SAASTE Technology

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What is Technology Education?

A definition of technology can be taken from any technology curriculum, but what it means to each individual is dependant on ones understanding of technology.

Below are some teachers understanding of technology:

Technology teaches communication, problem solving, finding solutions (based on informed choices), time and self management. Technology reinforces the fact that there are often many solutions to problems. *Ricardo Miller*

Technology is a process whereby learners identify a need or opportunity .Through the acquisition of knowledge they apply their skills. It stimulates critical thinking and creativity. *Averil Nolly*

It is about using the relevant skills, knowledge, and creativity making a contribution to address the problem in a particular situation by making use of necessary materials. It is a technique of doing something to solve a particular problem. *Nonzali Mzizi*

Technology is about applying the knowledge and skills which was acquired to meet certain needs and wants of society. *Cheryl Jafta*

Engaging in a process (Investigate, design, make and evaluate) to solve human needs and wants. *Deon Khan*

The RNCS does not say what I must do!

This sets the stage for a basic differentiation between a curriculum and a syllabus...

(TECHNOLOGY Revised National Curriculum Statement (RNCS)) A curriculum states in general terms concepts, skills, attitudes & awareness that should be developed, whilst, a syllabus is specific about what exactly must be developed e.g. a curriculum might say manipulative skills , while a syllabus might say cutting.

The RNCS is a curriculum statement, not a syllabus.

In each of the learning outcomes assessment standards spells out the minimum that a learner should be able to do and know at any particular grade level. What it says are the key concepts and ideas that should be developed. These can be developed through activities that are relevant to the concept of idea. Minimum does not preclude learners functioning at levels higher that those for a specific grade. Many of the assessment standards have some text within brackets. These texts are prefaced with; such as , e.g. and some are not prefaced. Interpretation of these texts will depend largely on whether the reader analyses it linguistically, technically, or emotively. Whatever the approach, it must not detract from the core requirement of the assessment standard.

The development of technology in the RNCS through the assessment standards suggests an approach which can be summed up thus:

- FP - craft-like in the approach to projects focus on the developing of manipulative skills
- IP - some elements of reproduction and/or adapting of existing products focus on development of cognitive skills while further developing manipulative skills
- SP - more innovative no reproduction focus on the honing of manipulative and specific skills greater emphasis on creative and lateral thinking.

Teaching and learning in Technology must be aimed at developing Technological Literacy so that learners are empowered to cope with the challenges of a technological society. As all developments are manifested through economic, political, social and environmental context there is a need for an understanding of the interconnections between technology, society and the environment. Inherent in the development towards technological literacy is Technological Capability. In the South African technology curriculum, the development of the skills associated with problem solving lies at the heart of capability.

What are these Learning Outcomes about?

The Learning Outcomes in the Technology Learning Area are interrelated statements that state in broad terms the facets that are considered vital to develop technological literacy in learners. The three outcomes focus on the following:

Learning Outcome 1

The learner is able to apply technological processes and skills ethically and responsibly using appropriate Information and communication Technologies

This outcome is a **SKILLS** outcome. The technological process is a way of doing something (like the scientific process skills). When a learner does technology he/she is demonstrating the

ability to do the skill. But the outcome talks of Process and Skill this refers to the stages of the process (South African) which are: Investigate Design, Make, Evaluate and Communicate. Each of these stages has skills associated with them, viz:

- Investigate: the skills of Finding out.
- Design: the skills of Planning / Decision making.
- Make: the skills of Making / Manufacturing.
- Evaluate: the skills of Reflecting / Checking.
- Communicate: the skills of Communication.

Learning Outcome 2

The learner is able to understand and apply relevant technological knowledge ethically and responsibly.

This outcome is about the **Content** (South African) through which we do our technology. It states the Knowledge and Understanding in the areas that form the focus of our studies. These are; Structures, Processing, and Systems & Control. Each of these are have information (knowledge) associated with them, but acquiring knowledge on its own is of no use unless there is an understanding of it. It is **Very Important** to note that the knowledge is written in as concepts. Refer to the section on Key Concepts to gain a better understanding of what is required in terms of these areas.

Learning Outcome 3

The learner is able to demonstrate an understanding of the inter-relationships between technology, society and the environment.

This outcome is about the interrelationship between **Science & Technology and Society**. It is designed to provide opportunities to develop **Awareness** of and opportunities to come up with strategies to address situations. This outcome is by far the **Most Powerful** of the outcomes because it gives us reasons for doing Technology. This outcome can **provide** the context and situations / scenarios for technology modules / projects. Technology exist because of us (our needs, wants and aspirations, to fix the things we do wrong and improve on the things we do right) and Technology is for us (to make our lives easier and comfortable). It is also important to note that this outcome is **Exactly** the same in the **Natural Science** learning area.

Key Concepts

The key concepts are the results of the lead teachers analysis of all the assessment standards. It talks to the key aspects that need to be addressed in each outcome at any grade level.

- Grade 4
- Grade 5
- Grade 6
- Grade 7
- Grade 8
- Grade 9

Modules

Our modules are complete units of work that contain a series of enabling activities / tasks and a challenge.

Each of these modules is designed to provide the learner with an opportunity to apply knowledge and skills in an authentic situation.

- Processing Grade 8/9
- Mechanical Systems Grade 9
- Structures Grade 5
- Structures Grade 8

Activities

The activities have been designed to develop specific knowledge & associated skills that form the core of the assessment standards of the various grades. These must not be considered, nor taken to be "technology" - They are only enabling activities designed specifically to assist you with ideas for the development of concepts, what needs to be taught, learnt, so that learners have a chance at success when engaging in technology. The activities are not contextualised in any module as such and are not about making a product, as our focus is on the development of concepts.

