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</table>
INTRODUCING THE TEACHER'S GUIDE

The Teacher's Guide gives week-by-week information on methodology, resources, assessment and integration with other learning areas and a vocabulary list.

METHODOLOGY
Teaching and learning activities are suggested and should be used when developing lesson plans. Technology lends itself to teaching and learning activities that are set in a real-life context and it has a hands-on approach to teaching and learning. The concept of less teacher talk and more teacher and learner hands-on activities is balanced against the time available for teaching and learning. A balance must be maintained between talking to and learners engaging in activities that develop a deeper understanding.

The work schedule follows Learning Outcome 1 as the methodology for teaching and learning in Technology. Learning Outcomes 2 and 3 are integrated with Learning Outcome 1. Experienced teachers can and should vary this teaching methodology.

The grid below illustrates a simple recipe for the teaching of technology.

<table>
<thead>
<tr>
<th>Activity</th>
<th>Explanation</th>
<th>Time allocation</th>
<th>Assessment: Informal / Formal</th>
</tr>
</thead>
<tbody>
<tr>
<td>Case study (Investigate)</td>
<td>Start by using a related context to determine prior knowledge and skills and to introduce new knowledge and skills relevant to the new project.</td>
<td>1 to 2 hours</td>
<td>The teacher must identify the informal and formal assessment activities. Informal assessment is used to assess learners during the activities when the skill or knowledge is being developed.</td>
</tr>
<tr>
<td>Teaching and learning activities (Investigate, design, make, evaluate, communicate)</td>
<td>These are a number of activities that develop the knowledge and skills the learners will need to solve the problem.</td>
<td>Times will vary, depending on the level of prior knowledge or the level of new knowledge and skills required.</td>
<td>A formal assessment task: An assignment, test and or project are used to assess the learner’s ability to apply knowledge and skills learned.</td>
</tr>
<tr>
<td>Project task (Technological Capability)</td>
<td>The learners apply the knowledge and skills taught to solve the problem and present a practical model and a poster or project portfolio.</td>
<td>This can be from 6 to 8 hours.</td>
<td></td>
</tr>
</tbody>
</table>
NOTE: The work schedule promotes the parallel delivery of teaching and learning with the development of the project as the formal assessment task. This allows for assessment of the project (capability task) to be spread during the term.

RESOURCES
The consumable and non-consumable resources listed in the work schedule are offered as a guide to support the teaching and learning process. Learners are expected to engage with the curriculum and, were possible, with resources that will support hands-on activities in the classroom. Schools must provide a budget for technology to purchase relevant consumable and non-consumable resources. All tools and equipment must be listed in the learning area inventory and a system developed to make these available to all technology classes. The provincial technology website provides a list of suggested materials and tools for the senior phase.

The following reference books were used when developing the work schedule and teacher's guide and offer valuable insight into the technological knowledge and skills addressed within the assessment standards. All the books are available from EDULIS.

9. Davis, Rick. Letts ultimate study guide, Revise GCSE: Design and Technology. LETTS, 2005

The listed websites contain information on knowledge and skills that is relevant to the National Curriculum Statement for Technology in South Africa.

www.technologystudent.com
www.kpsec.freeuk.com
www.secondarydandt.org
http://www.deyes.sefton.sch.uk/Technology/Default.htm

A further resource is the Provincial Technology website. It has valuable information that provides relevant information: http://curriculum.pgwc.gov.za/site/54/page/view/

INTEGRATION
Integration across learning areas is effective when teaching more than one learning area within the same grade. Use integration across learning areas to manage the teaching and learning workload. Another form of integration is the grouping together of the learning outcomes within a learning area. The nature of technology lends itself to the integration of learning outcome 2 and 3 with learning outcome 1. The work schedule reflects this integration.

The learning areas listed under integration are a guide for possible integration. Languages must be seen by all teachers as automatic integration as learners are engaged in reading, writing and speaking using the technology context for the development of literacy. The integration with languages allows all teachers to support the literacy development of all learners. The Natural Sciences learning area also has a direct link to Technology, with its process skills approach to teaching and knowledge content areas.

Assessment across learning areas within a formal task needs specialist attention. It is not recommended that a technology teacher assesses a task based on criteria from another learning area, unless the teacher is responsible for teaching both learning areas or it is a planned process.
ASSESSMENT

Continuous assessment
Continuous assessment involves the assessment of activities that are undertaken throughout the year using different kinds of assessment forms, methods and tools.

Informal assessment
Daily assessment activities provide learners with an opportunity to develop skills, knowledge and values required to complete the formal tasks in the programme of assessment.

Examples of daily assessment activities are the following: Worksheets, class discussions, question and answer sessions, responding to texts or pictures, using kits for building, making mock-ups (models or prototypes), homework tasks, completing crosswords, identify components or systems or processes, field trips, drawing or sketching, non-standardised class tests, notes in workbook / file.

Formal assessment
Learners engage in one formal assessment task per term. The formal programme of assessment uses projects, assignments, case studies and tests or exams as appropriate forms of assessment. Learners will engage in a project for teaching and learning in each term. However, the assessment of the project (technological capability) is planned for term 2 and 3 only. It is recommended that the project portfolio for term 2 reflects a concentrated approach to what is expected in a portfolio; four to eight A4 sides could be sufficient. The project portfolio presented for the third term should be a more comprehensive presentation of the technological processes.

A project is divided into a number of activities as the formal assessment is planned to run parallel to teaching and learning. This will reduce the workload at the end of the term.

FORMAL PROGRAMME OF ASSESSMENT:

<table>
<thead>
<tr>
<th></th>
<th>GRADE 7</th>
<th></th>
<th>GRADE 8</th>
<th></th>
<th>GRADE 9</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Form of assessment</td>
<td>Week</td>
<td>Form of assessment</td>
<td>Week</td>
<td>Form of assessment</td>
<td>Week</td>
</tr>
<tr>
<td>TERM 1</td>
<td>Case study</td>
<td>5</td>
<td>Assignment</td>
<td>5</td>
<td>Assignment</td>
<td>5</td>
</tr>
<tr>
<td>TASK 1</td>
<td>Assignment</td>
<td>7</td>
<td>Case study</td>
<td>6</td>
<td>Test</td>
<td>10</td>
</tr>
<tr>
<td></td>
<td>Practical</td>
<td>8/9</td>
<td>Test</td>
<td></td>
<td>Test</td>
<td></td>
</tr>
<tr>
<td>TERM 2</td>
<td>Project</td>
<td>2+</td>
<td>Project</td>
<td>2+</td>
<td>Project</td>
<td>3+</td>
</tr>
<tr>
<td>TASK 2</td>
<td>Exam</td>
<td>9</td>
<td>Exam</td>
<td>9</td>
<td>Exam</td>
<td>9</td>
</tr>
<tr>
<td>TERM 3</td>
<td>Project</td>
<td>2+</td>
<td>Project</td>
<td>1+</td>
<td>Project</td>
<td>1+</td>
</tr>
<tr>
<td>TASK 3</td>
<td>Test</td>
<td>10</td>
<td>Test</td>
<td>10</td>
<td>Test</td>
<td>10</td>
</tr>
<tr>
<td>TERM 4</td>
<td>Communication</td>
<td>5</td>
<td>Investigation</td>
<td>2</td>
<td>National external</td>
<td>7+</td>
</tr>
<tr>
<td>TASK 4</td>
<td>Practical</td>
<td>6/7</td>
<td>Design &amp; communicate</td>
<td>5</td>
<td>assessment</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Exam</td>
<td>9</td>
<td>Exam</td>
<td>8</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

NOTE: Tests and exams must be completed within the context of the school’s assessment plan. The inclusion of the exam or test on the programme of assessment above is to ensure that it is included.

