities in their learning environment and identify potential hazards

Record safety hazards in the home and discuss the hazards with parents/guardian and make recommendations to correct the identified hazard.

Visit the websites for the agencies that provide safety management to businesses and research their roles and functions.

Reasons for Safety Management

Ethical – to provide a safe environment for clients, employees and employers

Legal – to avoid lawsuits

Financial – to avoid financial inefficiencies and losses

Safety Management Systems

Work Systems

emergency cut off devices
installation of safety rails on all equipment
train employees in the correct and safe operation of the equipment to increase the space in which employees work to reduce the risk of injury due to cramped conditions.

Worker Systems involves training to:

employees to limit accidents
improve job performance and decision making
encourage employees and management work together to develop safety guidelines that are built upon the decisions workers are faced with on a daily basis

Occupational Health and Safety (OHS) Legislation

Stipulates guideline to ensure safe premises, work, information, machinery personal safety, personal hygiene and grooming, handling and disposal of waste

Personnel Designated to Promote Safety:

Fire fighters, Public Health Inspectors, Medical staff (Nurses, Doctors, Health Aides), Police, ODPEM, Security Guards. Janitors, NSWMA

Career associated with safety Management

Fire-fighters, Doctors, Nurses, Health Aides, Health Inspectors, Janitors, Environmental Specialist, Security Guards

Resources

Internet access, Resource books/CDs, textbook, sample document, brochures, pamphlets, user manuals, recording device, guest presenter, case study, picture, dictionary, measuring tools

Key Vocabulary

hazards, threats, danger, risks, safety fire-fighters, Health Inspectors, Security Guards, Police, Medical staff, disposal

Links to other subjects

Link with Social Studies Grade 8 Attainment Target 2
Develop and understanding of the interdependent relationship between man and his environment

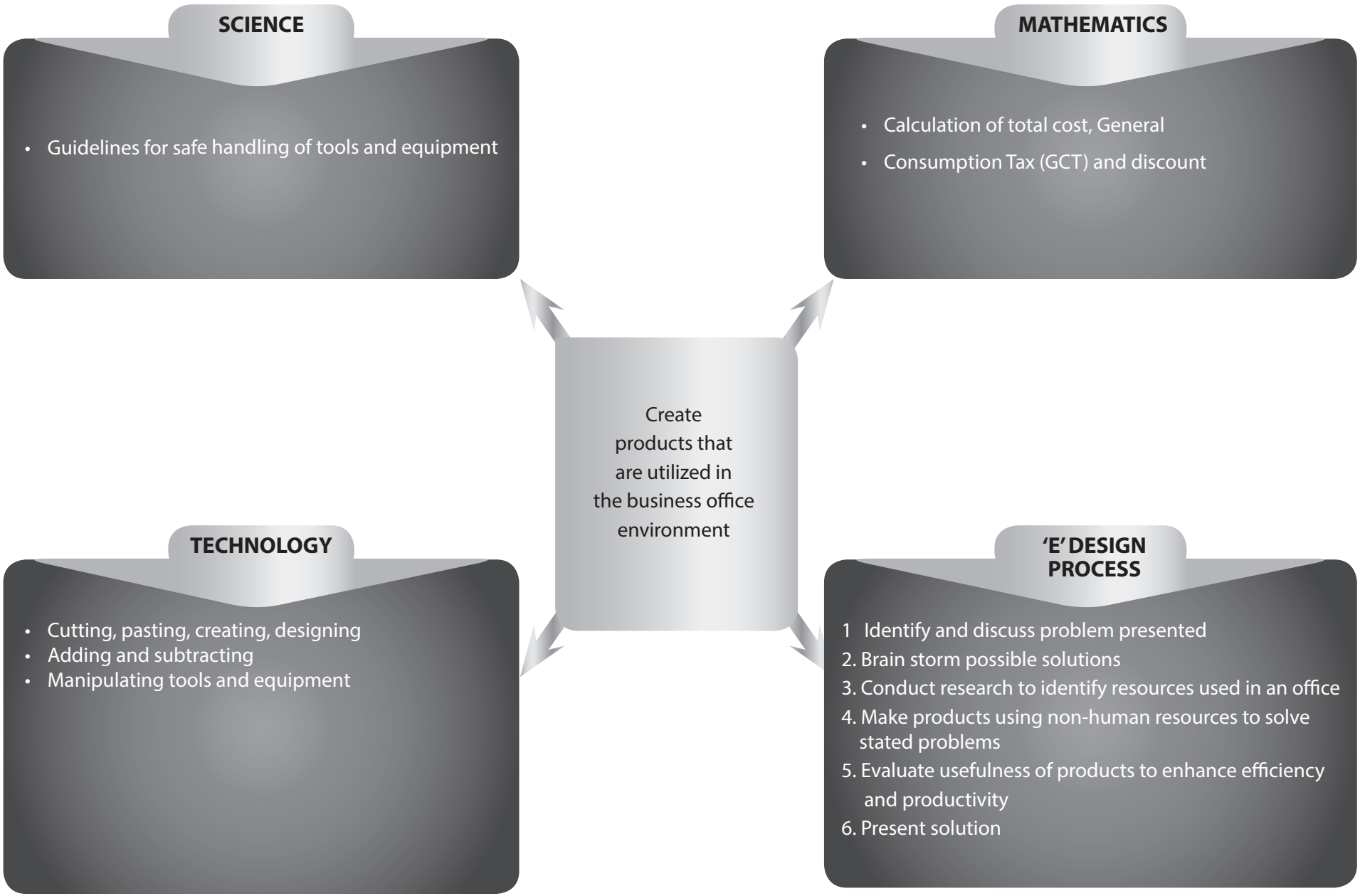
Link to Language Arts Grade 8 Attainment Target 3
Writing: Strand 3 Communication; AT2: Reading; Strand 2: Reading for Information

Link to ICT Grade 9 Attainment Target 3
Research, Critical Thinking, Problem Solving and Decision Making

GRADE 7
RESOURCE & TECHNOLOGY

UTILIZING RESOURCES AND TECHNOLOGY TO CREATE PRODUCTS

TERM 2 | UNIT 2


SCIENCE
• Guidelines for safe handling of tools and equipment
MATHEMATICS
• Calculation of total cost, General
• Consumption Tax (GCT) and discount
Create products that are utilized in the business office environment
TECHNOLOGY
• Cutting, pasting, creating, designing
• Adding and subtracting
• Manipulating tools and equipment
'E' DESIGN PROCESS
1 Identify and discuss problem presented
2. Brain storm possible solutions
3. Conduct research to identify resources used in an office
4. Make products using non-human resources to solve stated problems
5. Evaluate usefulness of products to enhance efficiency and productivity
6. Present solution

ABOUT THE UNIT

This unit focuses on the non-human resources that are used in the office of a business. Students will develop an understanding of the use of basic stationery and how they are utilized efficiently and effectively to carry out business activities. Emphasis will placed on paper and envelope types and sizes and how they are used in the office of a business. They will be given the opportunity to use some of the resources to perform basic skills such as cutting paper to various sizes, mathematical calculations and creation of business documents. These activities will enable them to understand some of the basic tasks that are performed by the different categories and levels of office staff. Students will also be encouraged to demonstrate safe and hygienic awareness in the use of the tools and materials.

RANGE OF CONTENT

Key concepts, skills and knowledge students will learn in this subject

- Types of stationery used to perform office functions
- Types and sizes of paper and envelopes (materials)
- Safe and hygienic use of tools and materials in an office
- Careers associated with the business office and their job functions
- Calculation and conversion of units of measurement (inches, millimetre, centimetre)
- Paper making processes
- Creation of business documents

GUIDANCE TO THE TEACHER

Students should be guided to understand the role the office performs in the day to day operations of a business. If there is an established office in the school, students should be taken on a guided tour to observe the tasks being performed and the tools and stationery used. Samples of stationery should be made available and students perform simple tasks.

Guidelines for completing Project

Students could compile a portfolio using appropriate application software or writing devices to illustrate how stationery is used to enhance efficiency and productivity in an office. The portfolio should contain the following:

- Samples of paper and envelope sizes
- Samples of documents used in business offices

A scoring rubric should be developed to serve as a guideline for what is expected in the final project, including points on which grades can be based.

Prior Learning

Check that students can:

- Identify some basic resources that are used in the office to perform business operations.

UNIT TITLE :MANAGING RESOURCES AND TECHNOLOGY

Resource & Technology Standard:

STRAND 1: CREATIVITY & INNOVATION	STRAND 2: EXPLORING METHODS AND PROCEDURES	STRAND 3: APPLYING SOLUTIONS	STRAND 4: CAREER PATHWAYS
Students will:	Students will:	Students will:	Students will:
Select from a variety of resources, the most appropriate resources to solve an identified problem	Identify tools, materials and equipment to perform tasks Demonstrate awareness of the safe and hygienic use of tools and equipment	Manipulate simple equipment, tools and materials to execute a simple task Differentiate materials, tools and equipment	Observe the rules and procedures of working within a group Identify technological applications for given tasks

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:

Students will:

- Define term stationery.
- Identify various stationery used in business offices
- Explain the process of how paper is made.
- Differentiate among paper types and sizes and their uses in the business office.
- Differentiate among the types and sizes of envelopes and their purposes.
- Sub-divide paper to illustrate various paper sizes as a fraction or percentage of its original using ISO "A" series (A4, A5, A6 etc.)
- Convert paper and envelope measurements from inches to millimetre and centimetre (imperial to metric).
- Select appropriate types and sizes of stationery for a variety of business uses.

OBJECTIVES CONT'D:
Students will:

- Utilize various stationery to create business documents
- Practice safety procedures when using office stationery and supplies.
- Identify careers associated with business offices

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Observe a collection of stationery used in the office from video presentation or from a tour of the school office. Make a list of all examples of stationery observed being used in the video presentation or on the tour of the office.	• Observe and record • Construct question and conduct interview • List types of stationery	Stationery appropriately identified and listed
View video presentation of the process of how paper is made or conduct research on the internet/books on how paper is made. In groups make a presentation on the paper making process using suitable pictures, diagrams, video etc.	• Observe and record • Research to gather information • Present findings	Paper making process
Conduct research (internet or textbooks) on the types of paper and their uses in business offices.	• Collect and examine samples	Paper types and sizes correctly identified
Using samples of paper (legal) students will use ISO measurement to convert the following: Legal paper to letter size; Letter size to A5; A5 to A6 etc. by: - Illustrate through folding the fraction/decimal (A5 to A4, A6 to A4, A8 to A4) of the various paper sizes to the letter size paper using the sample provided. - Affix labels to the sample sheet to show the fraction/decimal	• Measure and fold paper to desired size • Cut paper to desired size • Record fraction/decimal on sample	ISO paper sizes identified Fraction correctly labelled

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
- Adhering to safety regulations use office tools e.g. rulers, scissors or guillotine to measure and cut paper using ISO "A" series (A5, A6 etc.) Use calculator or appropriate software to convert the various paper sizes from inches to millimetre and centimetre.	• Label paper • Measure and cut paper to ISO measurement • Calculating and converting measurement	Conversion of the units of measurement
Create a classification table showing the ISO paper name, measurement in inches, measurement in millimetre, measurement in centimetre, and office uses of the various paper sizes. Samples of the paper sizes should be kept for inclusion in the portfolio illustrating the measurement for the length and width of each paper size.	• Create and populate table	office stationery and their uses correctly classified
Use ruler to measure the various sizes of envelopes in inches and convert them to millimetre and centimetre using calculators or appropriate software. In groups conduct research on the sample envelope assigned by teacher and make presentation on the following: the type of envelope Uses of the envelope Measurement /size of the envelope Use information gathered to prepare a classification table with the following headings: Name of envelope, measurement (mm), Measurement (inches), measurement in(cm) uses of each envelope size and type. Using materials given by teacher design and create an envelope of any design adhering to the relevant safety procedures.	• measure and convert envelopes sizes • Collect samples • Conduct research • Make classification table • Group presentation • Design and create envelope	Envelopes sizes correctly measured and converted to various units of measurement Identification types, size and uses of envelope. Envelopes appropriately designed.