- Conductors & Insulators

- Electronic Circuits
- AND & OR Gates
- Circuit/Systems Diagram
- Hydraulics
- Hydraulics & Pneumatics
- Technological Products
- Preservation-1
- Identifying Materials
- Properties of Materials
- Preservation-2
- Electroplating
- Conditioning-Strengthening/Waterproofing-1
- Conditioning-Strengthening/Waterproofing-2
- Shaping
- Forming
- Forces
- Types of Structures
- Mechanisms Worksheet

Key Concepts

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Grade 4

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KEY CONCEPTS, KEY FOCUS and IMPLICATIONS for TEACHING & LEARNING of Technology through the RNCS.		
Grade 4		
Investigates: • background context to situation • Existing products â identify main design aspects science process skills (if appropriate)	***Systems*** & Control: • Produce motion using simple mechanisms • Input - Output	***Impacts:*** technological products (express opinions on how these products makes lives easier)
Designs: Design brief • possible solutions (linked to design brief & specifications and/or constraints.) • choice	***Processing:*** Properties of materials (Physical & Chemical) and the influence these properties have on the effectiveness of products.	***Biases*** : technological products (Express opinions on how certain groups are disadvantaged by these products)

of solution with reasons		
Makes : Planning Materials list Tools list Neatness and safety	***Structures****:* Strengthening parts of and/or complete structures.	***Indigenous*** Technology: • Local Indigenous cultures (Describe use of scientific principles & technological products for specific purposes)
Evaluates : - with assistance • Product according to brief • Suggests improvements/modifications to product if necessary		
Communicates: • 2D (1st) *enhanced sketches / drawings (colour/ shading/ rendering) systems diagrams (input, process, output) • notes, labels, dimensions SA drawing conventions (for above)		

Grade 5

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KEY CONCEPTS, KEY FOCUS and IMPLICATIONS for TEACHING & LEARNING of Technology through the RNCS		
Grade 5		
Investigates: • background context to situation (list advantage / disadvantage of solution to people) • Existing products â identify some design aspects science process skills (if appropriate)	***Systems*** & Control: • conversion of energy from a chosen source to mechanical energy (movement) • Input - Output	***Impacts:*** scientific developments & technological products (Identify positive & negative effects on people / environment)
Designs: Design brief • possible solutions (linked to design brief & specifications and/or constraints.) • choice	***Processing:*** • Using Forming, Shaping & Conditioning techniques to transform materials into products	***Biases*** : technological products & services (Describe consequences of lack of access on certain groups)

of solution with reasons • chosen solution developed further		
Makes: Planning Materials list Tools list Neatness, safety, material use	***Structures:*** • Types of structures. • Relationship between materials & structures.	***Indigenous*** Technology: technological products (Explain the adaptation over time and among cultures)
Evaluates: â with assistance • identifying Strengths and weaknesses of: Product and of plan of action • Use criteria for evaluation • suggestions for improvement / modification		
Communicates: • 2D (1st) *enhanced sketches / drawings (colour/ shading/ rendering) systems diagrams (input, process, output) • notes, labels, dimensions SA drawing conventions (for above) Appropriate use of Technology to present information		

Grade 6

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KEY Pravin		
Grade 6		
Investigates: • background context to situation (list advantage / disadvantage of solution to people / environment) • Existing products â identify & compare design aspects science process skills (if appropriate)	***Systems*** & Control: • Types of movement (linear & rotary) • Input - Process - Output • Changing input and output motion (using the components of mechanical systems, hydraulic and pneumatic included) • Components of simple electric circuits. • Conversion	***Impacts:*** technological products & processes (Suggest improvements to minimize negative effects on people / environment)

	of electrical energy into other forms (light, heat etc.) • Input - Process - Output	
Designs: Design brief • possible solutions (linked to design brief & specifications and/or constraints.) • choice of solution with reasons • chosen solution developed further	***Processing:*** • Preservation of materials (drying, coating, canning, sealing) underpinned by an understanding of why materials deteriorate.	***Biases*** : technological products & services (Suggest ways to provide accessibility)
Makes : Planning Materials list Tools list Neatness, safety, material use	***Structures:*** Load bearing properties of materials Stability structures Reinforcing structures.	***Indigenous*** Technology: own & other societies (Describe similarities & solutions -past, present & future)
Evaluates â with assistance: • identifying Strengths and weaknesses of: Product , and of plan of action • Use criteria for evaluation • suggestions for improvement / modification		
Communicates: • 2D (1^{st}) *enhanced sketches / drawings (colour/ shading/ rendering) circuit diagrams (circuit symbols) systems diagrams (input, process, output) • notes,		

labels, dimensions SA drawing conventions (for above) Appropriate use of Technology to present information		