VOCABULARY
These words must be used during the teaching, learning and assessment process. The development of technological literacy can be promoted by using the vocabulary during teaching and learning on flashcards. They are sequenced in the order as they appear in the assessment standards as integrated in the work schedule.

The glossary provided explains some of the often-misunderstood technical process words. You are encouraged to use the glossaries found in textbooks and any technical dictionary for a detailed explanation of the key words.
DEVELOPING TECHNOLOGICAL CAPABILITY (Learning Outcome 1)

Analyzing a scenario and investigating
Bubble charts or spider diagrams are suitable methods used to present the analyses of a scenario. The following questions will help identify the key areas that may require more investigation or research: What is the problem, need or opportunity? Who will use the solution? Where will it be used? When will it be used? How will it be used? Why is it needed? What do similar solutions looks like? This analytical process supports the development of literacy skills within technology. It can be used to support the literacy programme’s reading half-hour. The development and use of flash cards of key knowledge and process skills concepts will add to the development of technological literacy. Items on the bubble chart that are similar must be grouped together, with links shown. Research or practical investigation activities become the method used to find answers to these questions. It is important to draw conclusions from the investigation or research that will affect the design solutions.

Writing a design brief
The design brief must be a short statement of the problem to be solved and not a description of the solution. An open brief allows for more creativity than a closed brief, which describes a solution.

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Yes</th>
<th>No</th>
</tr>
</thead>
<tbody>
<tr>
<td>It is a short, clear statement of what must be done</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It describes the problem and not a solution.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It describes who will use it.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It describes where it will be used.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>It describes the benefit a solution will have.</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Listing constraints
The factors that will limit design ideas are the constraints. These can be stated as one word; e.g. time, materials, tools, human resources, cost. These must be considered prior to listing the product specifications.

Writing specifications
Specifications will relate to where the solution will be used, who will use it and the implication for the selection of material. Aesthetics, performance and maintenance must also be considered. Each grade assessment standard provides detailed aspects to be included for the specifications e.g. safety, size, material, function, human rights, environment. It is best to list the specifications in a numbered list, as it is easier to use when evaluating the solution.

Generating design ideas
A wide range of alternative ideas must be developed, and compared against the specifications to identify a suitable solution. The sketches used to develop the design ideas are more important than the technical accuracy of the drawings. Detailed notes that explain the design must be added. Encourage creativity in design and not just a repetition of existing designs.

Making a design choice
A detailed process, that lists criteria to evaluate the various design options, must be used to identify the final design, which is developed further.
Planning for making a solution
This is a critical stage of the design process and requires detailed instructions regarding the making of a solution. Plans for creating a solution should have sufficient detail for another person to make the solution.
Aspects to consider and plan for are the materials to be used and the tools needed to make the final solution. Safety and efficiency are critical aspects that must be focused on during the making process.

Evaluating and testing
The evaluation process is not just an account of what was done nor is it a list of opinions; it is a “scientific process” to verify design procedures. An evaluation scale is used to rate each specification on a given scale. Testing, however, has to do with a practical activity that tests the functioning of the product. Learners must use the opinion of others to support suggestions for any changes or improvements to be made.

Communication: graphics
Three-dimensional sketches are best suited to show design ideas. Use notes with freehand sketches and enhance designs using colour, tone, shade, texture and thick and thin lines.
Formal drawing conventions are used to show the final design plan as a working drawing. Accuracy is important when completing the formal drawings. Grid paper can be used as a guide for sketching and doing formal drawings. When sketching or drawing a three dimensional view of an object it is a good idea to draw the item in a box that it will fit into (called crating) then add thick and thin lines and render and enhance as required. Working drawings include dimensions, notes that indicate material, construction methods and finish.

Step 1
Step 2
Step 3
# Basic Communication Conventions

<table>
<thead>
<tr>
<th>OBLIQUE PROJECTION</th>
<th>ISOMETRIC PROJECTION</th>
<th>DIMENSION LINES</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="www.tpub.com" alt="Oblique Projection" /></td>
<td><img src="www.tpub.com" alt="Isometric Projection" /></td>
<td><img src="www.tpub.com" alt="Dimension Lines" /></td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>SYMBOLS FOR ORTHOGRAPHIC PROJECTION (GRADE 9)</th>
<th>ONE POINT PERSPECTIVE (GRADE 8)</th>
<th>TWO POINT PERSPECTIVE (GRADE 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="www.ider.herts.ac.uk" alt="Symbols for Orthographic Projection" /></td>
<td><img src="whsd.org" alt="One Point Perspective" /></td>
<td>![Two Point Perspective](REF: drawsketch.about.com)</td>
</tr>
</tbody>
</table>

<table>
<thead>
<tr>
<th>FIRST ANGLE ORTHOGRAPHIC PROJECTION</th>
<th>THIRD ANGLE ORTHOGRAPHIC PROJECTION (GRADE 9)</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="www.tech.plymouth.ac.uk" alt="First Angle Orthographic Projection" /></td>
<td><img src="www.tech.plymouth.ac.uk" alt="Third Angle Orthographic Projection" /></td>
</tr>
</tbody>
</table>
GLOSSARY OF LEARNING AREA TERMINOLOGY

anthropometrics Measurements of people’s shape and size. Such measurements are usually taken when products are designed for human use (e.g. furniture, eating utensils, hairdryers, sporting equipment, cars, clothing).

assess To estimate the value of

assignment A task that has a specific instruction(s) and must be completed in a short specified time

bias People’s preconceived ideas or prejudices about some things or people before they actually meet or deal with them (e.g. in areas like gender, race, ethics, religion, disability)

case study Emphasise detailed contextual analysis of a limited number of events or conditions and their relationships

concept A general idea

constraint Aspects that limit conditions within which the work or solution must be developed often described in one word (e.g. time, materials, tools, human resources, cost)

design The plan, sketch, model, drawing, etc., that outlines or shows the intention of the proposed solution.

design brief A short and clear statement that gives the general outline of the problem to be solved as well as the purpose of the proposed solutions (It does not describe the solution)

design process A creative and interactive approach used to develop solutions to identified problems or human needs. Its associated functions are to investigate, design (development of initial ideas), make, evaluate and communicate.

ergonomics Feature(s) of a product or system that make it user-friendly

evaluate To give it a value or to judge the worth or quality of something

indigenous technology Technology employed by the native inhabitants of a country and which shows an important part of their heritage and which should be protected against exploitation by industrialized countries

project A task in which the time constraints are more relaxed than in an assignment. Projects are normally done over a period of time and not within a short specified time frame

project portfolio A systematic and organised collection of work. It includes findings, successful and unsuccessful ideas, notes on the process that was followed in developing solutions, data, pictures, drawings, and so on. The design process will be evident in a project portfolio.

prototype The original working model on which the final product is based.

specification A detailed description of the requirements or criteria that the solution or product must meet. It gives the specifics within the constraint, e.g. if size is the constraint then 130mm x 100mm x 25mm in size is the specification.

Technological capability The ability to use a combination of skills, knowledge and resources in a variety of contexts to solve a technological problem. Technological capability leads to technological literacy.