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Using the internet/textbooks conducts research or interview an office worker in their community to determine various office careers and their job functions.	• Construct question and conduct interview • Research and report	Identification of careers associated with the business office and their job functions.
Select appropriate stationery to be used for given tasks (e.g. prepare legal documents, business letters, index cards, short memorandum, complimentary slips, greeting/post cards, wedding invitations, graduation programmes and reports.	• Differentiating and selecting stationary.	Correct stationery selected for given task
Design a portfolio demonstrating the various types and sizes of office stationery (paper and envelopes) and their uses to enhance business processes. The portfolio should contain the following: • Samples of the types of paper and sizes (bond, parchment etc. and C4, C5 etc) • Samples of types of envelopes sizes and sizes showing their measurement in inches, mm and cm (labelled with length and width). • Samples of products created using office stationery (business letters, memorandum, programme, posters, flyers, invitations, business cards, letter heads, envelopes with addresses, complimentary cards, brochures etc.)	• Designing business documents • Collecting samples • Creating portfolio	Presentation of portfolio showing various paper and envelope types sizes and uses. Business document appropriately designed. Conversion of paper and envelopes correctly demonstrated.

Learning Outcomes

Students will be able to:

- Know the various types of stationery used in the office environment
- Explain how paper is made
- Practise safety and hygiene in the use of tools and stationery in the office environment.
- Utilize various stationery to promote efficiency in business operations
- Select the appropriate types and sizes of stationery for a given task
- Create various business products using office stationery
- Perform mathematical operations to convert paper and envelopes sizes from inches to millimetre and centimetre.
- Use fraction or decimal to derive various ISO paper sizes.

Points to Note

Types of Office Stationery include: types and sizes of papers, envelopes, file folders, message pads, note pad, index card

Paper types: bond, parchment, flimsy, copier paper, onion skin

Paper sizes: Legal, letter, A5, A6,A7, A8

Envelope sizes: C4, C3, C5, C6/DL, C7,

Envelopes types: regular, window,

To convert inches to millimetre multiple the number of inches by 25.4

To convert inches to centimetre multiple the number of inches by 2.54.

Extended Learning

Students could be encouraged:

Conduct research to determine the roles performed by an office worker

To interview office staff or relatives and friends to determine the skills and knowledge required by persons who work in an office.

Resources

Internet sources, recording device, Office Administration for CSEC textbooks, samples of paper, envelopes, video presentations, ruler, calculator, markers, crayons, pencils, computer, printer

Teachers should ensure that students practise online safety

Key Vocabulary

Stationery, paper, envelope, inches, centimetre, millimetre, bond, parchment paper, flimsy paper, onion paper, window envelopes, paper sizes (letter size, legal, A5, A6), envelopes sizes (C3, C4, C5, C6/DL, C7).

Links to other subjects

Link with Mathematics in Grade 4, 5 and 7 Attainment Target 1
Number (Number operation and application)

Link with Mathematics in Grade 7 Attainment Target 2
Measurement

Link with ICT in Grade 2 Attainment Target 2
Designing and Producing

Language Arts AT2 Grade 4-6
Research activities on issues and interests by generating ideas and exploring texts using a range of strategies

Link with Science in Grade 3 Attainment Target 1
Exploration, Atice

GRADE 7

RESOURCE & TECHNOLOGY

RESOURCES USED IN PRODUCTION

TERM 3 | UNIT 1


SCIENCE
• Renewable and non renewable resources used in production
• Types of renewable resources e.g. fossil fuel, natural gas
MATHEMATICS
• Conversion of unit of measurement
• Consumer arithmetic (fraction, percentage, mark-up, margins, profits percent)
Select factors of production and apply them to the creation of a product in order to generate income
TECHNOLOGY
• Cutting, pasting, creating, designing
• Adding and subtracting
• Manipulating tools and equipment
'E' DESIGN PROCESS
• Identify a factor of production
• Brainstorm and present possible products to be created
• Analyze a business model for a product creation
• Select factors of production and business model to create the product
• Evaluate the selection
• Present findings

ABOUT THE UNIT

In this unit students will learn about the factors of production that are utilized in the production of goods and service to satisfy needs and want. They will develop an understanding of the relationship among the factors of production. Students will identify the resources available in their immediate community and the Caribbean and the industries which utilize them to provide goods and services to meet consumers' needs and wants. Students will develop skills in identifying and organizing the appropriate factors of production that would be utilized for the production of selected goods or services. They will be able to classify workers according to skill and training required to perform job functions

RANGE OF CONTENT

What are the key concepts, skills and knowledge students will learn in this subject?

- Definition of terms production, land (natural resources), Labour (human resources), capital resources, enterprise, goods, services
- Factors of Production (natural resources, human resources, capital resources, enterprise)
- Renewable and non-renewable resources used in businesses
- Classification of human resources (unskilled, semi-skilled, skilled, professional)
- Types of capital resources employed in businesses (Fixed capital, working capital)

GUIDANCE TO THE TEACHER

Students should be provided with real life experiences to ensure concepts are learnt. They should be provided with the opportunities to interact with their immediate environment to identify the factors of production and observe how they are utilized in the production of goods or services. Where possible, students should be taken on field trips to observe production process. Parents can be invited during instruction to explain their various roles (mental and physical) in a business which produces goods and services. Small groups of students from a class can participate in field trip and provide a report following the experience. Permission can be sought to do a video recording of a production process and students view and give feedback.

At the end of the unit students should complete a project. The suggested project may be modified to suit the students' immediate environment. The students may select any economic activity which interests them but should be one that will satisfy the needs of the immediate community. An appropriate software application should be used to create a flow chart illustrating the business structure. Teacher should guide students to select an appropriate format to do a written presentation. Pictures should be included. A rubric should be developed outlining the requirements of the assignment. This should be given to students as a guide. Samples of the project should be displayed in the classroom.

Prior Learning

Check that students can:

- Identify basic resources used to operate a business
- Differentiate human and non-human resources

TITLE: RESOURCES USED IN PRODUCTION

Resource & Technology Standard:

STRAND 1: CREATIVITY & INNOVATION	STRAND 2: EXPLORING METHODS AND PROCEDURES	STRAND 3: APPLYING SOLUTIONS	STRAND 4: CAREER PATHWAYS
Students will:	Students will:	Students will:	Students will:
Create a business solution to satisfy a need or solve a problem using resources in their immediate or wider community.	Gather information necessary to plan the production of goods or services	Explain the process or steps involved in organizing the factors of production in order to produce a good or provide a service select appropriate factors of production to produce a good or provide a service	Identify skills and resources needed to produce the good/service
Identify the appropriate resources to be utilized in the production of goods and services		differentiate the factors of production	Observe rules and procedures of working within a group
			Participate in group activities

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:

Students will:

- Define key terms production, factors of production, natural resources (land), human resources (labour), capital resources, enterprise, goods and services.
- Identify the factors of production
- Explain the importance of each factor of production.
- Discuss how the factors of production are utilized in the creation of goods and services.
- Explain each category of workers as unskilled, semi-skilled, skilled or professional
- Identify natural resources and their related industries found in their immediate and wider communities.
- Differentiate between renewable and non-renewable resources used in production.

OBJECTIVES CONT'D:
Students will:

- Classify items as renewable or non-renewable resources.
- Convert time for depletion of energy to years, decades and century
- Organize the appropriate factors of production for economic activities
- Explore the skills, attitudes and values required for selected economic activities.
- Create a business model for a product and apply the factors of production to the creation of a product.

SCIENCE STANDARDS AT3 Energy Force and Matter – Grade 5
Understand the importance of energy in our everyday life, and the need for grouping things.

TECHNOLOGY
T&S Standard 1 & 5
Student will develop an understanding of the effects of technology on the environment.
Student will develop an understanding of the characteristics and scope of technology.

MATHEMATICS
AT1 Number Operation and application – Grade 5
Use the correct units, tools and attributes to estimate, compare and carry out the processes of measurement to given degrees of accuracy

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Collect pictures from magazines illustrating business activities or use a sample of the telephone directory or access same from the internet and select ten (10) businesses advertised; five which produce goods and five which produce services and explain the reason for grouping them accordingly. Use dictionary or any other source to correctly define the terms 'good' and 'service'. Select a product from a basket, in groups students record the resources (human, non-human, renewable and non-renewable resources) put into the production of the item to the point of purchase by the consumer. Conduct research on the internet or from textbooks and correctly define each factors of production clearly stating the reward / return for its employment.	• Research for information • Categorise businesses appropriately • Define terms • Classifying the factors of production • Research and define terms correctly	Correct definition of terms 'good' or 'service'. Listing of companies that produce goods and services Correct definition of terms good and service. Classification of factor of production Factors of production correctly defined
Conduct an interview with various categories of workers in the school community e.g. Administrative, ancillary and academic to determine their job functions or tasks and the level of training required to perform duties. Use internet sources or textbooks to define term – skilled, semi-skilled and unskilled and create a table with the heading unskilled, semi-skilled, skilled and professional and categorize the workers under the relevant heading based on the training and job function. Invite Guidance counsellor/resource persons to discuss career opportunities within the various groups of skilled, semi-skilled or professional workers.	• Compile question and conduct interview • Analyse information and discuss job functions • research for information • define terms correctly • plan and organize information • categorize groups appropriately • explain reasons	Terms correctly defined Categorise information appropriately Classification of worker in the appropriate group

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Use an appropriate device to create a video recording or conduct a tour or collect pictures of natural resources found on the school ground or immediate community In groups make a list of the natural resources discovered and discuss their uses, goods or services that are produced from and the industries that utilize them Conduct research online or use textbooks to define terms renewable and non-renewable resources and collect and display samples or pictures of same under the appropriate headings	• Research for information on resources • Plan and organise information accordingly • Organize groupings appropriately	natural resources correctly identified Resources correctly classified as renewable and non-renewable Classification table showing renewable and non-renewable resources
Use textbook or online sources to conduct research on renewable and non- renewable sources of energy. In the research students will determine: • Type of energy e.g. fossil fuel (coal, oil), natural gas, solar • Sources from which they are generated • Estimated length of time for depletion of non-renewable resources • Advantages and disadvantages of the various type of fuel Convert timeline for the depletion of existing sources of energy in years, decade, and century.	• Research for information on resources • Plan and organise information accordingly	Complete project on renewable and non-renewable resource
In groups, select the factors of production that would be required for a specific economic activity for example printing of T-Shirts for sale, grocery store, an internet café. The following should be explained; natural resources to be used should be classified as renewable or non-renewable; jobs functions to be performed should be classified according to skill, attitude and values, skills and attitude, profits to be made (mark-up and margins), pricing. Appropriate application software can be used to create a flow chart illustrating the business process.	• Demonstrate problem solving skills	Economic activity identified, and the factors of production to be utilized for the production, natural resources classified, and jobs listed according to skill, attitude and values

Learning Outcomes

Students will be able to:

- Differentiate between the factors of production
- Understand the role of the factors of production in the production of goods and services
- Organize resources to make a product of service
- Identify natural resources and their related industries

Points to Note

Renewable resources are natural resources that can be used to benefit people and can then be replaced for other people to enjoy.