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KEY CONCEPTS, KEY FOCUS and IMPLICATIONS for TEACHING & LEARNING of Technology through the RNCS		
Grade 7		
Investigates: • background context • Existing products - examine- (relevant to problem and based on key design aspects) • Practical tests / testing • Data handling (plan, collect, extract, copyright laws, summarise & present)	***Systems*** & Control: • Changing direction of movement and/or the value of force (using the components of mechanical systems, hydraulic and pneumatic included) • Input - Process - Output • Drawing system diagrams. • Series	***Impacts:*** technological products (Express reasons for positive and/or negative effects on quality of life)

	and parallel electrical circuits (with more than one output device) • Input - Process - Output • Drawing system diagrams	
Designs : Design brief Lists specifications and constraints based on specified design aspects. • possible solutions- alternative- (linked to design brief & specifications and/or constraints.) • choice of solution with reasons • chosen solution developed further -(graphics or modeling)	***Processing:*** Conditioning a material to change or improve specific properties (strength, fire resistance, waterproofing, taste, volume, texture, etc.)	***Biases*** : technological products (Express opinion on advantage or disadvantage on certain sectors of society)
Makes : Planning Materials list Tools list Construction techniques Safety, material and tool use	***Structures:*** Use of materials in structures based on their properties. Stability in terms of size, shape & form • Strengthening parts of and/or complete structures	***Indigenous*** Technology: • indigenous cultures in South Africa (Explain the use of specific materials with reasons for the differences)
Evaluates: • identifying Strengths and weaknesses of: Product , System and of plan of action • Use criteria for evaluation • suggestions for improvement / modification		

Communicates: • 2D (1st / 3rd angle) or 3D (isometric, perspective, oblique) • enhanced sketches / drawings (colour/ shading/ rendering) circuit diagrams (circuit symbols) systems diagrams (input, process, output) • notes, labels, dimensions, list of quantities. SA drawing conventions (for above) Appropriate use of Technology to present information.		

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KEY CONCEPTS, KEY FOCUS and IMPLICATIONS for TEACHING & LEARNING of Technology through the RNCS		
Grade 8		
Investigates: • background context • Existing products-compare- (relevant to problem and based on specified design aspects) • Practical tests / testing • Data handling (collect, extract, summarise, presents and uses the information to justify and support decisions)	***Systems*** & Control: Mechanical advantage -in terms of how movement and force is influenced-(mechanical systems, hydraulic & pneumatic included) • Drawing system diagrams • Input - Process - Output â□□ANDâ□□ & â□□ORâ□□ logic. (more than one input / control device) • Input	***Impacts:*** technological products (Express detailed opinion for positive and/or negative effects on quality of peopleâ□□s life & on the environment)

	- Process â Output • Drawing circuit diagrams • Representations using Truth tables • Drawing system diagrams	
Designs: Design brief Lists specifications and constraints based on specified design aspects. • possible solutions- alternative- (linked to design brief & specifications and/or constraints.) • choice of solution with reasons • chosen solution developed further -(graphics and/or modeling)	***Processing*** : • Forming, Shaping or Conditioning a material by adapting them for particular purposes (increased strength, withstand forces, etc.)	***Biases*** : Human rights (Opinions backed by factual evidence on effect of technology solutions)
Makes : Planning Materials list Tools list Construction techniques Design adaption Safety, material and tool use	***Structures:*** Frame Structures : • Structural components. Reinforcing techniques Stability (as in grade 7) all within the context of FRAME structures	***Indigenous*** Technology: • Cultures (Comparison of ways of solving similar problems in terms of their belief/value system)
Evaluates: • identifying Strengths and weaknesses of: Product , System and of plan of action • Use (given) criteria for evaluation • suggestions		

for improvement / modification		
Communicates: • 2D (1^{st} / 3^{rd} angle) or 3D (isometric, perspective, oblique) • enhanced sketches / drawings (colour/ shading/ rendering) circuit diagrams (circuit symbols) systems diagrams (input, process, output) • notes, labels, dimensions, list of quantities. SA drawing conventions (for above) Appropriate use of Technology to present information for particular target audience		

Grade 9

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KEY CONCEPTS, KEY FOCUS and IMPLICATIONS for TEACHING & LEARNING of Technology through the RNCS		
Grade 9		
Investigates: • identify & explain problem, need or opportunity in context • Existing products - analyses - (relevant to problem and based on specified design aspects) • Practical tests / testing • Data handling (Locate, collect, compare, sort, verify, evaluate, store, presents and uses	***Systems*** & Control: • Analyse systems and sub- systems • Drawing systems diagrams • Combining different sub- systems to create systems. • Input - Process â Output • Components of electronic circuits.	***Impacts*** : technological developments (Recognise & identify impacts on society/ environment and suggest strategies to reduce any negative impacts)

the information to justify and support decisions)	• Reading, Drawing & Building electronic circuits. • Input - Process â Output • Drawing system diagrams	
Designs: Design brief Lists specifications and constraints based on specified design aspects. • possible solutions- significantly different- (linked to design brief & specifications and/or constraints.) • choice of solution with reasons • chosen solution developed further -(graphics)	***Processing:*** • Preservation of materials (galvanised, frozen, dried, painted, varnished, electroplated) Manufacture of products from recyclable materials.	***Biases*** : Human rights (Opinions backed by factual evidence on technological decisions and suggest strategies for redress)
Makes : Planning Materials list Tools list Construction techniques Design adaption Safety, efficient material and tools use	***Structures*** : • Effect in performance of **materials** based on their properties • Analysis of the effect of loads.	***Indigenous*** Technology: • Cultures (Compare and explain global (world) adaptation of technological solutions for optimal benefit)
Evaluates: • identifying Strengths and weaknesses of: Product , System and of plan of action • Generating and using (own) objective criteria • suggestions for improvement / modification		

Communicates: • 2D (1st / 3rd angle) or 3D (isometric, perspective, oblique) • enhanced sketches / drawings (colour/ shading/ rendering) circuit diagrams (circuit symbols) systems diagrams (input, process, output) • notes, labels, dimensions, list of quantities. SA drawing conventions (for above) Appropriate use of Technology to present information for particular target audience		

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Our modules are complete units of work that contain a series of enabling activities / tasks and a challenge.

Each of these modules is designed to provide the learner with an opportunity to apply knowledge and skills in an authentic situation.