Technological literacy The ability to use, understand, manage and assess technology

Technological processes Creative human activities to develop technological solutions in order to satisfy human needs and wants (e.g. manufacturing, design, communicating, evaluating, repairing, restoring, cutting, shaping )
### SELECTION OF ACCEPTABLE CONVENTIONS FOR TECHNOLOGY

(Developed by SAASTE)

<table>
<thead>
<tr>
<th>CONVENTION</th>
<th>DESCRIPTION</th>
<th>USE</th>
</tr>
</thead>
<tbody>
<tr>
<td>Thick or dark line</td>
<td>Outlines of drawings, Lines for cutting, shaping. Outer limits of drawing</td>
<td></td>
</tr>
<tr>
<td>Thin or faint line</td>
<td>Folding or bending lines, dimensions, construction lines</td>
<td></td>
</tr>
<tr>
<td>Dashed line</td>
<td>Hidden details</td>
<td></td>
</tr>
<tr>
<td>Chain line</td>
<td>Centre lines, symmetry lines</td>
<td></td>
</tr>
<tr>
<td>Open dot/circle</td>
<td>Loose pivot</td>
<td></td>
</tr>
<tr>
<td>Closed dot/circle</td>
<td>Fixed pivot</td>
<td></td>
</tr>
<tr>
<td>Line (straight or curved) with arrow on one or both ends</td>
<td>Indicate direction Can be used as a pointer</td>
<td></td>
</tr>
<tr>
<td>Single cell</td>
<td>Energy source</td>
<td></td>
</tr>
<tr>
<td>Battery (two or more cells)</td>
<td>Energy source</td>
<td></td>
</tr>
<tr>
<td>Switch (open position)</td>
<td>Device to open or close a circuit</td>
<td></td>
</tr>
<tr>
<td>Diode</td>
<td>Process device that allows current flow in one direction only</td>
<td></td>
</tr>
<tr>
<td>L.E.D. Light emitting diode</td>
<td>Output device which emits light when small current passes through it</td>
<td></td>
</tr>
<tr>
<td>Capacitor</td>
<td>Process device that can store an electric charge</td>
<td></td>
</tr>
<tr>
<td>Bulb</td>
<td>Output device that lights up when current passes through it</td>
<td></td>
</tr>
<tr>
<td>Resistor (fixed)</td>
<td>Process device that restricts the electric current</td>
<td></td>
</tr>
<tr>
<td>Variable resistor (rheostat)</td>
<td>Adjustable process device to restricts the electric current</td>
<td></td>
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<td></td>
<td>GRADE 7:</td>
<td>GRADE 7:</td>
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<tr>
<td><strong>TERM 1</strong></td>
<td><strong>LEARNING OUTCOMES</strong></td>
<td></td>
</tr>
<tr>
<td></td>
<td>LO 1. Technological Processes and Skills. AS:</td>
<td></td>
</tr>
<tr>
<td></td>
<td>Investigate Design Make Communicate</td>
<td></td>
</tr>
<tr>
<td></td>
<td>LO 2. Technological Knowledge and Understanding. AS: Identify content area Structures and processing</td>
<td></td>
</tr>
<tr>
<td><strong>INTEGRATION:</strong></td>
<td>LOs 1, 2 &amp; 3</td>
<td></td>
</tr>
<tr>
<td><strong>TIME:</strong></td>
<td>11 weeks in 2010</td>
<td></td>
</tr>
<tr>
<td><strong>RESOURCES:</strong></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>ASSESSMENT:</strong></td>
<td>Formal Assessment: Case study, assignments and practical</td>
<td></td>
</tr>
<tr>
<td><strong>Barriers to learning:</strong></td>
<td>*</td>
<td></td>
</tr>
<tr>
<td><strong>ASSESSMENT:</strong></td>
<td>Formal Assessment: Project and exam</td>
<td></td>
</tr>
<tr>
<td><strong>Barriers to learning:</strong></td>
<td>*</td>
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</tbody>
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<table>
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<td><strong>INTEGRATION:</strong></td>
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</tr>
<tr>
<td><strong>TIME:</strong></td>
<td>9 weeks in 2010</td>
</tr>
<tr>
<td><strong>RESOURCES:</strong></td>
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## TECHNOLOGY: SENIOR PHASE LEARNING AREA PROGRAMME
### GRADE 8: WCED WORK SCHEDULES 2010

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<td>Structures</td>
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<td>Bias in Tech</td>
<td>Indigenous Tech and Culture,</td>
<td>Indigenous tech and culture, impact of tech, bias in tech</td>
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<td>Identify content area</td>
<td>Identify content area</td>
<td>Identify content area</td>
<td>(Identify selected content area)</td>
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<td>Systems &amp; control: Mechanical and electronic</td>
<td>Processing</td>
<td>Structures integrated with processing, or systems &amp; control: Mechanical / Electronic</td>
<td>Structures, processing, systems &amp; control: Mechanical, electrical and electronics</td>
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<td>Situation: Bias in society</td>
<td>Situation: Processing materials</td>
<td>Situation: Learner’s Choice</td>
<td>Situation: Learner’s Choice</td>
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**INTEGRATION:** LOs 1, 2 & 3
**TIME:** 11 weeks in 2010
**RESOURCES:**
* ASSESSMENT:
Formal Assessment: Assignment and test

<table>
<thead>
<tr>
<th><strong>INTEGRATION:</strong> LO 1,2 &amp; 3</th>
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<td><strong>TIME:</strong> 9 weeks in 2010</td>
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* ASSESSMENT:
Formal Assessment: Assignment and test

**INTEGRATION:** LO 1 and 2
**TIME:** 10 weeks in 2010
**RESOURCES:**
* ASSESSMENT:
Formal Assessment: National external assessment

**Barriers to learning:**
TERM 1 WEEK 1

REFLECTION AND OVERVIEW

METHODODOLOGY
⇒ Complete school, grade and learning area administration.
⇒ Prepare seating plan.
⇒ Develop classroom code of conduct and share expectations for the term.
⇒ Give learners an overview of Technology for the year.
⇒ Prepare learning area workbook / file and compile index and content page.
⇒ Set the scene for the term by introducing the formal assessment task and discuss the rubric(s).

<table>
<thead>
<tr>
<th>Task 1 Forms of assessment</th>
<th>Possible mark</th>
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</thead>
<tbody>
<tr>
<td>Case study / Assignment: Activity 1</td>
<td>50</td>
</tr>
<tr>
<td>Test: Activity 2</td>
<td>50</td>
</tr>
<tr>
<td>Total for Task 1</td>
<td>100</td>
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</table>

⇒ Ask learners questions relating to technology to determine what they did in the previous grade.
⇒ Take a cool drink can or any other product and engage learners in a class discussion with the following questions and instructions:
  1. What is the need or problem that the product solves?
  2. Name the design features of the product.
  3. What relevant knowledge and skills are required to make the product?
  4. What material is the product made of?
  5. What manufacturing process was used to make the product? What criteria would you use to evaluate the effectiveness of the product?
  6. Sketch the product on an A4 sheet of paper.
⇒ Divide the learners into groups of 5. Each group selects a different product that is available in the classroom and discusses the product in relation to the questions above. Each group gives feedback to the class.
⇒ Give learners a worksheet based on technological knowledge areas and technological process skills. It should contain a picture or illustrations. This can be used as a baseline activity.
⇒ Show examples of best practice from the previous year’s work.
⇒ Learners review the week’s learning and reflect on progress made.