Non-renewable resources are resources that are in limited supply and cannot be replaced once it has been extracted and used. Non-renewable resources are things that are extracted or mined from the Earth, such as petroleum, coal and metals. Once they are taken out of the ground, they cannot be replaced.

A good is a tangible product.

Service intangible products such as accounting, banking, teaching.

Needs refers to goods and services that are essential to survival eg. Food, clothes , shelter Wants are desire to improving your quality of life eg. Houses, cars, entertainment

Production is the process of using materials (resources, technology) and transforming them to produce goods and services to satisfy human wants and needs.

Factors of production are the resources needed by businesses to produce goods and services. They include natural resources (land), human resources, capital resources and enterprise.

Natural resources – things found on the land, under the earth, sea or in the atmosphere that are used in production

Capital resources refer to wealth that is set aside to further

Extended Learning

Have students research the types of products that are made from nonrenewable as well as renewable resources or how specific products are developed or manufactured from certain nonrenewable or renewable resources.

production machines, equipment used in the production of goods and services or money

Types of capital:

- Fixed capital includes building, machinery etc. that are kept for a long time/used over several batches of production.
- Working capital: money (cash &bank) stocks of materials and goods used for the day to day running of the business.

Human resources refer to the input (mental or physical) man makes towards production

Category of human resources:

Unskilled: jobs that involve very little of no formal training e.g. office cleaners, office bearer, production line worker.
Semi-skilled: person who has partial training in a skill
Skilled: jobs that require a high level of training and experience e.g. Office Clerk, Bank Tellers

Professional: jobs that require a high level of educational qualification e.g. Accountants , Bank Managers

Enterprise: This is the factor that organizes the other factors into a productive unit. The decision on what to produce, how, for whom and where to produce is taken by the entrepreneur.

Resources

Copies of telephone directory, internet access, textbooks, resource personnel, field trips, samples of resources, video, recording device, pictures from magazines

Key Vocabulary

human resource (labour), natural resource (land) , capital resource, enterprise, renewable resources, non-renewable resources, recycle, good, service, unskilled workers, semi-skilled workers, skilled workers, professional workers, fixed capital, working capital.

Links to other subjects

ICT Attainment Target 2 Grade 6
Designing & Producing (Technology Operations and Concepts)

Social Studies Attainment Target 1 Grade 3
Physical Environment and its Impact

Language Arts AT 3 Grade 7-9:
Writing: Strand: Communication Write well-constructed paragraphs which have linking sentences with and between them

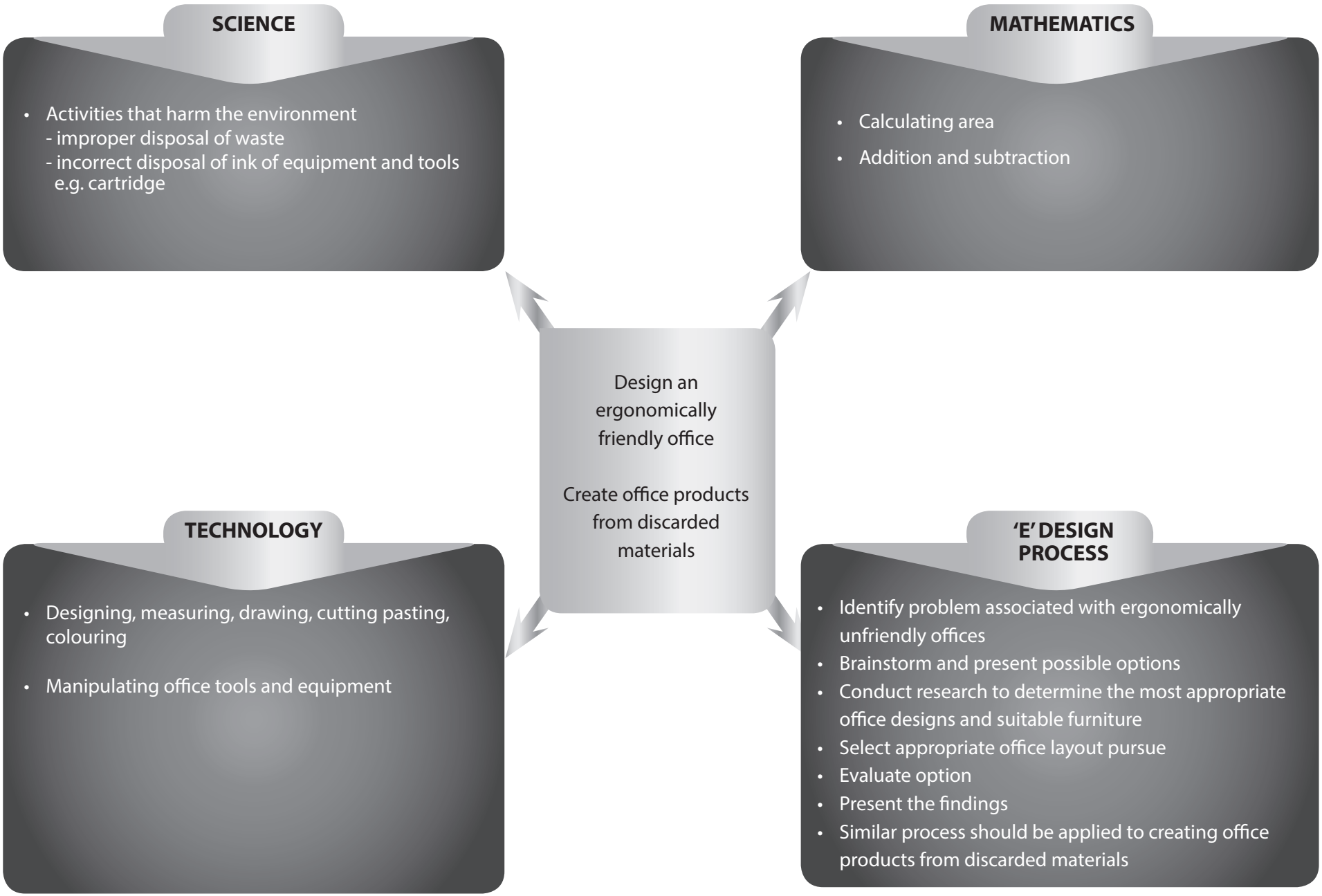
Language Arts AT 1: Listening and Speaking:
Listen to, recall, understand and respond to speakers' messages, whether implicit or explicit

GRADE 7

RESOURCE & TECHNOLOGY

PROTECTING AND CONSERVING RESOURCES IN THE BUSINESS ENVIRONMENT

TERM 3 | UNIT 2


SCIENCE
• Activities that harm the environment
- improper disposal of waste
- incorrect disposal of ink of equipment and tools e.g. cartridge
MATHEMATICS
• Calculating area
• Addition and subtraction
Design an ergonomically friendly office
Create office products from discarded materials
TECHNOLOGY
• Designing, measuring, drawing, cutting pasting, colouring
• Manipulating office tools and equipment
'E' DESIGN PROCESS
• Identify problem associated with ergonomically unfriendly offices
• Brainstorm and present possible options
• Conduct research to determine the most appropriate office designs and suitable furniture
• Select appropriate office layout pursue
• Evaluate option
• Present the findings
• Similar process should be applied to creating office products from discarded materials

ABOUT THE UNIT

The unit is designed to develop students' understanding of the methods of protection and conservation employed by businesses to ensure maximum productivity, economic benefits and the health and safety of its employees. They will learn how businesses create office layouts to ensure the health and safety of employers, employees and clients. Emphasis is placed primarily on protection and conservation of materials, tools and furniture used in the office environment.

The unit also aims at introducing students to the various ways of reducing, reusing and recycling waste that is generated in their homes, schools, and business in their communities. From the basic classroom activities, it is hoped that students will launch a waste reduction programme in their schools.

RANGE OF CONTENT

What are the key concepts, skills and knowledge students will learn in this subject?

- Definition of terms: conservation, protection, ergonomics, office layout, discarded, recycle/reuse, waste
- Standards for establishing an office environment to ensure increased productivity and protection of employees
- Features of an ergonomically friendly business office
- Appropriate furniture and equipment to create an ergonomically friendly business environment
- Advantages and disadvantages of an ergonomically friendly business environment
- Appropriate layout of an ergonomically friendly business office
- Harmful activities carried out in an office that affect the environment
- Conservation methods employed in the business environment,
- Methods of reducing, reusing and recycling discarded materials in a office environment
- Economic benefits of practising conservation in the business office

GUIDANCE TO THE TEACHER

A practical approach should be taken to teaching the unit. If the school has well-established office permission should be sought to have small groups of students visit to observe the layout. Students should be encouraged to share their observations during the course of the instruction to encourage confidence in public speaking and participation. Field trips could also be organized to establish businesses in the immediate and surrounding communities to provide students with real life experience of a modern office layout. Permission must also be sought to visit such offices. Students should be encouraged to prepare a report outlining their observations. This visit can be conducted at any point in the lesson.

Students should be encouraged to collect discarded materials from an office, home, or school and recycle into useful articles e.g. printed paper and use the reverse side to make useful items such message sheet, scrap pads, vases.

Prior Learning

Check that students are aware of:

- Some of the effects to workers if inappropriate equipment and furniture are used to perform tasks in a business
- Some items that are made from recycled materials

UNIT TITLE: PROTECTION & CONSERVATION OF RESOURCES IN THE BUSINESS ENVIRONMENT

Resource & Technology Standard:

STRAND 1: CREATIVITY & INNOVATION	STRAND 2: EXPLORING METHODS AND PROCEDURES	STRAND 3: APPLYING SOLUTIONS	STRAND 4: CAREER PATHWAYS
Students will: Brainstorm to identify appropriate equipment and furniture to create a comfortable working environment Use expressive language to describe the process of creating an ergonomically friendly environment	Students will: Identify the factors which must be considered when establishing an ergonomically friendly environment Use simple tools and materials to create reusable items from discarded materials	Students will: Create a visual image of an ergonomically friendly working environment Explain the steps to recycle discarded materials	Students will: Demonstrate awareness of the range of occupations utilized in the office Identify technological applications in creating a comfortable office environment

ICT ATTAINMENT TARGETS:

COMMUNICATION AND COLLABORATION - Use technology to communicate ideas and information, and work collaboratively to support individual needs and contribution to the learning of others.

DESIGNING AND PRODUCING - use digital tools to design and develop creative products to demonstrate their learning and understanding of basic technology operations.