- Processing Grade 8/9
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Processing Grade 8-9

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Situation

Company TLTP is inviting you to submit a design and sample for a new material to be used in the manufacture of a variety of South African made products. The company is looking for innovative use of basic materials and processes for a material that meets with the following: The use of any recyclable paper (non-gloss)

The use of a suitable laminating and /or weaving technique that maximizes strength The use of a suitable bonding agent that allows for initial and/or further forming and contributes to the strength of the material.

===Activity 1=== approx: 1 week (LO 1, 3) Basic raw materials have for centuries been processed to produce useable materials. Some of these materials were plant (flax, bamboo, reed), animal (hides, silk, hair) or mineral (sand, clay) in origin. Conduct a basic research into how "your forefathers" "the San culture" "the Egyptians", "Khoi"; processed plant materials. Present your research topic under the following headings:

- The plant type that was processed (include pictures/drawings where possible)
- The actual process that was carried out on the plant

- What the final product was for the processed plant
- What do you think the need was for this product
- What effect do you think the use of this plant had on the environment

Place this research task in your portfolio under the section: Investigate.

- Assessment RESEARCH*

===Activity 2 === approx: 2 weeks (LO 2, 1) Textile is a word commonly used to describe something made from fibres.

Fibres are the basic materials (building blocks) and can be natural (wool, rubber, cotton, wood, carbon) or synthetic (nylon, polyester-made from chemicals). These can be processed in different ways: they can be twisted together to produce yarn, can be pulped and rolled to produce sheets, they can be extruded (forced through a small hole) to produce thread. Fibres can be classified as primary materials. When they have been processed they can be called secondary materials.

Fibres
Fibres

Secondary materials could be used in this state or could be further processed to produce fabrics.Fabrics are anything that is made by interlacing these secondary materials. There are many methods of interlacing, but this module will focus on a common method of interlacing called weaving. When we weave we use two sets of material. One is referred to as the warp and the other the weft. The warps are usually the initial structure of the fabric. The weft, which is the filler, usually runs at right angles (90 degrees) to the warp. They do not always have to be at right angles. It is the way in which the weft is interlaced that gives a fabric its working qualities.

In this module we indicate warp as shaded and weft as un-shaded.

Warp and Weft
Warp and Weft
Warp and Weft
Warp and Weft

Study the basic weaves shown below:

Plain
Plain
Twill
Twill
Satin
Satin

The strength of Fabrics is influenced by the orientation of the fibers. A unidirectional material has the fibres laid parallel to one another (like laminating), a bi-directional material is one where the fibres are at an angle to one another, and random reinforcement is where the fibers are randomly placed (felting, matting).

Unidirectional
Unidirectional
Bidirectional
Bidirectional
Random
Random

Practical task 1

Make one or more of the different types of interlacing (plain, twill, satin, diamond, random) using any one of the following: paper, thin cardboard, plastic, string, knitting wool etc.

Worksheet 1

Refer to worksheet 1 for the task

Place this worksheet task in your portfolio under the section: Investigate. You must also put the examples of the weaving that you made in this section.

- assessment TEST*
- assessment PRACTICAL

===Activity 3=== approx: 1 week (LO 1, 2) Materials technology is one of the fastest growing technologies in the world. It is because of new materials or new ways of making materials that their initial properties are improved. These new materials allow products to be better, stronger, smaller, lighter, resistant to the elements, etc. One of the ways to improve the properties is to use a bonding agent.

This activity is a practical activity in experimentation. It is a controlled experiment where certain variables are kept constant. We want to find out which bonding agent is best AND which interlacing is best. You will conduct the experiment, record the results in graph form, make your findings and finally offer an informed decision on which of the four test pieces is the strongest (in terms of bending).

Refer to worksheet 2 for the task

Recording of results - using a bar graph. An example of a bar graph is shown below.

Bar Graph
Bar Graph
In the bar graph alongside the X axis is the constant (days of the week) the Y axis is the responding variable.

Place the graph in your portfolio under the section: Investigate. If it is possible place the test pieces in a plastic sleeve or glue to a page in the portfolio as well.

Activity 4- approx: 1 week (LO 1)

Now that you have created your own material we are going to look at manufacturing something with it. In this module we will look at a basic concepts viz: forming (refer to the glossary for the meaning of forming)

Container Container
Containers

- First do a sketch of the shape you want to form a curve hollow, etc
- Use any interlacing technique to create a piece of material. The size is up to you
- Decide on what to use as a former or how you will do the forming
- Use your bonding agent to complete the piece.

Technological Process (LO 1)

Identify a need or opportunity to use the knowledge and skill that you gained in this module to design and make something within the context of the brief from Company Kalamazoo. The material must be hard, scratch resistant and waterproof.

Investigate:

- Write down the need or opportunity that you identified.
- Write a design brief for what you will design and make.
- Write two design specifications for the material that you will make
- Write one product specification of the artifact that you will make.

Design: Show two alternative designs of the product you will make

- Do a final drawing that shows the design of the material.
- Show also the design of the product that you will make

- These final drawings should include the following:
- Measurements (dimensions) of the product
- A 3D drawing of the product with notes/labels
- A list of materials needed for the product
- A set of steps you will follow to make the product (do this in the form of a flow chart)

Make: The material and then the product (you will be assessed on the material that you make

Evaluate: Evaluate the material that you have made. Test your material for the following properties: waterproof, hardness and scratch resistance.