RESOURCES
Textbooks, workbook/file, any made products, examples of good practice, handout

INTEGRATION
Languages

ASSESSMENT
Informal: Teacher observation

VOCABULARY
design process, technological processes, skills, structures, processing, mechanical, electrical, technology, society, environment, information and communication technology, ethical, project portfolio, case study, assignment
TERM 1 WEEK 2

INVESTIGATE EXISTING PRODUCTS

METHODOLOGY
⇒ Divide learners into groups of 5 and provide each group with different packaging material, such as paper, cardboard, tin or plastic, to test the effect that different forces have on it.
  o Learners must suggest strategies to test the packaging for the following forces: tension, compression, bending, torsion, shear force.
  o Learners perform a practical test and note their finding in their books.
  o Learners identify similarities and differences of packaging and tabulate their findings.

Example:  

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Name of product A</th>
<th>Name of product B</th>
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</thead>
<tbody>
<tr>
<td>Shape</td>
<td></td>
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<tr>
<td>Volume</td>
<td></td>
<td></td>
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<tr>
<td>Strength</td>
<td></td>
<td></td>
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<tr>
<td>Content mass</td>
<td></td>
<td></td>
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<tr>
<td>Packaging mass</td>
<td></td>
<td></td>
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<tr>
<td>Mass of material held in the packaging</td>
<td></td>
<td></td>
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<tr>
<td>Price</td>
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<tr>
<td>Forces the product must withstand</td>
<td></td>
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<tr>
<td>Environment friendly</td>
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⇒ Show learners an example of packaging that has collapsed and discuss the reasons for this. Suggest reasons, like weak joints, incorrect material, lack of rigidity, no reinforcement used in the corners, etc.
⇒ Write new vocabulary on flashcards and place them on a word wall.
⇒ Initiate a class discussion on the positive and negative effects packaging has on the environment and on people's lives. Learners present information in their workbooks.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Examples of packaging material (paper, wood, metal, card, plastic) pair of scissors, stationery

INTEGRATION
Languages

ASSESSMENT
Informal: Group assessment of comparative table

VOCABULARY
processing, investigate, compare, scenario/design situation, packaging, properties of materials, life span, safety, impact, environmentally friendly, forces, tension, compression, bending, torsion, shear
TERM 1 WEEK 3

CREATE A SOLUTION

METHODOLOGY
⇒ Use other scenarios to develop understanding of a design brief, constraints and specifications.
   o Constraints are often one-word statements that limit design ideas.
   o Specifications are specific requirements a product must meet.
   o A good design brief is a short and clear statement that gives the general outline of the problem to be solved as well as the purpose of the proposed solutions (It does not describe the solution)
⇒ Explain that limitations are factors that reduce creativity and limit design freedom. Use examples to illustrate.
⇒ Explain the background by reading the scenario and identifying key aspects. The learners read the given scenario on their own and write a design brief, and list constraints and specifications.
⇒ Instruct learners to sketch some design options according to their design brief. Learners write notes to clarify the design features.
⇒ Show how to enhance sketches by using colour, texture, shade, etc.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Stationery, workbook, dictionary

INTEGRATION
Languages

ASSESSMENT
Informal: Self-assessment of design brief and drawings, using a checklist

VOCABULARY
investigate, list, scenario, national context, problem, need, opportunity, decorate, product, design brief, specification, constraint, prototype, generate, alternative solutions, target market, communication, three-dimensional, two-dimensional, sketches, enhancing techniques, appearance

TERM 1 WEEK 4

DEVELOP COMMUNICATION SKILLS

METHODOLOGY
⇒ Demonstrate two-dimensional communication on the board, showing different packaging. Learners copy or draw their own examples.
⇒ Show how to add enhancements, like shade, colour and texture. Instruct learners to fold an A4 page into 4 sections. In each quarter they do a rubbing of different objects with different textures, e.g. wood, sole of a shoe, brick.
⇒ Present a set of formal working drawing as an example.
⇒ Draw formal two- and three-dimensional views of a packaging on the board for learners to copy. Learners add notes to clarify design features (e.g. dimensions), label different views and indicate the materials used.
⇒ Learners review the week's learning and reflect on progress made.
**TERM 1 WEEK 5 AND 6**

**FORMAL ASSESSMENT TASK**

**TASK 1: ACTIVITY 1 – CASE STUDY OR ASSIGNMENT**

**METHODOLOGY**

- Set case study or assignment for learners to complete.
  - The learners read through the case study and identify key words and phrases.
  - They must underline important words, find the meanings of the new words and identify the problem, need or opportunity.
  - Write a design brief and list constraints and specifications.
  - Draw two- and three-dimensional sketches of possible solutions and label them.

**RESOURCES**

- Case study, rubrics, memorandum, stationery

**INTEGRATION**

- Languages

**ASSESSMENT**

- Formal: Teacher assesses Task1 – Activity 1 (Assignment or case study), using a memo and rubric

**VOCABULARY**

- Vocabulary from Weeks 1-4

**TERM 1 WEEK 7**

**DEVELOP COMMUNICATION SKILLS**

**METHODOLOGY**

- Demonstrate how to draw three-dimensional projections (isometric projection)
  - Use isometric grid paper to do drawings.
  - Write notes to clarify the product design features.
- Learners review the week's learning and reflect on progress made.

**RESOURCES:** Stationery, isometric grid paper

**INTEGRATION**

- Mathematics
ASSESSMENT
Informal: Teacher observes learners while drawing

VOCABULARY
Three-dimensional projections, oblique, isometric, drawings, sketches

TERM 1 WEEKS 8 AND 9

PLAN AND MAKE A SOLUTION BASED ON THE SCENARIO

METHODOLOGY
⇒ Use flash cards on a word wall when explaining new concepts.
⇒ Demonstrate techniques learners could used to make packaging. Learners draw up a list of materials and tools they intend to use.
⇒ Present a flow chart for a simple construction process. Learners draw a flow chart to show the main steps they will follow for constructing the product.
⇒ Discuss the following safety rules with learners:
  1. Listen carefully to the instructions.
  2. Do not run or bump each other.
  3. Inform the teacher if you hurt or cut yourself.
  4. Wear protective clothing, where possible.
  5. Keep tools not being used packed away.
  6. Do not use tools or machines you have not been taught to use.
  7. Keep hands away from the line of cut.
  8. Use tools carefully.
 10. When passing tools with sharp edges, keep the sharp edge facing you.
⇒ Be present when learners are constructing the product and observe the process.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Flash cards, stationery, workbooks, pair of scissors, ruler, craft knife, card, glue, adhesive tape

INTEGRATION
Languages

ASSESSMENT
Informal: Peer assesses the planning, the construction and the product, using a checklist

VOCABULARY
make, safety, flow chart, efficient use of materials, materials, tools, measuring, marking, finishing, cutting, shaping, joining
TERM 1 WEEK 10

FORMAL ASSESSMENT TASK
TASK 1: ACTIVITY 2 TEST, teacher assesses, using a memorandum and rubrics

⇒ Completed during the term as per the school's assessment plan as informed by the learning area programme of assessment.
⇒ Follow these steps when setting an activity to be assessed:
  o Specify the date, time, mark allocation, concepts and skills to be assessed.
  o Provide learners with the outcomes of the test. Be specific, you are not trying to trick the learners.
  o Set the activity, using a professional standard based on your school's policy. Headings should include the name of the school, name of the learning area, the date of the assessment, the time duration and the name of the setter and moderator.
  o Instructions and questions should develop from the known to the unknown, from the concrete to the abstract and from the easy to the more complex.
  o An assessment grid should be completed when setting all assessment tasks or activities. The grid indicates the marks allocated for each assessment standard and the cognitive level that each instruction or question reflects.
  o A memorandum and or rubric must be completed prior to the activity being done.
⇒ LO 1, 2 and 3 can be assessed in the test

RESOURCES
Question paper, answer sheet if needed, memorandum and rubrics
TERM 2 WEEK 1