RESEARCH, CRITICAL THINCKING, PROBLEM-SOLVING AND DECISION MAKING-use appropriate digital tools and resources to plan and conduct research, aid critical thinking, manage projects, solve problems, and make informed decisions.

DIGITAL CITIZENSHIP - Recognise the human, ethical, social, cultural and legal issues and implications surrounding the use of technology and practice online safety and ethical behaviour.

OBJECTIVES:
Students will:

- Define the terms: conservation, protection, ergonomics, layout , discarded, recycle/reuse,
- Outline the standards for creating an ergonomically friendly office environment
- Identify appropriate furniture and equipment to ensure health, safety and increased productivity
- Explain the advantages and disadvantages of establishing an ergonomically friendly environment
- Select appropriate furniture and equipment for an ergonomically friendly business office
- Design a model of a computer workstation
- Discuss activities carried out in the office that affect the environment
- Discuss conservation methods used by businesses

OBJECTIVES CONT'D:
Students will:

- Identify reusable materials that can be converted into efficient used in an office
- Create recycled items for use in the business office
- Discuss the benefits of recycling

SCIENCE STANDARDS

Strand 1 Exploring Science and the Environment – Earth's Resources - Grade 6

Student should recognize how some activities can harm the environment

TECHNOLOGY

T&S Standard 1 & 5

Student will develop an understanding of the effects of technology on the environment.
Student will develop an understanding of the characteristics and scope of technology.

MATHEMATICS

Strand Measurement – Grade 5

Attainment Target: Students should use the correct units, tools, and attributes to estimate, compare and carry out the processes of measurement to given degrees of accuracy

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Participate in a role play depicting employees expressing frustration about the effects of the inappropriate furniture and equipment to their health, safety and productivity or view video recording of an office or any other business environment depicting an ergonomically unfriendly business office Discuss the role play or video recording and identify the ergonomic issues which contribute to workers dissatisfaction. Conduct a research from internet sources or textbook to define the term ergonomics and outline standards for selecting furniture and equipment to create an ergonomically friendly business office	• Dramatize to express ideas • Interpret presentation and discuss problems • Use search engine to perform single topic searches	Students' understanding of the standards for an ergonomically friendly business office environment to ensure performance and productivity definition of the term ergonomics
View pictures or a video recording of different types of office layout and discuss the following: suitability and quantity of furniture and equipment, opportunity for free movement and health and safety issues associated with the layout and choice of furniture and equipment. Discuss the advantages and disadvantages of the different layout and the suitability of the furniture and equipment	• Observe , analyse and make judgement or conclusion	Advantages and disadvantages of proper and improper office layout to workers' health and safety and productivity
Collect photos/pictures online or offline of proper selection and layout of furniture and equipment e.g. workstation setups, keyboards, chairs, desks. Use them to create a layout or design of a computer workstation or small office. Measurements should be indicated in office design e.g. indicate measurement for floor space (length, width, area) or Write a two-page report of the effects of poorly organized office layout on employees health, safety and productivity. Make recommendations for an ergonomically friendly office. Create document using suitable application software	• Conduct research for information • Plan, Design and make model, • Calculation of area • Express ideas in well constructed and logical sequence	Office design including appropriate furniture and equipment showing calculations of area of floor space

Suggested Teaching and Learning Activities	Key Skills	Assessment Criteria
Conduct a research from internet sources or textbooks and develop a manual using suitable application software to provide guidelines for selecting furniture and equipment for a business office Prepare a checklist to evaluate contents of manual	• Research and present guidelines	Identifying appropriate office furniture and equipment with special features to ensure an ergonomically friendly environment
Make a collection collect discarded materials in the home, school, office (environment) In groups discuss how each item can be harmful and recommend ways of recycling/reusing materials or tools for effective use in the business environment create designs and make items that can be used efficiently in the business environment Use dictionary or any other source to identify the meaning of the word 'conservation'	• Plan and design creative and innovative ways or reuse	Models or prototype of items that can be effectively utilized in a business
Write short paragraphs on the economic benefits gained from the reuse of discarded materials or Design a brochure or comic strip to provide information on how to dispose of old or unwanted equipment, materials or tools. Use pictures to illustrate	• Creativity, innovation, plan, discuss, organize, collaborate, • resourceful, evaluate	Tangible items for use in the office e.g. pencil holders made from paper and foil holders, vases made from plastic bottles Benefits of using discarded materials

Learning Outcomes

Students will be able to:

- Know the health issues that can arise as a result of poor ergonomic conditions
- Demonstrate skills to create an ergonomically friendly office environment
- Form opinions and make decisions about how to use resources for environmental sustainability
- Differentiate between reusable and disposable waste
- Understand the potential environmental and economic viability of reusing and recycling
- Create useful articles from discarded materials
- Create document using application software

Points to Note

Definition of ergonomics
Designing and arranging the work environment (furniture, equipment, workstations, ventilation, lighting, layout) to create a safe and comfortable place for employees

Methods of protecting workers' health and safety
Creating an ergonomically friendly office environment which includes Selecting appropriate tools, materials, equipment and furniture, providing adequate space, ramps, monitor screen, emergency exist adequate lighting and proper ventilation

Standards for establishing a suitable office layout (ergonomically friendly office environment) to ensure employees health and safety
Amount of available space, quantity of equipment, type of equipment, health and safety practices, need for privacy

Benefits of an ergonomically friendly office environment
Creates a safe and healthy working environment, Increases productivity, reduces labour turnover, minimizes absenteeism, stress, illness and increases morale

Disadvantages of an ergonomically unfriendly office environment
Eye strain resulting from too much exposure to glare from computer
Back and neck strain resulting from using an inappropriate chair or desk

Extended Learning

Students can conduct research to:
identify appropriate resources (furniture and equipment) to set up an ergonomic computer workstation effects of computer use on eye strain, tendonitis, safety issues e.g. radiation from monitor identify other resources used in a business that can be recycled, how, where and the benefits

Identify how business disposes of old or unwanted electronic equipment without throwing them away.

Points to Note

Methods of conservation used in the business office
Recycling waste materials e.g. reverse side of wasted printed paper to make message pads

Teacher should ensure that students practice online safety and cite sources accurately

Extended Learning

Resources

Computer, Internet access, video recording devices, magazines, waste paper, paper and foil holders, plastic bottles, markers, crayons, coloured paint, samples of discarded materials used in the office, reference text e.g. Office Administration for CSEC textbooks

Key Vocabulary

work environment, ventilation, temperature, office layout, ergonomics, equipment, workstation, discarded, reuse, recycle

Links to other subjects

Link with Visual Arts: AT 1: AT 2: Plan and Design office layout:

Drama: AT 1: Exploring and Creating by thinking critically and use drama to express ideas and explore situations :

Language Arts AT 3: Writing; Grades 4-6; Write well-constructed paragraphs which have linking sentences within and between

APPENDICES

TERMS	DEFINITIONS/MEANINGS
Technology	Means by which knowledge, tools, equipment and materials are creatively utilized to solve practical problems
Module	A component or portion of the subject which can be taught independently of the other components, but is an integral part of the whole subject
Resource	The means or material available to solve a problem
Design Process	A strategy that is utilized to solve a problem or meet a need
Skill	Specific ways and means of using knowledge, tools and materials – things learnt to do
Knowledge	Theoretical and practical understanding of what was taught – new things learnt
Attitudes	Positive behaviours that are displayed e.g. following instructions, working harmoniously with others
System	A set of related parts which work together to accomplish some purpose
Student's Log	An on-going self-assessment record of student's own experiences while working through the subject
Aesthetics	Area of design concerned with how a product looks. Also concerned with making products look attractive
Prototype	An accurate, detailed, working model of a product, showing what the design will look like and sometimes, how it will work

TERMS	DEFINITIONS/MEANINGS
Bond Paper	Bond paper is a strong, durable paper especially suitable for electronic printing and use in office machines for letters, invoices, and in business for printing and communication.
Capital	Refers to wealth that is set aside to further production machines, equipment used in the production of goods and services or money
Conservation	The protection of plants and animals, natural areas, and interesting and important structures and buildings, especially from the damaging effects of human activity
Ergonomics	The scientific study of people and their working conditions, especially done in order to improve effectiveness
Flimsy Paper	This is thin paper used for making carbon copies of a letter
Good	A good is a tangible product
Hazards	Refers to anything which could be dangerous to you, your health or safety, or your plans or reputation
Hygiene	Hygiene is the practice of keeping yourself and your surroundings clean, especially in order to prevent illness or the spread of diseases.
Needs	Needs refers to goods and services that are essential to survival
Office Layout	Office layout refers to the systematic arrangement of office equipment, machines and furniture while providing adequate space to office personnel for regular performance of work.
Onion paper	Onion Skin paper is a light weight typewriter paper use for making carbon copies or for airmail letters.
Parchment Paper	This is a waterproof and grease-resistant paper produced by treating ordinary paper with concentrated sulphuric acid.

TERMS	DEFINITIONS/MEANINGS
Production	This is the process of converting raw materials into finished products. It is the creation of goods and services to satisfy the needs and wants of consumers
Recycle	To treat or process (used or waste materials) so as to make suitable for reuse
Resource	Refers to anything that can be used to produce or create goods and services to satisfy human wants and needs
Service	Service intangible products such as accounting, banking, teaching
Technology	This is the use of knowledge, skills, tools and materials and equipment to solve practical problems or to satisfy a need.
Threats	A statement of an intention to inflict pain, injury, damage, or other hostile action on someone
Wants	Wants are desire to improving your quality of life
Workstation	an area with equipment for the performance of a specialized task usually by a single individual

The 21st century is a time of rapid technological growth and social change. The school curriculum must, therefore, ensure that young people are well prepared for the challenges and opportunities that they will meet as adults in this century. The MoEYI is making every effort to provide for the multiple intelligences of our children and cater to their diverse needs in order to fully maximize their capabilities. Hence, the MoEYI has created alternative pathways to receiving an education at the secondary level.

Providing alternative pathways will be far-reaching in carrying out the Ministry's mantra, "Every child can learn....every child must learn". Learning pathways will allow for an inclusive approach in which instruction is based on tailored curricula, enabling each learner to perform to his/her fullest potential based on aptitude, interest and ability. Alternative Pathways represent a new approach to secondary education. Secondary education in Jamaica is being reframed and re-positioned as customised, diverse, relevant, equitable, outcomes-based, and inclusive; and significantly, this approach will signal the introduction of a seven year (Grades 7-13) period of instruction for students on all secondary pathways.

Goals of the APSE

- Design the school system to offer differentiated instructional programmes, informed by the National Standards Curriculum (NSC).
- Develop individualized intervention/learning plans based on students' performance profile.
- Provide special educators as Pathway Coaches to support subject teachers of students on Secondary Pathways II and III in the delivery of instruction.
- Facilitate a functional academic approach at the secondary level characterised by response to intervention (RtI) methodology, interactive, learner-centred, project-based and problem- based learning, reflection and alternative forms of assessment.
- Foster a system for ALL students to exit the secondary level with the knowledge, skills, competences and attitudes which will have them ready for the world of work or to access tertiary level education.

Secondary Pathways I, II & III (SP I, II & III)

All students will access secondary education via the prevailing Grade Six examination. The exit examination will provide individual profiles to inform decisions for pathway access and standards for differentiation.