- assessment TECHNOLOGICAL PROCESS

Glossary

Research finding out (e.g. Reading up, questionnaire, experiment, survey, etc)

Forming pushing, pulling stretching, etc a materila into a particular shape (all of the material is used nothing is cut away)

Investigate finding out about specific things

Textile something that is made of fibres or filaments

Flow chart block diagram that shows set steps (can be words or pictures or both)n

Fibre fine threads (can be natural or synthetic)

Interlacing textiles made by using fibres that have been interlocked by weaving, knitting, crocheting, etc

Product specification about the finished product (use, purpose, material, shape, colour, size, etc)

Weaving a form of interlacing

Design specification about how it will be made (construction technique, manufacturing technique, finishing technique, etc)

Yarn fibres / filaments twisted together

Fabric interlacing yarns or filaments

Laminating making materials by layering separate pieces

Processing series of actions towards a specific end

Processes Actual things that we do to materials (form, shape, extract, reduce, etc)

Graph a drawing (graphical) representation of data / information

Worksheet 1

Name:.....

Grade:.....

You will need

- A4 sheet of paper
- A pair of scissors
- Any two bonding agents (e.g. wood glue, varnish, resin, wall paper glue, or silicone)
- Two R5-00 coins (as mass pieces) or something of similar mass.

You are required to do the following:

1. Use the paper and cut it into strips of 10 mm wide. 2. Choose a method of interlacing (twill, plain, satin, etc) and create two pieces (set 1) of fabric - (40 mm X 100 mm) 3. Choose a different method of interlacing and create two more pieces (set 2) of the same size. 4. Apply a bonding agent to one piece from each set. 5. Apply a different bonding agent to the other pieces in each set. (allow time to dry) - (note that you will have to apply at least 3 or 4 coats)

Now test each piece for strength.

6. Place each test piece between two wooden blocks of 44 mm in height. 7. Place the two coins on top of each test piece and determine the bending distance of each piece. 8. Fill in the table below and use it to record the results.

Test Piece	Type of weave	Bonding agent	Bending distance in mm
A			
B			
C			

D

9. Use your results to draw a bar graph.

10. Which of the four pieces is the strongest? .....

11. Come up with an experiment to test your material for the following: (a) Waterproof (b) Scratch resistance

NB! Place this worksheet task in your portfolio under the section: INVESTIGATE.

Worksheet 2

Name:.....

Grade:.....

1. Draw a flow chart to show how any two of the following are processed from its primary state to a secondary state and then to a useable material. You must choose one from each set.

Set 1 cotton plant, sheep, sisal (plant) Set 2 - tree, sand (silica-glass), chemicals (plastic)

File:Saaste Modules 1.png

Flowchart one

Flowchart two

2. In the drawings below add labels to show which are the warps & which are the wefts.

W_W_Tech.jpg

W_w_Tech.jpg

3. Do a freehand sketch to show any two of the following methods of producing a fabric; Felting, twill weaves, satin weave, plain weave.

NB! Place this worksheet task in your portfolio under the section: **INVESTIGATE**.

TEST 1

Name:.....

Grade:.....

1. In the drawing below add in labels to show which are the warps and which are the wefts. (2) Test1_Tech.jpg

2. The drawing below shows the warps in a piece of material. Use a pencil to draw in the wefts so that the material shows a twill weave. Shade either the warp of weft to make the drawing clear (2) Test6_Tech.jpg

3. The strength of a textile is influenced by the way the fibres are arranged. Three ways of arranging the fibres are shown below. Choose from the given words to indicate each type. RANDOM BIDIRECTIONAL UNIDIRECTIONA(3)L

Test2_Tech.jpg

Test3_Tech.jpg

Test4_Tech.jpg

4. Refer to the graph shown below and answer the questions: (5) Test5_Tech.jpg

4.1 Which player scored the most points in 10 minutes in game 1?

4.2 Which player scored the least points in 10 minutes in game 1?

4.3 How many more points did the highest scorer make than the lowest scorer in game 2?

4.4 If you were to choose a player for your team which player would you choose. Give a reason for your choice.

5. Draw a flow diagram to show how any primary material is processed until it is made into a product. Show only 3 stages of processing in your diagram. (3)

Total: 15

Educators Guide

The focus of this module is on outcomes 1, 2 & 3

The core of this module is to:

- Create an understanding of the term processing
- Create an understanding of materials
- Create an understanding of interlacing as one way to produce a material

- Create an awareness that different cultures have created materials for specific purposes
- Provide authentic (real) experiences of the creation of a material outside of mere reproduction of existing ones.
- Expose learners and educators to various aspects that make up research and how this falls within investigations
- Provide opportunities to develop technological literacy by creating an understanding and awareness of technological terminology
- Creating opportunity for learners to acquire relevant knowledge and apply this to a real situation.

This module requires that educators "teach" the module. It also requires that learners "actively do things" so that learning takes place. The entire module could be completed in 4 to 5 weeks (approx 4 periods in a 5 day cycle)

The module is designed to take a logical approach by first setting the scene or context (in this case the need from the company for a material with specific properties). We want learners to see the connection to technology today and to the past and we do this by addressing outcome 3. We then address outcomes 2 & 1 by finding out things by research, investigations, experiments, etc to construct knowledge relevant to the context /situation and then in line with the definition of technology we ask the learners to apply the knowledge and skills to address the situation (outcome 1). When this module is done we pick out those activities we want to assess for certain forms of assessment.

Introduce activity 1 by using anything in the classroom to begin the conversation: This could be a non threatening way to start this module is to have an oral discussion. This also draws on their prior learning.