REFLECTION AND OVERVIEW
INVESTIGATE STRUCTURES AND BIAS IN TECHNOLOGY

METHODOLOGY
⇒ Make sure the learners update their workbooks or files.
⇒ Create time for learners to review the previous term's work and reflect on progress made.
  Learners reflect on standard of achievement and write down expectations for the term.
⇒ Set the scene for the term by introducing the formal assessment task and discuss the rubric,

<table>
<thead>
<tr>
<th>Task 2: Forms of assessment</th>
<th>Possible mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project: Activities 1-6</td>
<td>80</td>
</tr>
<tr>
<td>Exam: Activity 7</td>
<td>40</td>
</tr>
<tr>
<td>Total for Task 2</td>
<td>120</td>
</tr>
</tbody>
</table>

⇒ Divide learners into groups of 5. Handout pictures or models of real structures, e.g. chair, tower, bridge, etc., or show a video of structures and ask them to respond to the following questions and instructions:
  1. Name the types of structure.
  2. What materials are they made of?
  3. List the properties of those materials.
  4. Name and identify the joining techniques.
⇒ Display pictures of different bridges or any other structures. Use flash cards and introduce the structural components: columns, beams, arches, buttresses, struts, stays, guys, ties.
⇒ Give learners a worksheet with pictures of a play park to identify, to label the different structural components and to describe their safety, suitability and fitness for purpose.
⇒ Use the following as a guide to develop a questionnaire that learners will use to collect data when they visit a play park, or view pictures or a video of one:
  o Type of equipment in the play park
  o Size of equipment: (length x breadth x height)
  o The material(s) the equipment is made of
  o The sizes (weights and heights) of the users of the equipment
Learners will present the information using tables or other suitable methods, and draw conclusions based on the relationship between the sizes of the users and the equipment.
⇒ Promote a discussion on how various structures often do not take into account people who have disabilities.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Flashcards, video, workbooks/files, models of structures, pictures of bridges or play parks

INTEGRATION
Languages

ASSESSMENT
Informal – Peer assessment of worksheets using checklist

VOCABULARY
compare, product, structural component, column, beam, arch, buttress, strut, stay, guy, ties, bias
TERM 2 WEEK 2

INVESTIGATE STRUCTURAL COMPONENTS

METHODOLOGY
⇒ Ask learners to collect pictures of structures with different structural components. They identify and describe the various components.

⇒ Give learners a scenario that requires the construction of a tower that will support a load, e.g. a water tank.
  o Learners sketch their ideas
  o Provide learners with the material and equipment (scissors, paper straws, pins and tape) to make a frame structure using reinforcement techniques.
  o Test the structure by placing books on the structure to see how rigid, stable and strong it is.
  o Turn the structure upside down and place books on it. Observe what happens and give reasons.
  o Keep five of the completed towers to use in the evaluation session in Week 7.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Flashcards, paper straws, tape, pins, scissors

INTEGRATION
Languages

ASSESSMENT
Informal – Peer assessment of worksheets using checklist
Formal: Teacher assesses Task 2: Activity 1 (Practical investigation), using an analytical rubric

VOCABULARY
structures, investigate, structural components, columns, beams, arches, buttresses, struts, stays, guy, ties, reinforcing techniques, joining techniques, stable, strong

TERM 2 WEEK 3

WRITE A DESIGN BRIEF AND DEVELOP DESIGN IDEAS BASED ON THE SCENARIO

METHODOLOGY
⇒ Discuss the scenario presented and guide learners to analyse it.
⇒ Use flashcards to introduce reinforcing techniques for frame structures. Demonstrate and show the learners what triangulation, fillets, webs, orientation and cross sections are.
⇒ Provide learners with a tape measure to measure anthropometric data.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Illustrations of reinforcing techniques, flash cards, tape measure / ruler, workbooks, etc.
INTEGRATION
Languages and Natural Sciences

ASSESSMENT
Formal: Teacher assesses Task 2: Activity 2 (Design), using an analytical rubric

VOCABULARY
investigate, access data, design brief, specifications, constraints, alternative solutions, chosen solution, frame structures, reinforcing, triangulation, fillets, webs, orientation, cross sections

TERM 2 WEEK 4
DEVELOP THE CHOSEN DESIGN BASED ON THE SCENARIO

METHODOLOGY
⇒ Use two chairs of different designs and ask the learners to identify the similarities and differences. Indicate which one would be able to hold 5 learners and give the reasons for the choice

⇒ Demonstrate orthographic drawings and indicate correct line types and dimension lines.
⇒ Hand out a worksheet with pictures of frame structures that shows possible structural failure.
  o Learners draw in the appropriate reinforcement techniques.
  o Learners choose one of the pictures on the worksheet and draw a working drawing showing all the relevant South African conventions, e.g. line types, measurements, labels.

⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Chairs, examples of orthographic drawings, pictures of structures, worksheets, workbook,

INTEGRATION
Languages

ASSESSMENT
Informal: Peer observation
Formal: Teacher assesses Task 2: Activity 3 (Communication), using an analytical rubric

VOCABULARY
communication, plans for construction, orthographic projection, dimension lines, line types, design notes, structures, stable strong, strengthening, base size and shape, centre of gravity

Figure 1 Orthographic Drawing layout
REF: http://www.tech.plymouth.ac.uk
TERM 2 WEEK 5

PLAN FOR MAKING BASED ON THE SCENARIO

METHODOLOGY
⇒ Demonstrate suitable safe construction procedures. Learners draw up a list of materials and tools they intend to use.

⇒ Draw a simple flow-chart to show the construction steps. Learners develop own steps for construction procedure they will follow.

⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Stationery, flash cards, suitable tools, materials

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 2: Activity 4 (Construction plan), using an analytical rubric

VOCABULARY
plan, material, tools, safety, steps for construction, flow chart, measuring, marking, cutting, shaping, joining, finishing

TERM 2 WEEK 6 AND 7

MAKE A SOLUTION BASED ON THE SCENARIO

METHODOLOGY
⇒ Provide learners with all the necessary tools and materials to create their solution in class.
⇒ Observe the construction process, making sure that safety procedures are applied.
⇒ Learners review the week's learning and reflect on progress made

RESOURCES
Cardboard, wood, plastic, saw, pair of scissors, glue, glue gun, nails, and hammer

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 2: Activity 5 (Practical), using an analytical rubric

VOCABULARY
Make, safety, checks to improve quality, efficient use of materials
TERM 2 WEEK 8

EVALUATE THE PRODUCT AND THE DESIGN PROCESS BASED ON THE SCENARIO

METHODOLOGY
⇒ Debate the evaluation of products by discussing the criteria used to purchase a similar product made by a different company. e.g. cellphone, jeans, shoes. Distinguish between assessing and evaluating a product.

⇒ Evaluate the towers made in Week 2
  o Divide the learners into groups of 5 and give each group a tower made in Week 2.
  o Test the strength of the structure by placing heavy objects on it.
  o Continue adding weights till the structure collapses.

⇒ Learners list their observation as to why the structure collapses and suggest improvements for making the structure stronger. Based on their suggested improvements, each learner sketches the structure and labels design feature added to strengthen the structure.

⇒ Give learners a checklist with a set of criteria to evaluate their product.
  o List the strength and weaknesses of the process and the product.
  o Identify any improvements that could be made.
⇒ Learners review the week's learning and reflect on progress made.