SPI is a 7-year programme with a curriculum based on the constructivist approach. At Grades 7-9 students will access the National Standards Curriculum (NSC), and at Grades 10, 11, 12 & 13, they will access the curricula/syllabi of the examining body.

SP II is a 2-year transitional programme with a curriculum based on the constructivist approach. Special educators/pathway coaches will work with teachers and students on this pathway. Students will be provided the required intervention and support to allow for transition. At the end of Grade 8 students will be re-evaluated through psycho-educational evaluation to determine their readiness for crossing over into either SP I or SP III.

SP III is a 7-year programme with a curriculum based on the constructivist approach. At Grades 7-9 students will access the National Standards Curriculum (NSC), and at Grades 10 & 11, they will access the curricula/syllabi of the examining body. At the end of Grade 11 SP III students will transition into the Career Advancement Programme.

At Grades 7-9 the NSC, will be modified to meet the needs of the SP III students. Students in SP III will be instructed through a functional academics curriculum in the core subjects- Mathematics, English Language, Communication, Social Studies and Science. Their instruction will be further enriched with Personal Empowerment, Technical and Vocational instruction, as well as the performing and creative arts. Pathway Coaches will collaborate with subject teachers to prepare content, ensuring differentiation in instruction for students on
SP II and III. These students will also be supported through use of the Response to Intervention (RtI) methodology.

PERSPECTIVES OF SCIENCE, TECHNOLOGY, ENGINEERING, MATHEMATICS & THE AESTHETICS (STEM/STEAM) IN RELATION TO THE NATIONAL STANDARD CURRICULUM (NSC)

INTRODUCTION & BACKGROUND

The integration of theoretical principles that relate to STEM/STEAM Education in the NSC began in June 2014. This move was influenced by recommendations of the STEM Steering Committee that emphasized the need to develop learners who are not just productive, but who would also be innovative Jamaicans. STEM integration was also regarded as one of the strategic long term means of addressing the economic challenges being faced by Jamaica using education as a primary vehicle for the implied transformational change to happen, beginning from short term efforts.

Initial discussions and deliberations promoted an emphasis on STEM rather than STEAM Education. However, critical analysis of the conversations conveyed the perspective of STEM as a collection of related disciplines that all learners should have the opportunity of pursuing, to develop the competencies they offer and as a consequence be able to gain employment or become employers in STEM related areas. As stakeholders from different backgrounds processed their understanding of STEM, new meanings of the concept emerged from the discussions. One was the perspective of STEM as a methodology. There was, however, concern about the exclusion of “A” in STEM. This “A” component however, brought to the discussion, multiple meanings. In some Aesthetics as a field and was considered an important component to be included if educators are serious about issues of discrimination, holistic learning and current research on the iterative function of the brain that warrants attention to brain based learning and the role of the Arts in promoting knowledge integration to cater to multiple domains of learning. There was also discontent about neglecting the Performing Arts when related creative industries contribute significantly to economic development. The concern was that the role of the Arts to economic development was being trivialized.

The call for the integration of the Aesthetics or Art forms became more pronounced as STEM took on more national significance. This was supported by research that indicates the importance of the Aesthetics in developing values and attitudes, in promoting holistic learning and in serving as drivers of innovations. By integrating principles from STEM with those from the Arts/Aesthetics, the approach to problem solving would encourage greater appreciation for and reliance on the interdependent nature of knowledge when science and arts intersect. Additionally, STEAM as a methodology encourages the harmonizing of the cognitive and the emotional domains in the problem-solving process.

The concept of STEAM was adopted in 2015, as an integrative approach to education and a methodology that pays attention to the benefits to be derived from the inclusion of the Arts or Aesthetics with STEM related principles. These collective benefits are supported by Jolly (2014), Sousa and Pilecki (2013) and include divergent thinking; differentiated learning; Arts integration; focus on intrinsic motivation and informed decision-making.

PERSPECTIVES OF STEM/STEAM IN THE CONTEXT OF THE NSC

In the context of the NSC, STEM/STEAM is used in a number of ways. These include:

STEM/STEAM as an integrative learning approach and methodology in facilitating learning. This perspective places emphasis on STEM/STEAM as a means of helping learners become creative or innovative problem solvers and lifelong learners who rely on scientific principles (laws and theories) to address issues/concerns or to deal with observed phenomenon that are puzzling for them or that inspire interest. As an approach, the focus is on solving problems based on principles. As methodology, the focus is on the system of practical procedures to be used to translate principles into the problem - solving processes or to choose from available problem- solving models.

STEM/STEAM as an Experiential-Vocational Learning Framework that is based on problem solving through the project-based approach. Emphasis is placed on solving real life problems in a context that requires learners and their facilitators to observe work-based principles. The primary purpose for this focus is for learners to: (i) become employable (ii) prepare for further education and/or for occupational or work readiness.

STEM as types of institutions in which learning is organized as a meta-discipline as described by Morrison and Bartlet (2009). Based on this perspective, STEM facilitates the demonstration of knowledge in a manner that removes the boundaries of each discipline for application to problem as would be practised in the real world.

IMPLICATIONS OF PERSPECTIVES OF STEM/STEAM IN LIGHT OF THE NSC

Since the NSC is based on Constructivism principles, STEM/STEAM as an approach and methodology, has to be established on post-positivistic thinking. From this position, STEM/STEAM influences the kind of practice that promotes collaboration, negotiation of meaning and openness to scrutiny.

The NSC developers selected a Constructivist approach that included the deliberation, designing and development stages of the curriculum process. Evidence of the influence of Constructivism can be seen the NSC Framework Document that conveys the following emphasis:

(i) **The element of objectives** is presented in two forms; firstly as **Learning Objective**s to focus attention on process and experience rather than product. Secondly as Learning Outcomes that serve as some of the outputs of the process. They include the basic understandings, skills and dispositions anticipated from learners' engagement in the planned experiences.

(ii) **The element of content** is treated as contexts for learners to think critically, solve problems creatively while developing their identity as Jamaicans. Content is not expected to be treated as disciplines to be mastered but as areas that contribute knowledge, skill sets and attitudes that form the composite of competencies to be acquired from their integration in the learning situations.

(iii) **The element of learning experiences (method)** is presented as a set of learning activities that serves as a source of problems to be addressed as a part of the learning process. These real-life activities provide the scope of knowledge, skills and required dispositions or character traits for learners to make sense of that aspect of life or the world that they represent. They are the threads that connect all the other elements of the curriculum and allow for the integration of STEM/STEAM in the following ways:

- Identification of activities that are presented as problems to be solved using the STEM/STEAM approach based on contextual factors that include the profile of the learner, the learning conditions and the anticipated impact.
- Integrating activities to form a real problem to be solved as a short, medium or long term project to which the project based learning would be applied.
- The examination of learning activities by learners and teachers as co-learners through multiplelenses using content of science, technology, mathematics and the humanities that they have already explored to engage in the problem identification and definition processes.
- Extending learning in the formal setting to the informal by connecting co-curricular initiatives that are STEM/STEAM based that learners are undertaking at the institutional level through clubs and societies, as whole school projects or in partner ship with external stakeholders.
- Using the learning activities to review STEM/STEAM initiatives that form a part of the informal curriculum to and for reflection on action.

- Using activities as springboards for reflecting on career or occupational interest in STEM/STEAM related areas.

(iv) The element of evaluation is communicated in two major ways; firstly as prior learning which serves diagnostic purpose and secondly as an on-going developmental process. This formative focus is indicated by the inclusion of explicitly stated assessment criteria that are to be used alongside the learning activities. The use of assessment criteria as counterparts of the learning activities also indicates that assessment is learner centred since it is serving developmental rather than promotional purpose and as a consequence, allows learners to self-correct as they use feedback to develop feed-forward capabilities. Evidence of learning, based on the learning outcomes, can be collected from various types of assessment methods that emphasize the learner centred constructivist orientation. This brings to the fore the need for serious consideration to be given to differentiation in assessment for fairness and credibility of claims about learners' capabilities and to inform decisions that will impact their educational journey.

In general, this integrated approach, which is the context of STEAM, is aimed at improving the quality of the educational experience for learners while influencing the achievement of the aims of education that relate to productivity and creativity as part of the profile of the Jamaican learner.

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The 5Es Overview: "The 5E Learning Cycle"

What is a 5E Learning Cycle?

This model describes an approach for facilitating learning that can be used for entire programmes, specific units and individual lessons. The NSC supports the 5E constructivist learning cycle, as it places emphasis on the processes that may be used to help students to be personally involved in the learning situation as they are guided to build their own understandings from experiences and new ideas.

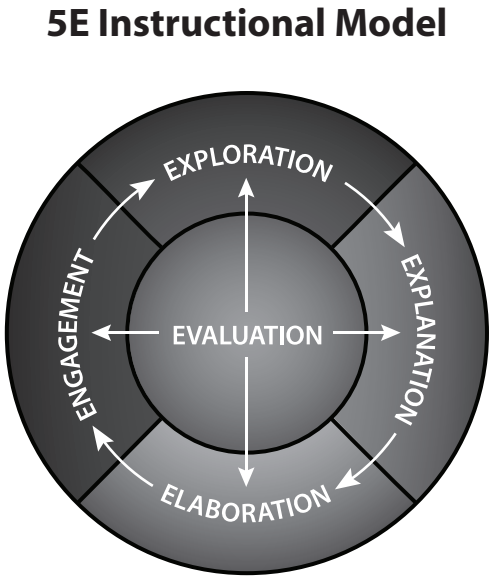

Figure 1. Illustrating one version of the 5E model that conveys the role of valuation as an interconnecting process that is at the core of the learning experience.

Figure 2, illustrating a cyclical perspective of the model with each process being given similar emphasis in contributing to the learning experience on a whole.

EXPLANATION OF THE INSTRUCTIONAL MODEL

What are the 5Es?

The 5Es represent five key interrelated processes that provide the kind of learning experiences for learners to experience the curriculum or planned learning episodes: Engage, Explore, Explain, Extend (or Elaborate), and **Evaluate**.

ENGAGE: The purpose of the ENGAGEMENT dimension is to help students to be ready intellectually, socially, emotionally etc. for the session. Attention is given to the students' interests and to getting them personally involved in the lesson, while pre-assessing prior understandings, attitudes and/or skills. During the experience, students first encounter and identify the instructional task and their roles and responsibilities. During the ENGAGEMENT activity, students make connections between past and present learning experiences, setting the organizational groundwork for upcoming activities. The engagement activity may be used to (a) help student unearth prior knowledge (b) arouse their curiosity (c) encourage students to ask questions as a sign that they have wonderments or are puzzled.

EXPLORE: The purpose of the EXPLORATION dimension is to get students involved in solving a real problem that is based on a selected context. EXPLORATION provides them with a chance to build their own understanding of the phenomenon being investigated and the attitude and skills involved for arriving at a workable solution. In exploring the students have the opportunity to get directly involved with the phenomenon and materials. As they work together in learning teams or independently, the need to share and communicate becomes necessary from the experiences. The teacher functions as a facilitator, providing materials, guarding against obstacles to learning and guiding the students to operate based on agreements. The students become inquirers and co-owners of the learning process. In exploring, they also ask questions, formulate hypothesis, search for answers or information/ data, reflect with others, test their own predictions and draw conclusions.