You could ask what the tiles on the floor, the glass of the window, the desk, the roof sheet, the clothes they are wearing, the paper in the class, the ink in the pen, etc are made of. All of these things made of materials that have been processed in some way. Ask what they think the raw material was and how they thing it was processed. Notice we want their ideas on these questions and not necessarily a technical or pure scientific correct answer. When this is done tell them about their first task that will be discussed in the next period In the next period introduce activity 1 Explain that it is a research task and that they have to go and find out how another culture in the past created products from basic materials. They should write this up It should not be longer than one page discourage photocopies of books This is an assessment activity

In activity 2 we have started with knowledge The idea is for you to go through this with the learners (teaching and explain as you go along) For the knowledge we have supplied a worksheet which summarizes the essential things that need to be known. Later as a form of assessment we give a test. The practical activity is to get them to make the connection between the theory and the practice We suggest that paper be used so that the final task is easier to do. This is an assessment activity for two things (practical the small weave that they make & the test of knowledge: notice the way in which we set out the test it is less theoretical)

In activity 3 we focus on an investigation in the form of an experiment the idea is to get learners into the skills of performing authentic test and recording findings and then making decisions based on their findings What is good about this activity is that it has a direct bearing on the final task (that is, it is not just something to do in the class, but what they find out here can and should influence their decisions on the final product). As this is the first of our modules we are giving the steps of the experiment. The idea is to make the test pieces, use the diagram as a guide to test them and recording the findings in a graph. There is a lot of learning in this activity one is that they learn the value of fair testing, two they learn how to work with graphs, three they learning about conducting relevant research. Note the following: they must use many layers of the bonding agent (one or two is not going to be enough) They must note exactly how many layers they apply to each side All test pieces must have the same number of layers or the results will be false.

When doing the graph the following is important: The constants always go on the "X" axis In our case it will be each test piece. The responding variables always go on the "Y" axis In our case it will be the measurement of the amount of sagging with the mass pieces on it. The example in the module is of the constants on the X axis which is the days of the week (this is constant) the Y axis the responding variable which shows the number of learners that were absent on particular days.

In activity 4 we introduce the concept of forming (forming is twisting, pushing, etc a material out of shape without removing any of the material, i.e. no cutting or filing, etc). The simplest way to form the interlaced material is to place it over or into a former. Formers can be things like plastic bottles, bowls, balloons, pipes, etc. After the bonding agent is applied and it dries the material will keep its shape.

For the technological process we have set out lead questions or statements to help the learners complete the task. They can decide on any situation to address (e.g. a pencil holder, a sweet tray, a protective cover for something, a holder for something, etc)

- They must write a design brief
- They must write 2 design specifications of the material (type of interlacing, type of bonding agent, number of layers of bonding agent, etc)
- They must write 1 product specification (shape, size, use, purpose, etc)
- The designing has two parts to it one is of the material and the other is of the product
- Ensure that learners understand what is required The module tell them exactly what is required.

Other aspects of the task are in the module.

Enjoy the module with your learners

Author/s: Deon Khan (Mentor-Osman Sadeck)

Mechanical Systems Grade 9

SAASTE Technology

Key Concepts

Modules

Activities

Grade 4 - Grade 5 - Grade 6 - Grade 7 - Grade 8 - Grade 9

Processing Grade 8/9 - **Mechanical Systems Grade 9** - Structures Grade 5 - Structures Grade 8

Conductors & Insulators - Electronic Circuits - AND & OR Gates - Circuit/Systems Diagram - Hydraulics - Hydraulics & Pneumatics - Technological Products - Preservation-1 - Identifying Materials - Properties of Materials - Preservation-2 - Electroplating - Conditioning-Strengthening/Waterproofing-1 - Conditioning-Strengthening\Waterproofing-2 - Shaping - Forming - Forces - Types of Structures - Mechanisms Worksheet

Mechanical Systems

Help the guard stay out of the rain

Forms of assessment:

- Technological process
- Communication
- Test
- Practical

Specific Outcome:

- Understand and apply the technological process to solve problems and to satisfy needs and wants.

- Apply a range of technological knowledge and skills ethically and responsibly.

Resources required:

- Ruler, pencil, strips of cardboard, drawing pins or thumb-tacks.

You will be assessed on the following:

- Your knowledge and understanding of Systems and Control (Levers)
- Your ability to identify problems, needs and wants.
- Your ability to consider a range of possible solutions.
- Your ability to make informed choices.
- Your ability to develop a design brief. * Your ability to communicate.

MECHANISMS

What is a mechanism?

It is a device that has the ability to do Mechanical work. The machine will change (convert) or pass on (transmit) energy. Machines are made from a number of working parts called MECHANISMS. All mechanisms are based on what ancient philosophers called the big five machines. The five simple machines form the basis of all other machines developed throughout history.

File:SA NC Saaste Modules 2.png

Machines cannot do work on their own. They need energy and someone or something to operate them. Some machines are controlled by computers. (e.g. automatic washing machine). The energy, which is used by the machine, is called the INPUT. The result of this energy input is called OUTPUT.

File:SA NC Saaste Modules 3.png

Three major mechanisms include: 1. LEVERS - A rod that pivots around a point.

2. GEARS - (Wheel & Axle) A wheel with teeth.

3. PULLEY - (Wheel & Axle) A wheel with a groove.

THE SIMPLEST AND ONE OF THE EARLIEST MECHANISMS USED: LEVERS

Understanding levers:

A lever can therefore be described as a mechanism designed to lift loads or create (or transfer) movement. It uses a stiff rod that pivots (turns) about a point. The point is called the FULCRUM.

File:SA NC Saaste Modules 4.png

The following symbols, represents the different elements in a lever system.

File:SA NC Saaste Modules 5.png

Three classes of levers are identified, which are determined by the placement of the FULCRUM (pivot) relative to the EFFORT and the LOAD.