PRESENT THE DESIGN PROCESS AND THE PRODUCT BASED ON THE SCENARIO
⇒ Explain and or demonstrate available ICT and show how it can help improve presentations.
  Learners display and present evidence of work done during the term in a suitable format e.g. portfolio.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Tower, books, stones, questionnaires, pictures of a play park, stationery, tape measure, ruler, project portfolios, ICT equipment or pictures, workbooks

INTEGRATION
Languages

ASSESSMENT
Informal: Learner observation when testing the tower
Formal: Teacher assesses Task 2 Activity 6 (Evaluate), using an analytical rubric.

VOCABULARY
test, evaluate, objectivity, design brief, specifications, suggest improvement, modify, weaknesses, structural failure, design bias, information communication technology, project portfolio
TERM 2 WEEK 9

FORMAL ASSESSMENT TASK

Task 2: Activity 7 Exam – Assessed by the teacher using a memorandum and rubrics

⇒ Complete during the term as per the school’s assessment plan as informed by the learning area programme of assessment.
⇒ Learners are assessed on LOs 1, 2 and 3.

RESOURCES
Question paper, answer sheet (if needed), memorandum and rubrics

TERM 2 WEEK 10

FINAL RECORDING AND REPORTING
TERM 3 WEEK 1

REFLECTION AND OVERVIEW

METHODOLOGY

⇒ Make sure the learners update their workbooks/files.
⇒ Create time for learners to review the previous terms work and reflect on progress made.
⇒ Learners reflect on standard of achievement and write down expectations for the term.
⇒ Set the scene for the term by introducing the formal assessment task and discuss the rubric.

<table>
<thead>
<tr>
<th>Task 3: Forms of assessment</th>
<th>Possible mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Project: Activities 1-6</td>
<td>100</td>
</tr>
<tr>
<td>Test: Activity 7</td>
<td>20</td>
</tr>
<tr>
<td>Total for Task 3</td>
<td>120</td>
</tr>
</tbody>
</table>

⇒ Read the scenario and analyse it to identify a possible need or problem to be solved.
⇒ Use a simple mechanical system, e.g. hole punch, stapler, and highlight the following key features: They make a job easier. It involves movement. A force is involved. It requires an input. It produces a specific output.
⇒ Demonstrate and explain the use of force used in different mechanical systems and present a systems diagram for a hydraulic system
⇒ Provide learners with suitable resources to complete a research activity on how different cultures solved the similar problems identified in the scenario.
⇒ Plan for learners to display their research in the classroom in Week 2.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Textbooks, workbooks, stationery, examples of mechanical systems, syringes, plastic tube, reference books

INTEGRATION
Languages

ASSESSMENT
Informal: Teacher observation
Formal: Learners start Task 3, Activity 1 (Research), to be presented at the end of Week 2.

VOCABULARY
investigate, scenario, problem, needs, mechanical systems, value of force, systems diagram, pneumatics, hydraulics, indigenous technology, cultures
TERM 3 WEEK 2

INVESTIGATE HYDRAULIC AND PNEUMATIC SYSTEMS

METHODOLOGY

⇒ Compare existing products to explain the differences between HYDRAULICS (use of oil under pressure) and PNEUMATICS (use of air under pressure) and present them using systems diagram.
   Information:
   o Doors in buses and trains operate by means of pneumatics systems. Air can be compressed and is thus safer to use where people are involved.
   o Refuse trucks will use hydraulic systems as a greater force is needed. Liquids cannot be compressed.

⇒ Demonstrate mechanical advantage of hydraulic and pneumatic systems.
   o Divide the class into groups of 5 learners. Give each group four syringes of different capacity (e.g. 2 x 5 ml and 2 x 10 ml) and a 200 mm length of tubing. Instruct groups as follows:
     • Connect two syringes of different sizes with tubing as shown.
     • Connect another pair and fill the system with water. Ensure that there are no air bubbles in the system. Push in the plunger of syringe A (the smaller syringe) and observe what happens to syringe B. Reverse the process.
     • Learners answer the following questions:
       1. Which plunger, used as the input, is easier to push in?
       2. Describe the distance the plunger in syringe A (input) moved when pressed, in relation to the plunger in larger syringe B (output).
       3. Discuss the relationship between the input force or effort needed to move the plunger in the input syringe and the force achieved on the output.
       4. Identify and explain the advantages and/or disadvantages you observed [Answer: The distances the plungers move are different. It is easier to press the smaller plunger, which moves a longer distance when compared to the distance the plunger in the output syringe moves. The larger syringe will require more effort to press the plunger for a shorter distance, but with an increase output distance in the smaller syringe.] Note: By adjusting the size of the syringes it is possible to show how to multiply force (see Figure 2). A small mass on a small syringe can lift a much larger mass if it is resting on a bigger syringe. This is because the pressure in the two syringes is equal, but the surface areas of the two pistons are different, and force = pressure × area.

⇒ Instruct learners to draw a systems diagram to show the working of a hydraulic system and/or pneumatic system.
⇒ Review learning by displaying pictures that show hydraulic and pneumatic systems in use.
⇒ Write the words hydraulics, pneumatics, force, input, output and motion, on flash cards and place them on the word wall.
⇒ Learners review the week's learning and reflect on progress made.
⇒ Allow time for learners to present and display their research in the classroom.
RESOURCES
Textbooks, workbooks, stationery, syringes, tubing, water, pictures/videos

INTEGRATION
Languages and Natural Sciences

ASSESSMENT
Formal: Teacher assesses Task 3: Activity 1 (Research), using an analytical rubric

VOCABULARY
Compare, collect data, poster, report, systems and control, mechanical, pneumatics, hydraulics, motion, force, systems diagram, plunger, syringe, input, process, output distance, mechanical advantage

TERM 3 WEEK 3
INVESTIGATE MECHANICAL ADVANTAGE

METHODOLOGY
⇒ Show a range of mechanical components for learners to identify, e.g. gears, pulleys, levers.
⇒ Provide learners with a tabulated list of symbols that represent different mechanical components.
⇒ Prepare group investigation activities using made components or mechanical kits to demonstrate understanding of the mechanical advantage of different mechanical systems:
  ○ Gear systems
  ○ Pulley-/ belt-drive systems
  ○ Linked lever systems

⇒ Explain "mechanical advantage" (MA)
  ○ Demonstrate, using a car jack, how easy it is to lift a heavy object.
  ○ Machines are used to make work easier and faster. How much easier and faster a machine makes your work is the mechanical advantage of that machine. In scientific terms, the mechanical advantage is the number of times a machine multiplies your effort force.
  ○ Learners must be able to describe mechanical advantage.
  ○ Provide the equation to calculate the mechanical advantage of a lever system:
Expanded Opportunity:

⇒ More advanced calculations can be done to develop further understanding of mechanical principles. These calculations are not specified as part of the curriculum, but do allow for a better understanding of the mechanical principles.

\[
\text{Gear Ratio: } = \frac{\text{number of teeth on the driven gear}}{\text{number of teeth on the drive gear}}
\]

\[
\text{Velocity Ratio: } = \frac{\text{diameter of driven pulley}}{\text{diameter of drive pulley}}
\]

⇒ For further understanding consult your textbook or any other suitable reference book.

⇒ Draw up a worksheet for learners to reflect their understanding of the principles investigated during the week. Possible instructions for the worksheet:
  - Match corresponding mechanical components with mechanical systems and indicate direction of movement.
  - Describe the mechanical advantage of a specific system.
  - Determine mechanical advantage when given the formula.
  - Sketch systems to solve a specific need or identified problem, and present them, using a systems diagram.