EXPLAIN: The purpose of the EXPLANATORY dimension is to provide students with an opportunity to assess their thinking and to use intellectual standards as critical thinkers to communicate their perspectives and/or the meaning of the experiences. They rely on communication tools and their skills as Language users to: (a) organize their thoughts so that they are clear, relevant, significant, fair, accurate etc. (b) validate or affirm others (c) self-motivate. Reflection also occurs during the process and may cause students to adjust their perspective or justify their claims and summarise the lessons being learned. Providing explanations contributes to vocabulary building and self-corrective actions to deal with misconceptions that they become aware of from feedback of their peers and/or their facilitator.

EXTEND: The purpose of this dimension is to allow students to use their new knowledge and continue to explore its significance and implications. Students work independently or with others to expand on the concepts and principles they have learned, make connections to other related concepts and principles within and/or across disciplines, and apply their understandings in new ways to unfamiliar situations.

EVALUATE: The purpose of the EVALUATION dimension is for both students and facilitator to determine progress being made or the extent to which learning has taken place based on the stated objectives or emergent objectives. EVALUATION is treated primarily as an on-going diagnostic and developmental process that allows the learner to become aware of gaps to be treated and progress made from their efforts to acquire the competencies that were the focus of the session. Examples of competencies include understanding of concepts, principles and processes and demonstrating various skills. Evaluation and assessment can occur at different points during the learning episode. Some of the tools that assist in this diagnostic and formative process include rubrics, teacher observation log, self-inventories, peer critique, student interviews, reflective presentations, displays/expositions,

portfolios, performances, project and problem-based learning products. Analysis of reflections, video recordings are useful in helping students to determine the depth of their thinking and understanding and the objectives they have or have not achieved.

Who developed the 5E model?

The Biological Science Curriculum Study (BSCS), a team led by Principal Investigator Roger Bybee, developed the instructional model for constructivism, called the “Five Es”.

The Link between the 5E model and Types of Learning Activities

The five (5) types of Learning Activities purported by Yelon (1996) can be integrated with the 5E’s so as to enrich the teaching and learning process. He noted that every instructional plan should include the following learning activities

1. Motivation Activities: Intended to help learners to be ready for the session
2. Orientation Activities: Inform students of their roles and responsibilities based the purpose or objectives of a learning episode.
3. Information Activities: Allow students to manipulate current knowledge, access/retrieve and generate new ideas
4. Application Activities: Allow for the use of knowledge and skills in novel situations
5. Evaluation Activities: Allow for reflection, corrective actions and sourcing of evidence to confirm/refute claims about learning.

These activities can be planned to serve one of the purposes of each dimension of the 5E model. For example, ENGAGEMENT may be comprised a Motivation Activity and an Orientation Activity. EXPLORATION and EXPLANATION require an Information Activity, while EXTEND requires an Application Activity. EVALUATION requires the kind of activity that will contribute to the collection of data for assessing and arriving at a conclusion about performance based on stated or expected purpose for which learning is being facilitated.

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SUBJECT: Resource and Technology

MODULE: Business Basics

UNIT TITLE: **Safety Management in the Business Environment**

TOPIC: Understanding Occupational Health and Safety Management in the Business Environment

BIG IDEA: Safety comes First!

PROBLEM STATEMENT/ FOCUS QUESTION:

Accidents happen every day on the road, in the home, at school and other places.
What are some of the safety concerns in the workplace?

GRADE: 7

DURATION: 60 minutes

PRIOR LEARNING

Students should be aware of the key terms associated with safety and the meaning of safety and hygienic signs and symptoms displayed in businesses.

R & T Strand: Explore Methods and Procedures

Attainment Target:

- Demonstrate an awareness of safe and hygienic use of tools and equipment
- Gather information about strategies and procedures that are used by various agencies/ organization that ensure safety in the business

SCIENCE STANDARD

Attainment Target 1. Exploring Science and the Environment – Grade 7

- Appreciate the importance of scientific methods and be aware of safety procedures to be taken when using equipment, tools and materials

MATHEMATICS STANDARD

Attainment Target 5. Collect, organise, interpret and represent data and make inferences by applying knowledge of statistics and probability - Data Handling and Probability Grade 3. Interpret data presented in simple tables, pictographs and bar graph using horizontal and vertical representations.

TECHNOLOGY STANDARD

T&S Standard 5

Student will develop an understanding of the effects of technology on the environment.

Resource Materials:

Computer, projector, internet access, video, handouts/books, flip chart, markers

Learning Objectives:

Students will be able to:

1. define the terms safety management, occupational health and safety (OHS), and risk assessment
2. Identify different kinds of risks associated with different organizations or types businesses
3. State the benefits of OHS
4. Outline the importance of doing risk assessment
5. Explain the elements involved in safety management

Content Outline:

- Safety management – definition, components/elements in safety management
- Occupational health and safety – definition, OHS risk factors in the workplace with particular emphasis on the business environment, laws and standards, rights and responsibilities, benefits of OHS
- Identifying safety and health hazards in the environment – risk assessment, importance of risk assessment

  Classroom Safety e.g. Students will

  - use tools and equipment in a safe manner and assume responsibility for their safety and safety of others.
  - demonstrate courtesy in regard to the ideas expressed by classmates and will show appreciation for the efforts of others

ACTIVITY HIGHLIGHTS

Engagement

Students will view a video presentation at https://youtu.be/QO3aOrxkAiE that shows accidents in an office. After viewing the video, they will be asked to tell what they observed in the video. With guiding questions and prompts from the facilitator, it is anticipated that the concept of risk, safety, damage and hazard will come up in the discourse to assess prior learning.

Exploration

Using the video presentation as a prompt, facilitator engage students in a class discussion to identify other kinds of risks and hazards associ-

ated with other types of businesses in their environment. Students will then view the following videos https://youtu.be/73zfbMmXlPk and https://youtu.be/5cqrZSnCsJ4 which depict additional hazards prevention strategies.

Students will be placed in groups using the jigsaw method to do internet research. If there is no internet access, teacher should provide materials on a) risk assessment b) occupational health and safety and c) safety management based on guiding questions from teacher. They will relate the topics to business. Students will prepare posters using presentation software where possible (flip chart and markers can be used to create posters where computer resources are not available) to represent their understanding of the topic given.

Explanation

Students will present their summary of the topics to the large group using the presentations prepared as aides accordingly.

Extension/Elaboration

Teacher and students will give feedback accordingly as they respond to the respective presentations made by the various groups. Teacher will place additional points on board where necessary. Students will be allowed to place posters on walls to create a gallery. Gallery walk will be done to facilitate students taking down information from posters and the board.

Evaluation

Presentations will be assessed using rubric developed.

A case study/scenario will be given to students which will require them to identify the risk assessment, OHS and safety management is**sues and** procedures. This can be an end of class activity of homework.

Enrichment

Students will use principles from the lesson to conduct a risk assessment in the school and identify possible solutions. They will prepare a report. Teacher will give guidelines for this activity. Students can take pictures to support any concerns identified.

SUBJECT: Resource and Technology
MODULE: Business Basics
GRADE: 7
DURATION: 60 minutes
TOPIC: Safety and Hygiene in the Business Environment

ATTAINMENT TARGET:

STRAND 1: Creativity and Innovation

ATTAINMENT TARGETS:

Students will:

- Select the appropriate safety solutions aPPLICABLE TO THEIR BUSINESS IDEA CONCEIVED.

STRAND 2: Explore Methods and Procedures

ATTAINMENT TARGET:

Students will

- Gather information necessary to safeguard against risks and hazards in the business environment.

STRAND 3: Apply Solutions

ATTAINMENT TARGET:

Student will:

- Create visual images of appropriate safety and hygienic symbols and manual

STRAND 4: Career Pathways

ATTAINMENT TARGET:

Students will:

- Utilize technological applications to complete given tasks
- Observe rules and procedures for working collaboratively

SCIENCE

AT 2 Grade 2

Understand how the need for taking care of the body, cleanliness and diet.

TECHNOLOGY

T&S Standard 8

Student will develop an understanding of design.

Standard 11

Students will develop the ability to apply the design process.

MATHEMATICS

AT – Grade 4

Students should be able to make and explore geometric shapes, polygons, non-polygons and compound shapes and apply knowledge of their properties to problem solving situations.

Lesson Duration: One hour

Resource Materials: (Audio visuals, print, internet)

Video: https://www.youtube.com/watch?v=dBf6BTX1bmM **(what causes accidents safety training video preventing accidents and injury)**

LEARNING OBJECTIVES:

Students will:

1. State the benefits of maintaining safe and hygienic practices in a business environment.
2. Discuss the risks associated with an unsafe and unhygienic business environment.
3. Design safety symbols/signs appropriate for the business environment using various geometrical shapes.

CLASSROOM SAFETY E.G. STUDENTS WILL

- use tools and equipment in a safe manner and assume responsibility for their safety and safety of others.
- Demonstrate courtesy in regard to the ideas expressed by classmates and will show appreciation for the efforts of others

ACTIVITY HIGHLIGHTS

Engagement

Students will be shown a video on workplace safety training & what causes accidents(https://youtube.com/watch?v+=dBf6BTX1bmM). They will be asked to watch it critically and ascertain the benefits of maintaining a safe business environment. They will then be engaged in a whole class discussion. They will then be asked to brainstorm and make note of benefits of maintaining hygienic practices in a business environment.

EXPLORATION

Students will be encouraged to work in small groups to discuss and come up with specific risks associated with unsafe and unhygienic business environment. Students will research: finding videos, pictures, books etc., that depict risks linked with unsafe and unhygienic work environment.

EXPLANATION

After students present their findings, the students will be guided into focusing on risks as it relates to lawsuits, public relations and how profit and revenue can be affected by unsafe and unhygienic workplace practices.

EXTENSION (WORKING THROUGH THE DESIGN PROCESS)

Students will be placed in groups and each group assigned a particular geometrical shape. Each group will be required to find safety signs/ symbols that usually have the same shape as the one assigned. E.g. triangle is usually used when cleaning is in process. Students will be encouraged to create a sign/symbol to present to the rest of the class and outline its importance in a business environment.

EVALUATION

Students will be assessed based on accuracy, measurement, colour, word size and font visibility, collaboration and explanation of the use-fulness of the sign/symbol to the business environment.

ENRICHMENT

Students will be asked to revisit the business place or school office from the previous lesson's assignment and create a needed safety sign/symbol for use in that work environment based on the unsafe and unhealthy practices they had observed.

SUBJECT: Resource and Technology
MODULE: Family and Consumer Management
UNIT TITLE: **Safety Management in the Business Environment**
TOPIC: Sewing Machines
GRADE: 7
DURATION: 1 ½ hr

PRIOR LEARNING

ATTAINMENT TARGET 2: Through a project – based approach student will be able to explore methods and procedure in solving problems relating to textile/clothing fabrics

SCIENCE STANDARDS: Apply and use laboratory techniques safely in machine operation

MATHEMATICS STANDARDS: collect, organise interpret and represent data b using a table etc., measuring to create borders

TECHNOLOGY STANDARDS: Use technology to communicate information and understanding

RESOURCE MATERIALS: Pictures of the sewing machine, sewing machine instruction manual, reading material, computer and printer, relia such as machines, bobbins, threads, templates, puzzle pieces, LCD. Paper scissors, colour and plain paper, glue, tracing paper

LEARNING OBJECTIVES

Students will:

1. differentiate among the types of sewing machines
2. identify the main parts of the sewing machine
3. explain the function of each part identified
4. label diagrams of the sewing machine
5. create sewing machine manuals

Content Outline:

a. Types of sewing machines
b. Parts of the sewing machine
c. Function of the parts of the sewing machine
d. Procedure for correct usage of the machine

Classroom Safety

Students will plug and unplug machines using proper procedure.