File:SA NC Saaste Modules 6.png

The load is at one end and the effort at the other, with the fulcrum situated somewhere in between. Eg. scissors

File:SA NC Saaste Modules 7.png

The load is placed between the effort and the fulcrum. Eg. Wheelbarrow

File:SA NC Saaste Modules 8.png

The fulcrum is at one end, the load at the other and the effort somewhere in between the two. Eg. Tweezers File:SA NC Saaste Modules 9.png

Input motion	Position of fulcrum	Measured output distance
Push down	A eraser at 50mm mark	
Push down	B eraser at 100mm mark	
Push down	C eraser at 150mm mark	

Results: Which example provided the greatest output?

- .....

Conclusion: What effect does the position of the fulcrum have on the output distance?

- .....

Which one of the three examples is the best demonstration of distance multiplication?

- .....

Mechanisms are used to make work easier. (e.g. input motion less than the output motion). This is called a Mechanical Advantage. There are two types of Mechanical Advantage e.g. Distance Multiplication and Force Multiplication. The mechanical advantage of a lever can be calculated. The greater the mechanical advantage, the easier it is to lift an object.

The formula used to calculate mechanical advantage is: MA =load/effort

Study the following example and complete the calculations:

Always convert mass into force, 50 kg x 10 m/s² = 500 N

An effort of 20 N is needed to lift a load of 50 kg with a wheelbarrow. What is the mechanical advantage created by the wheelbarrow?

Mechanical advantage is: MA =load/effort

MA=_____

TEST 1

Grade 9.....

Name .....

1. What is the fulcrum of a lever system?

- .....
- ...../3

2. Which symbol is used to indicate the fulcrum? ..... /1

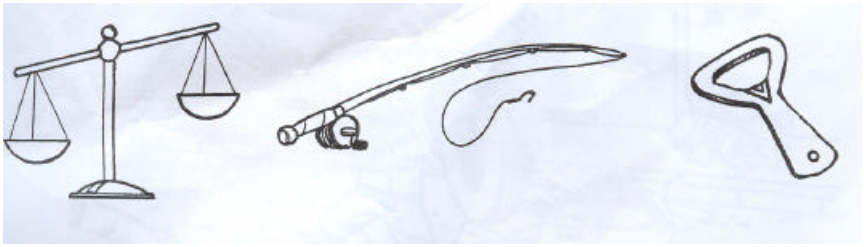
3. How does the effort differ from the load in a lever system? /3

- .....
- .....

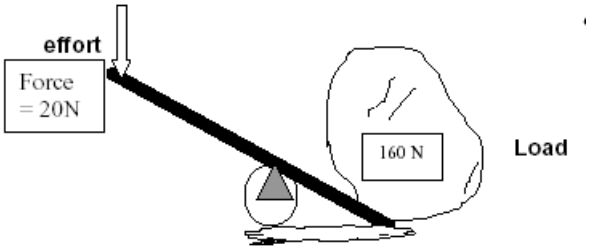
4. Using the picture below, identify the position of the FULCRUM, LOAD. /2

File:SA NC Saaste Modules 10.png

5. Name the class of levers represented in Figures 1, 2 and 3. /6



6. Calculate the mechanical advantage you would get by using the lever in load /5 Formula: MA =load/effort



TOTAL [20]

Activity 2 LINKAGES / LINKED LEVERS

LINKAGE: A mechanism made by connecting levers together.

Linkages are designed to:

- change the direction of a force or motion,
- allow two parts to move at once,
- make objects move identical to each other

The following graphic symbols can be useful in understanding how a linkage system works.

●	**Fixed pivot**: use a black dot on a sketch to indicate a moving part that is attached to the background
○	**Loose pivot**: Use the circle on a sketch when you want to attach moving parts to each other.
Right Up down Left	**Types of movement** Linear (in a straight line)

The following drawings indicate different combinations of levers in a linkage system: Fill in I for input and O for output

File:SA NC Saaste Modules 14.png

- complete the practical activity on the next page.

PRACTICAL ACTIVITY

This activity must be done in groups. (2/3 students)

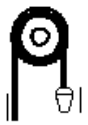
MAKE, LOOK AND DRAW WORKSHEET.

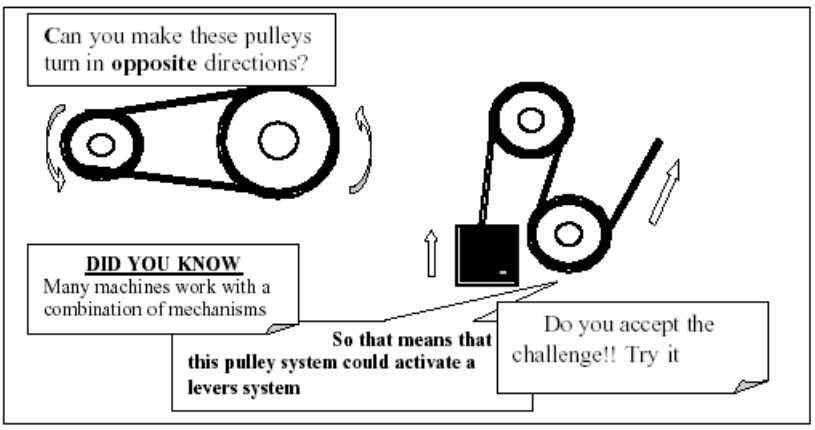
Use the mechanisms kits provided by your teacher and construct all the linkage systems as illustrated on the previous page. Discuss in your group the input and output direction of motion. Complete the table below.