RESOURCES
mechanical components, mechanical kits, cardboard, pins, pair of scissors, paper fasteners, elastic bands, glue, worksheet, pictures

INTEGRATION
Languages, Mathematics and Natural Sciences

ASSESSMENT
Informal: Teacher observation of learners doing practical investigation activities
Peer assessment of the completed worksheet using a memorandum

Mechanical Advantage (MA) = load (L) divided by effort (E): \( MA = \frac{L}{E} \)

\[
MA = \frac{50N}{10N} = 5 \quad \text{or mechanical advantage of 5}
\]

Conclusion:
It is five times more difficult to lift the load without the lever or a load 5 times greater can be lifted with the same effort.

Mechanical advantage allows for a larger load to be moved with a smaller effort

NOTE:
- Effort is measured in Newtons
- Load is measured in kilograms and must be converted to newtons
- 1 kg = 10 Newtons
TERM 3 WEEK 4

DESIGN A SOLUTION BASED ON THE SCENARIO

METHODOLOGY
⇒ Complete investigation activities from the previous week prior to learners writing the design brief, and listing constraints and specification linked to given scenario.
⇒ Learners start their design sketches to show possible solutions and complete the design stage as related to the problem identified in the scenario.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Stationery, project portfolio

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 3: Activity 2 (Design) – using an analytical rubric

VOCABULARY
design, design brief, constraint, specification, generates solutions, design notes, chooses best design, develops design

TERM 3 WEEK 5

COMMUNICATE A FINAL DESIGN BASED ON THE SCENARIO

METHODOLOGY
⇒ Demonstrate communication skills by showing the difference between orthographic, oblique, isometric and perspective drawing skills.
  o Draw an example of a simple shape in orthographic, isometric and oblique on the board.
  o Emphasize the use of South African drawing conventions, types of lines and dimension lines.
  o Follow the steps below to show how to construct a simple one-point perspective drawing of the same shape.

Step 1. Draw one side of the cube and select a vanishing point (marked with an 'X').

- 28 -
Step 2. Draw very faint lines from each corner to the vanishing point.
Step 3. Draw horizontal and vertical lines for the back of the cube.
Step 4. Go over the faint perspective of the cube so that the lines that make up the cube are dark and sharp.
Step 5. Learners practise by drawing their own drawings.

⇒ Learners review work and complete drawings that outline the plan for their designed construction.

RESOURCES
Stationery, grid paper, drawing equipment

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 3: Project Activity 3 (Communication), using an analytical rubric

VOCABULARY
plan for construction, drawings, sketches, two-dimensional, three-dimensional, orthographic, oblique, isometric, perspective, projection lines, construction lines, hidden lines, visible lines, dimensions lines

TERM 3 WEEK 6

PLAN FOR MAKING A SOLUTION BASED ON THE SCENARIO

METHODOLOGY
⇒ Provide a range of possible tools and material that can be used to create a solution.
⇒ Demonstrate and describe the purpose of each tool and how to work safely.
⇒ Explain the stages of the planning process. Learners complete these in their project portfolio.
  o List materials and tools.
  o Present sequenced steps for construction.
  o List safety procedure.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Project portfolio, stationery

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 3 Activity 4 (Plans to make), using an analytical rubric

VOCABULARY
planning, resources, material, tools, safety, construction processes
TERM 3 WEEKS 7 and 8

MAKE A SOLUTION BASED ON THE SCENARIO

METHODOLOGY
⇒ Demonstrate appropriate construction processes and joining skills as needed to create the solution
⇒ Provide learners with all the necessary tools and materials. Learners must create a solution in class.
⇒ Remind learners about safety measures while working with the tools, and efficient use of materials
⇒ Learners complete the construction and reflect on progress made.

RESOURCES
Cardboard, wood, plastic, saw, pair of scissors, glue, glue gun

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 3 Activity 5 (Practical), using an analytical rubric

VOCABULARY
make, marking out, measuring, cutting, joining, finishing, work safely, efficient use of materials

TERM 3 WEEK 9

EVALUATE THE PRODUCT AND PRESENT THE CONSTRUCTION PROCESS, BASED ON THE SCENARIO

METHODOLOGY
⇒ Provide learners with a checklist with set criteria to evaluate the product and the construction process.
⇒ Instruct learners to do the following:
  o Develop a test to evaluate the functionality of the product.
  o List the strength and weaknesses of the process followed and the final product.
  o Suggest improvements to the process followed to improve efficiency when constructing.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Evaluation checklist

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 3 Activity 6 (Evaluate), using an analytical rubric

VOCABULARY
test, evaluate, objective criteria, design brief, specifications, constraints, improvements, modification, efficiency of plan, project portfolio
TERM 3 WEEK 10

FORMAL ASSESSMENT
Task 3: Activity 7: Test Assessed by the teacher using a memorandum and rubrics

⇒ Complete during the term as per the school's assessment plan as informed by the learning area programme of assessment.
⇒ Learners are assessed on LOs 1, 2, and 3.

RESOURCES
Question paper, answer sheet (if needed), memorandum and rubrics
TERM 4 WEEKS 1

REFLECTION AND OVERVIEW

METHODOLOGY
⇒ Make sure the learners update their workbooks/files.
⇒ Create time for learners to review the previous terms work and reflect on progress made.
⇒ Set the scene for the term by introducing the formal assessment task and discuss the rubric(s).

<table>
<thead>
<tr>
<th>Task 4: Forms of assessment</th>
<th>Possible mark</th>
</tr>
</thead>
<tbody>
<tr>
<td>Assignment: Activity 1 - Investigation report</td>
<td>20</td>
</tr>
<tr>
<td>Assignment: Activity 2 - Design / Communicate</td>
<td>50</td>
</tr>
<tr>
<td>Exam: Activity 3:</td>
<td>50</td>
</tr>
<tr>
<td>Total for Task 4</td>
<td>120</td>
</tr>
</tbody>
</table>

⇒ Draw electrical circuit diagrams of series and parallel circuits on the board and revise basic concepts:
  o Describe the components and symbols for a cell, switch, connecting wire, light bulb, motor.
  o Build or show an example of the circuits.
  o Draw a systems diagram for a simple electrical product: e.g. hair drier.

⇒ Indicate the key features of the scenario by presenting a spider diagram on the board for learners to copy.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Electrical products, models of parallel and series circuits, cells, switch, connecting wire, bulb, motor

INTEGRATION
Languages and Natural Sciences

ASSESSMENT
Informal: Teacher observes learners’ responses to electrical knowledge concepts

VOCABULARY
background context, environment, need, problems, wants, solutions, systems and control, electrical product, parallel circuit, series circuit, systems diagram, circuit diagram
TERM 4 WEEKS 2

ELECTRICAL PRODUCTS AND THEIR IMPACT ON SOCIETY

METHODOLOGY
⇒ Remind learners about the problem identified in the scenario and explain the link between the problem to be solved and parallel and series circuits.
  o As there are two entrances to the home, the solution will need two input devices. However, with only one person on duty, only one output device is needed.
  o Learners need to decide on the appropriate method to connect the devices.
⇒ Display a selection of switches as input or control devices or use illustrations to show what they look like.
⇒ Examples:

<table>
<thead>
<tr>
<th>Push-button switch</th>
<th>Single-pole single-throw (SPST) switch</th>
<th>Single-pole double-throw (SPDT) switch</th>
</tr>
</thead>
<tbody>
<tr>
<td><img src="image" alt="Symbol" /></td>
<td><img src="image" alt="Symbol" /></td>
<td><img src="image" alt="Symbol" /></td>
</tr>
<tr>
<td>Current flows only when the button is pressed. Often used on a doorbell.</td>
<td>An on/off switch. Current flows only when it is the closed position.</td>
<td>A two-way changeover switch. It directs the current into one of two routes.</td>
</tr>
</tbody>
</table>

REF: www.kpsec.freeuk.com
⇒ Draw the symbols of the switches on the board for the learners to copy.
⇒ Provide learners with resources and references to prepare a written report on the positive and negative impact that electrical products have on the quality of life and the environment in which they live, as well as any bias evident with reference to human rights issues.
  o Hold an open class discussion for learners to share ideas.
  o Each learner individually writes an A4 page report on the topic.