Students will ensure that fingers are kept away from machine needle while sewing.

Students should be focussed and alert while on task.

ACTIVITY HIGHLIGHTS:

Engagement

Trader Joe's machine factory reported that the student interns have made several errors in the manufacturing department. They were not aware of the various types of sewing machines and could not identify the parts and functions in relation to the correct use of the machine. As a result of this there were frequent accidents in the factory. How can we assist Trader Joe's machine factory to solve this problem?

STUDENTS WILL BRAINSTORM TO ARRIVE AT SOLUTIONS TO TRADER JOE'S PROBLEM.

FOCUS QUESTIONS:

What types of sewing machines have you seen? Which of these do you think would be in a factory?
What kind of accidents might have occurred?
Why do you think machines were broken?
Could an operational manual/learner guide help solve Trader Joe's problem?
What job opportunities exist at Trader Joe's Factory?

EXPLORATION

A simulation of Trader Joe's factory will be set up in the clothing lab. Students will be placed in groups to research the following areas: types, parts and function, diagrams and use and care of sewing machines. A display and descriptive table will guide the research. Students will record their findings in Microsoft word paying particular attention to creating a table, insert pictures using appropriate ICT tools. Students will explore the features of learner guides to include the following:

- Layout and colour scheme
- Borders
- Cover page
- Font size and selection

Create a proto type learner guide (drawing, sketch etc.)

EXPLANATION

Each group will present their findings using ICT example multimedia projector. Teacher and students will discuss findings. Students will ask/answer questions to provide clarifications. A summary of the main points will be highlighted.

ELABORATION/EXTENSION

Students will work collaboratively to create/produce a learner guide for Trader Joe's machine factory
They will:

Collect the resources required to make the learner guide.
Decide on the procedures for making the learner guide
Make, evaluate and display the learner guide

EVALUATION

- Rubric will be used to assess the learner guides. Rubric would include creativity, use of ICT, collaboration and accuracy of information presented.
- Students will take a ten point quiz on the types, parts and functions of the sewing machine.

ENRICHMENT

Students may publish the learner guides online or in other medias.
Create a sales strategy/pitch to sell the learner guide to Trader Joe

a) Project-Based Approach

The content associated with each of the modules of Resource and Technology is delivered in a context as a real life problem or need to be met. Usually a scenario depicting a real life problem is developed to introduce each project. For example, in introducing the Grade 4 Agriculture project 'Create an Ornamental Garden' students could be presented with a real life situation in their school environment of an area which has become a haven for garbage presenting an unattractive and unhygienic area. Students brainstorm and research to identify and develop solutions to the named problem and then plan, design and create high-quality, authentic products and presentations using 21st century skills of critical thinking, collaboration, communication and Information Technology. Projects should be carefully planned, managed, and assessed to help students learn the content relevant to each discipline. The following features should guide the learning process utilizing project based learning:

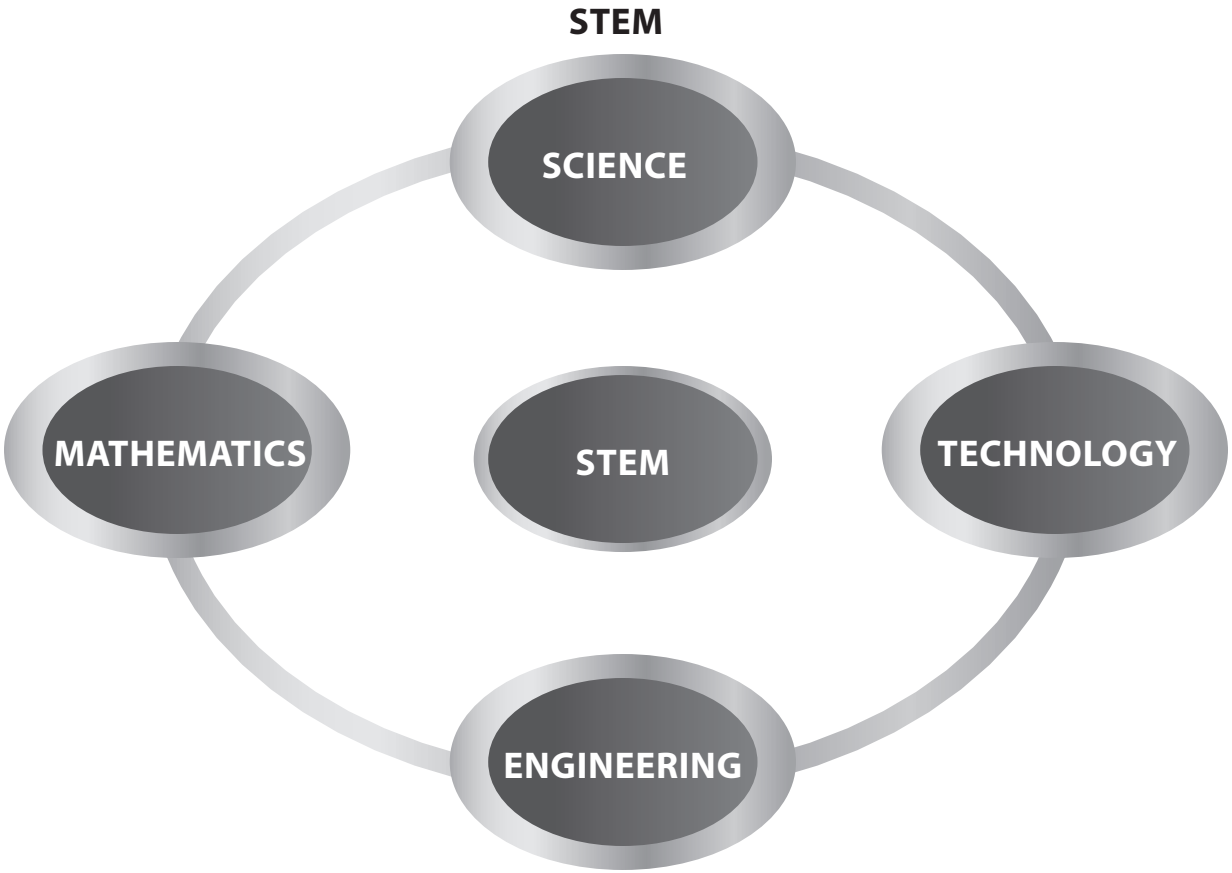
- problem-based – students develop imaginative solutions to presented or observed problems
- Reality-based – students work in real-life/world learning environments
- decision-making – students have choices about what they learn, make choices within their learning environment and set personal goals
- design driven – students develop an awareness of design principles and elements for creating their own work and interpreting the work of others
- aesthetically aware – students learn through their senses and learn to control elements/factors appropriate to the project
- technology-based – students understand the relationship between materials, systems and processes

Teachers should ensure that the problems and solutions presented are in keeping with the content/knowledge, skills and attitudes illustrated in the Teachers' Guides.

b) Integration of STEM

The integration of STEM/STEAM principles is utilized in the delivery of the Resource and Technology programmes. STEM/STEAM education is an approach to teaching and learning that integrates the content and skills of Science, Technology, Engineering and Mathematics. Content is delivered through action-based activities that involve the use of skills, processes, tools/equipment and materials to design and develop solutions to authentic tasks.

Designing is an important aspect of the creation of solution. Hence the emphasis on developing design layout using the elements and principles of Design Arts



EXPLANATION OF THE ACRONYM 'STEAM'

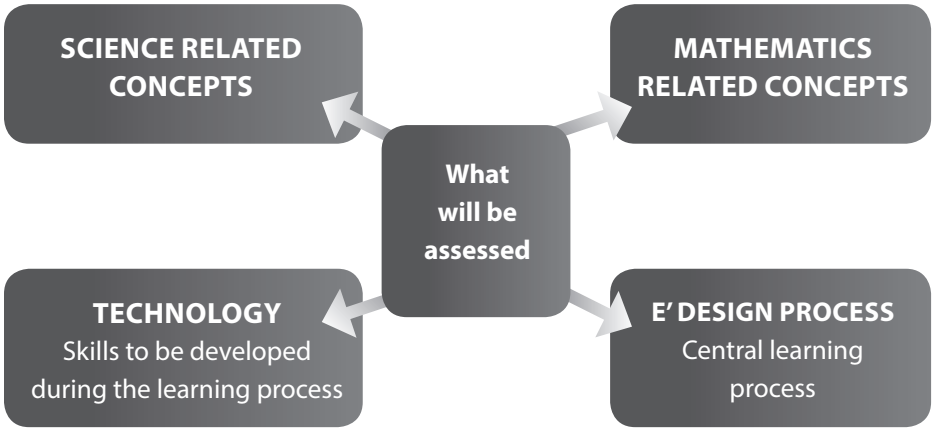
'S' – Science concepts specific to the topic to be presented is integrated in the lesson

'T' - Technology combined use of skills, attitude, knowledge and resources to create things that people need and want to make life easier and better

'E' – Engineering Design Process –

'A' – the use of the aesthetics to create aesthetically pleasing products

'M'- Mathematical concepts specific to the lesson being taught is integrated in the lesson



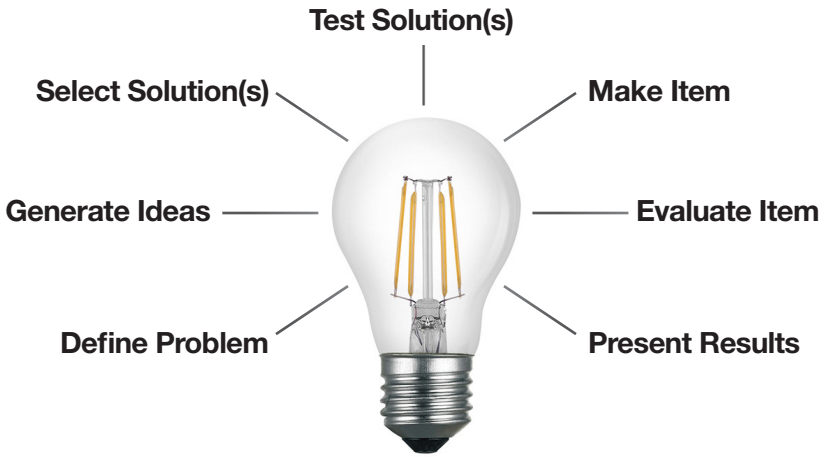
ATTRIBUTES OF A STEM LEARNING ENVIRONMENT

- Utilize the engineering design process ('E')
- Engage in the scientific process
- Apply mathematical practices
- Explore appropriate uses of technology
- Support collaboration and communication
- Encourages risk taking
- Align STEM lessons with real life context

c) 'E' Engineering Design Process

The Design Process is a systematic problem solving strategy which is used in the delivery of Resource and Technology programme to solve practical problems. This process is similar to other problem solving processes but this particular process was adopted because of its design feature which ensures that student will use materials, tools and equipment in problem solving

The Design Process as illustrated in the diagram below comprises seven (7) stages or aims. Students may begin with Stage 1 – define or identify the problem and continue in order to Stage seven (7)



STAGES IN THE DESIGN PROCESS

Other approaches are also valid. Students may start by:

- Evaluating an existing product/system e.g. assessing the nutritional value of a favourite snack or rules that are in place to ensure safe and hygienic learning environments and continue by
- Suggesting ways to improve the product or system
- Planning to make a new version
- Making it and
- Evaluating it against the original
- Present results (orally or written)

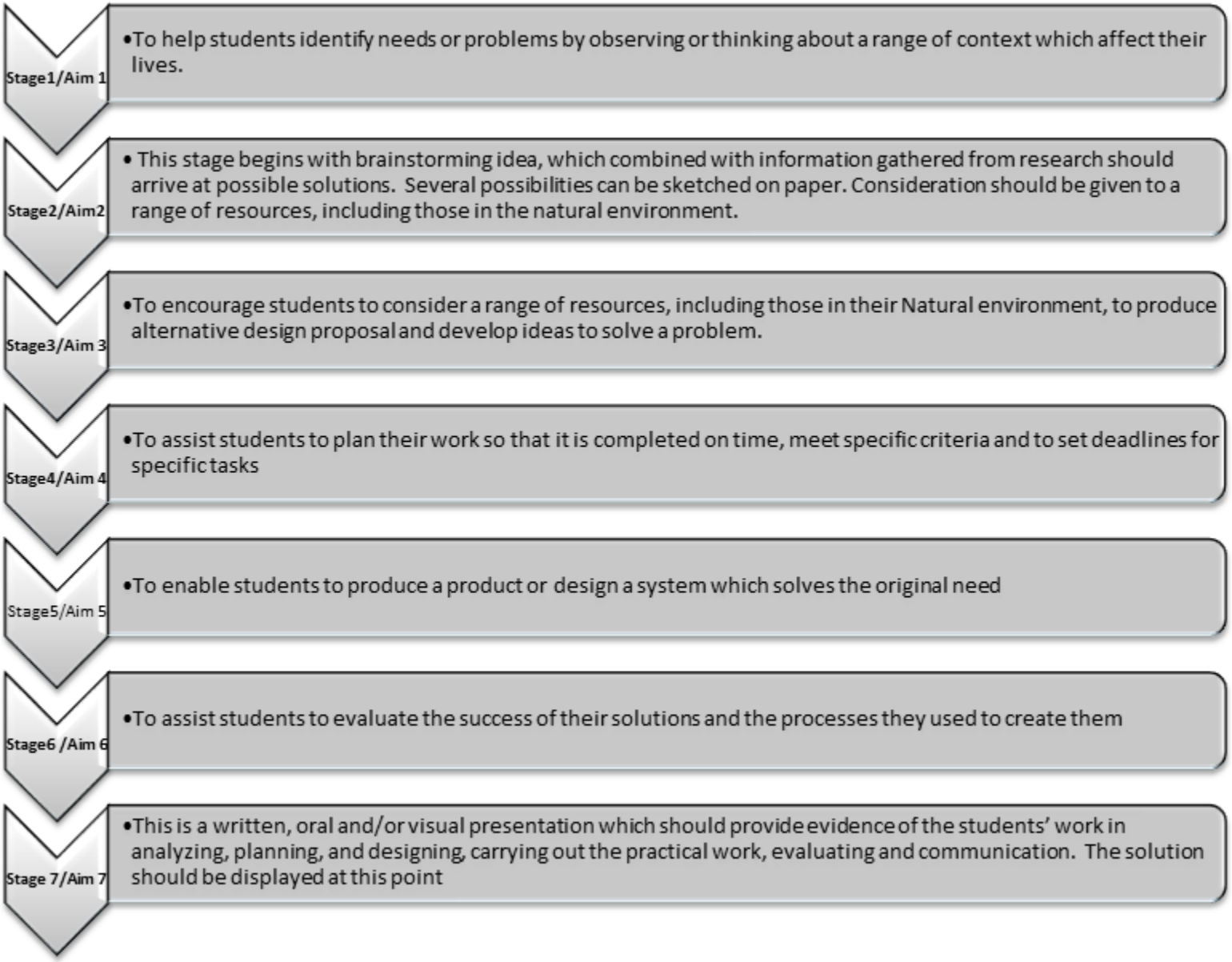
For younger students, the teacher might produce a partly completed product e.g. a partly completed bird house. Students could:

- Discuss how it can be developed/completed
- Plan ways of improving it
- Make their own version
- Evaluate the product
- Present results (orally or written)

It should be noted that if students are to develop problem solving skills, focus must be placed on all stages of the design process. The majority of time must not be spent of making the products/systems but equally on the knowledge, skill and attitude so that students acquire the necessary competencies related to the task or project. Given that the Design Process is seen as the central learning process for all students, the role of the teacher is to guide pupils through the process

AIMS OF THE DESIGN PROCESS

There are seven major aims of the Design Process



Project-based learning (PBL) demands excellent assessment practices to ensure that all learners are supported in the learning process. With good assessment practices, PBL can create a culture of excellence for all students and ensure deeper learning for all. Assessment should be integrated seamlessly into the projects, measuring students' understanding from the beginning to the end of the project.

Assessing Learning Outcomes

From Grades 4-9 student achievement should be one of continuous assessment and based on the learning outcomes selected for each project to ensure that students acquire the necessary knowledge, skills and attitudes. In other words, the assessment should be based on what each student can do. No more than ten learning outcomes or 'can' statements should be selected for each project of unit of work.

No more than ten learning outcomes should be selected of a project or unit of work. This will help to keep the assessment and recording process to a manageable size for the teacher.

Assessment should be developed on a four-point scale;

I	Can do with a lot of help
II	Can do with some help
III	Can do with very little help
IV	Can do independently

Assessment conducted in this manner will provide a picture of exactly what each student can and cannot do or how much assistance will be needed to develop the competencies.

This form of assessment is more informative and useful than those which grade students on a scale of 1-10 at the end of a project. Teachers and individual students should discuss the assessments and agree on the next learning steps. A record of assessments should be kept in a mark book or file set out as shown on the next page.

Supporting knowledge and understanding can be assessed in the traditional way, that is by objective tests such as multiple choice.

Assessing the End Product or System

All aspects of the Design Process are to be assessed. Teachers should observe what students do in an effort to create a solution to a need or problem. This would involve the activities such as collaborating with each other, conducting research, planning, designing and making the final product or system. Evidence of students' work throughout the project or unit work should be filed.
A sample rubric is presented below to assess the end product, article or system made for a project.

STUDENTS' NAMES	LEARNING OUTCOMES				
	performs safe and healthy practices related to gardening functions	Can select appropriate materials and tools to create an ornamental garden	Can perform mathematical functions to design and create an ornamental garden	Perform procedures and processes for preparing an ornamental garden	Perform procedures and processes for preparing an ornamental garden
John Allen					
Rupert Bonnett					
Nayla Burnett					

KEY TO SCALE		
I	Can do with a lot of help	30-49
II	Can do with some help	50-64
III	Can do with very little help	65-79
IV	Can do independently	80-100

SAMPLE RUBRIC FOR ASSESSING END PRODUCT FOR A PROJECT

Descriptors	No progress (0)	Introductory (1)	Emergent (2)	Proficient (3)	Mastery (4)
Plan	Student's work demonstrates no understanding or progress towards achievement of the outcome.	Student does not understand problem and cannot identify data or create plan	Student understands problem but cannot identify necessary data or create plan to so	Student understands problem but can only identify some necessary data or create a slightly inaccurate plan to	Student understands problem, identifies necessary data for solving and create an accurate plan to solve problem.
Research	Student's work demonstrates no understanding or progress towards the achievement of the outcome	Student used only the reference provided by teacher	Student used at least one credible additional sources of data collection	Student used at least two credible additional sources of data collection	Student used at least three credible additional sources of data collection
Process	Student's work demonstrates no understanding or progress towards achievement of the outcome.	Student's work demonstrates no sequencing to achieve expected outcome	Student's work demonstrates limited sequencing to achieve expected outcome	Student's work demonstrates adequate sequencing to achieve expected outcome	Student's work demonstrates logical sequencing to achieve expected outcome
Application	Student's work demonstrates no understanding or progress towards achievement of the outcome.	Student demonstrates limited mastery of the relevant skills	Student demonstrates mastery of 50% of the relevant skills	Student demonstrates mastery of 70% of the relevant skills	Student demonstrates mastery of all the relevant skills necessary

SAMPLE RUBRIC FOR ASSESSING END PRODUCT FOR A PROJECT

Descriptors	No progress (0)	Introductory (1)	Emergent (2)	Proficient (3)	Mastery (4)
Safety	Student work demonstrates no understanding or progress towards achievement of the outcome.	Student does not adhere to appropriate safety guidelines	Student adheres to a few of the appropriate safety guidelines.	Student adheres to most of the appropriate and relevant safety guidelines.	Student adheres to all appropriate and relevant safety guidelines.
Product/ service	Student work demonstrates no understanding or progress towards achievement of the outcome.	Product/service is complete but cannot satisfy its intended purpose	Product/service can satisfy few of its intended purpose	Product/service can satisfy most of its intended purpose	Product/service can satisfy its intended purpose
Explanation/ presentation	Student demonstrates no understanding or progress towards achievement of the outcome.	Student can explain only limited aspects of the work logically	Student can explain the solution but cannot explain why the methods work.	Student can explain how to solve problem and why the chosen methods work; but did not provide alternate solution.	Student can explain thoroughly how to solve the problem and provided alternate solutions to the chosen methods.
Collaboration	Student demonstrates no understanding or progress towards achievement of the outcome.	Students worked independently	Students worked together on few occasions.	Students worked well together most of the times with most members making valuable contribution.	Students worked well together to achieve objectives with each member making valuable contribution.
Design	Student work demonstrates no understanding or progress towards achievement of the outcome.	Student has made an incomplete attempt to create a design, working-drawing, plan or chart of solution	Student creates design working-drawing, plan or chart that is not logical to the solution	Student creates a reasonable design working-drawing, plan or chart for the solution	Student creates a logical diagram, working-drawing, plan or chart to help solve problem.

MAINTAINING A STUDENT'S LOG

Resource and Technology must be delivered as a student centred subject. Therefore any assessment of students' performance should include their own assessment of work and progress. The student's log is one way to secure this kind of self-assessment. The next page carriers a recommended format for the student's log. Students are encouraged to note what they learnt and their overall experiences when they complete a topic and problem. They should provide their frank and honest assessment. Individual sheets of the student's log can be produced and given to students. They, in turn, should secure these in a file folder to be kept for inspection and assessment by the teacher.

Information to Students

This log is for your personal use. You are to write down what you have learnt and how you feel about each topic covered. A topic may cover more than one class. Therefore, your log should be written up at the end of the last class on each topic.

FORMAT OF A STUDENT'S LOG

PROJECT: _____
PROBLEM: _____

SKILLS	KNOWLEDGE	ATTITUDES
PERSONAL COMMENT (Verbal & or Graphics)		

NAME: _____

GRADE: _____ DATE: _____