RESOURCES
Flashcards with key words, textbook, examples of switches / pictures of switches

INTEGRATION
Languages and Natural Sciences

ASSESSMENT
Formal: Teacher assesses Task 4 Activity 1 (Investigation Report), using an analytical rubric

VOCABULARY
information sources, report, electrical products, electrical circuits, input device, control device, impact of technology, bias in technology, human rights
TERM 4 WEEK 3

INVESTIGATE LOGIC CONDITIONS – “AND” and “OR” GATE

METHODOLOGY
⇒ Make notes and diagrams on the board to explain an “AND” logic condition, e.g. use an electrical circuit with the switches connected in series and describe where it is used.
⇒ Build the circuit to illustrate an “AND” logic gate.

<table>
<thead>
<tr>
<th>“AND” logic gate</th>
<th>Series circuit diagram (Switching circuit with 2 switches in series)</th>
<th>IEC symbol for the &quot;AND&quot; gate</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td><img src="image" alt="Series circuit diagram" /></td>
<td><img src="image" alt="IEC symbol" /></td>
</tr>
</tbody>
</table>

REF: [www.kpsec.freeuk.com](http://www.kpsec.freeuk.com)

⇒ Draw systems diagram to illustrate how the “AND” gate works.
⇒

INPUT
Switch S1 and S2 is ON

PROCESS
Current flows

OUTPUT
Light shines

⇒ Draw the truth table for the “AND” logic gate on the board and explain what a truth table is.
  ○ NOTE:
    When a device is on, it is recorded as a “1”. This means the switch is closed.
    When a device is off, it is recorded as a “0”. This means the switch is open.
  ○ The truth table for an “AND” gate will look like the following:

<table>
<thead>
<tr>
<th>Input “A” S1</th>
<th>Input “B” S2</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

  ○ Give learners an example without the output recorded and have them complete it in their workbooks.

⇒ Make notes and diagrams on the board to explain “OR” logic condition, e.g. use an electrical circuit with the switches connected in parallel and describe where it is used.
⇒ Build the circuit to illustrate an “OR” logic gate.
“OR” logic gate

Parallel circuit diagram (Switching circuit with 2 switches in parallel) | IEC symbol for the OR gate
---|---

![Parallel circuit diagram](image)

![IEC symbol for OR gate](image)

REF: [www.kpsec.freeuk.com](http://www.kpsec.freeuk.com)

⇒ Draw a truth table for an “OR” logic gate on the board.
  o The truth table for an “OR” gate will look like the one below.
  o Use the above circuit and complete a truth table. (see example below)

<table>
<thead>
<tr>
<th>Input A</th>
<th>Input B</th>
<th>Output</th>
</tr>
</thead>
<tbody>
<tr>
<td>S1</td>
<td>S2</td>
<td></td>
</tr>
<tr>
<td>0</td>
<td>0</td>
<td>0</td>
</tr>
<tr>
<td>1</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>0</td>
<td>1</td>
<td>1</td>
</tr>
<tr>
<td>1</td>
<td>1</td>
<td>1</td>
</tr>
</tbody>
</table>

⇒ Give learners an example without the output recorded. They must then complete it in their workbooks.

⇒ Learners review the week's learning and reflect on progress made.

Expanded opportunity

⇒ Explain the use of integrated circuits in modern electronics.

**Note:** Switches and lights have been used to explain the concepts of “AND” and “OR” gates. In modern electronics, integrated circuits (ICs) are used. Integrated circuits are small devices that integrate at lot of gates.

REF: [www.kpsec.freeuk.com](http://www.kpsec.freeuk.com)

RESOURCES
Stationery, flashcards, electrical components, light bulb, switches, connecting wire

INTEGRATION
Languages and Natural Sciences

ASSESSMENT
Informal: Teacher's question and answer session

VOCABULARY
compare products, electrical systems, practical demonstration, circuit diagram, systems diagram, series circuit, parallel circuit, symbols, open switch, closed switch, logic gate, “AND gate”, “OR gate”, truth table
TERM 4: WEEKS 4 & 5

DESIGN AND COMMUNICATE A SOLUTION BASED ON THE SCENARIO

METHODOLOGY
⇒ Review the analyse of the scenario completed in Week 1
⇒ Prepare learners to continue with their Formal Assessment Task 4 Activity 2 by doing the following:
  o Writing a design brief and listing constraints and specifications
  o Presenting a circuit diagram and a systems diagram of an electrical systems to solve the problem
  o Drawing a truth table for their solution
  o Listing tools, materials and devices to build the solution
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Stationery

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 4 Activity 2 (Design and Communicate), using the analytical rubric

VOCABULARY
design brief, constraints, specifications, circuit diagrams, systems diagram, truth tables, electrical symbols, electrical components, tools, materials, logic gates

TERM 4 WEEK 6

PRESENT DESIGN AND COMMUNICATION SKILLS BASED ON THE SCENARIO

METHODOLOGY
⇒ Remind learners of the requirements, as stated in the scenario, that must be presented:
  o A scale drawing showing the layout of the problem
  o The circuit diagram used in the solution
  o The truth table
  o An explanation of the installation process
⇒ Give learners class time to complete the evidence listed above and to present it for formal assessment.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Stationery

INTEGRATION
Languages

ASSESSMENT
Formal: Teacher assesses Task 4: Assignment using an analytical rubric

VOCABULARY
presentation skills, information and communication skills, assignment, report, design, communicate
TERM 4 WEEK 7

REVISE AND CONSOLIDATE COMMUNICATION SKILLS

METHODOLOGY

⇒ Select a simple product and use it to demonstrate and revise a range of South African drawing conventions by drawing the following on the board:
  o Orthographic projection (1st angle)
  o Three-dimensional drawings (oblique)
  o Three-dimensional drawings (isometric)
  o Three-dimensional drawings (one-point perspective)
  o Types of lines
  o Dimension lines
  o Enhancing techniques
  o Labels
  o Notes to clarify meaning

⇒ Identify a range of other products for learners to demonstrate their communication skills. Learners complete their own set of drawings based on the examples on the board.
⇒ Learners review the week's learning and reflect on progress made.

RESOURCES
Stationery, drawing equipment, paper

INTEGRATION
Languages

ASSESSMENT
Informal: Peer assessment using a checklist or analytical rubric for communication

VOCABULARY
presentation skills, sketches, drawings, projection, two-dimensional, three-dimensional, orthographic, oblique, isometric, perspective, labels, notes, dimension lines, construction line, hidden line, visible line, tone, texture, colour, shading, notes

TERM 4 WEEK 8

FORMAL ASSESSMENT
Task 4: Activity 3 (Exam), assessed by the teacher using a memorandum and rubrics

⇒ Complete as per the school's assessment plan as informed by the learning area programme of assessment
⇒ Learners are assessed on LOs 1, 2, and 3.

RESOURCES
Question paper, answer sheet (if needed), memorandum and rubrics

TERM 4 WEEK 9 AND 10

FINAL RECORDING AND REPORTING

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