LOOK & DRAW include fixed and loose pivots In-clude input and output directions	**Write down the Input &Output direction. (Same or** opposite direc-tion)
Reverse linkages	
Push-pull linkages	
Equalising linkages	
Lazy tongs	
Parallel linkages	

Introduction to PULLEYS

A pulley is a wheel with a groove, e.g.

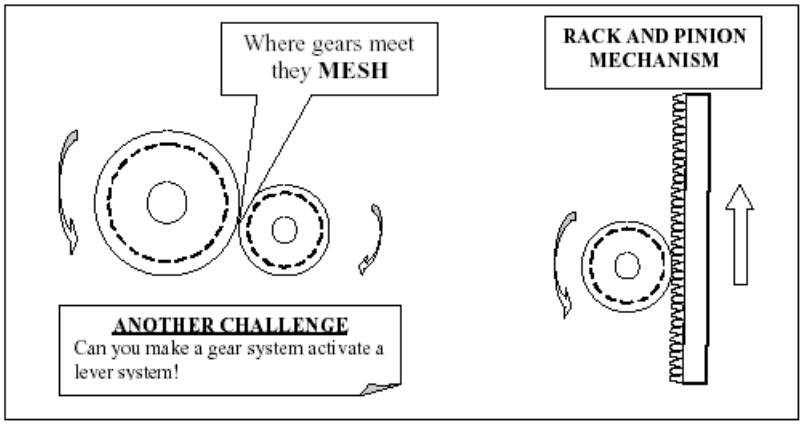




- Use your mechanisms kit to build the above examples.
- Draw exactly what you have done.
- Use a block diagram to indicate the Input and Output direction.
- Provide 2 examples of where pulleys are used in the building industry.

Introduction to GEARS

A gear is a wheel with teeth, e.g.



Use the mechanisms kit and build at least 3 examples of gears (you could use more than 2 gears in a gear system).

- Draw exactly what you have done.
- Use a block diagram to indicate the Input and Output directions in each of your examples.
- Provide 2 or 3 examples of gears in used in children's toys.

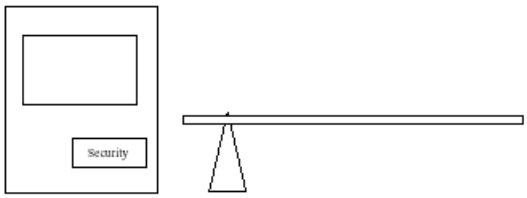
PROJECT PORTFOLIO

work in groups of 3

SITUATION

You are employed as an engineer at a city office block, which has boom gates on entering and leaving. You have noticed that at peak time on rainy days the security guards have to stand in the rain to lift and lower the boom gates. Use one or a combination of the 3 simple mechanical systems to lift and lower the boom gate, which can be operated from inside the security office.

- Discuss the words you do not understand.
- Circle the most important words.



1. Write in your own words what you think the problem is. Try and do it in two sentences

- .....
- .....

2. Write down a design brief, a few specifications and two constraints for the problem identified in the last sentence of the paragraph.

- .....
- .....
- .....
- .....
- .....
- .....

3. In your group, think of possible solutions that will solve the problem identified in the situation above. Draw freehand sketches of two different ideas.

- .....
- .....

4. From the two solutions you identified and sketched (drew), select the one you believe to be the best solution. Give one reason for your choice.

- .....
- .....

5. Produce a two-dimensional working drawing for presentation. The working drawing should include the dimensions and the kind of materials that must be used in arriving at the solution.

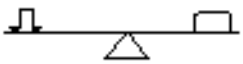
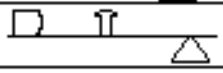
6. Produce a model. You will be assessed on the effectiveness of the mechanisms used in your model.

7. Prepare a formal presentation to sell your idea to the class. Your presentation should explain to the class how the mechanism that you have designed in Activity 3 works.

HINTS

- The product can be 2 dimensional on an A4 card.
- Divide the card in half (one half for in the booth and the other half outside)
- Corrugated cardboard is a versatile and cheap resource
- One-sided corrugated cardboard can be used for gear teeth and on racks.
- Hot melt glue guns are very effective (glues strongly and quickly)
- Paper fasteners are quick and easy to use (e.g. fixed and loose pivots)

DATASHEET FOR TECHNOLOGY

CONVENTION	DESCRIPTION	USE
	Thick or Dark line	Outlines of drawings, Lines for cutting, shaping, Outer limits of drawing
	Thin or Feint line	Fold or Bending lines, Dimensions, Construction lines
	Dashed line	Hidden details, (when working with fabric, it is used to indicate where to stitch)
	Chain line	Centre lines, Symmetry lines
	Open dot/circle	Loose pivot
	Closed dot/circle	Fixed pivot
	1st Class Lever	Mechanical advantage (e.g. screw driver opening paint tin)
	2nd Class Lever	Mechanical advantage (e.g. wheel barrow)
	3rd Class Lever	Mechanical advantage (e.g. tweezers)
	LINEAR Straight Line	Used to Indicate direction. Can also be used as a pointer - up / down / left / right / forwards / backwards
	Reciprocating	To and fro movement (e.g. sewing machine needle moving up and down)
	Rotary (clockwise or anti clockwise)	Circular motion (e.g. A motor spinning clockwise; GEARS)
	Oscillating	Swing back and forth (.e.g. pendulum; swing)
	Recyclable	This product / the material it is made from can be broken down and made into a product.
	Recycled	This product has been made from recycled material
	Gear	Indicate a gear in a diagrammatic representation
	Gear Train	Indicates the meshing of gears (e.g. driver, idler, driven respectively)
	Pulley	Indicate a pulley in a diagrammatic representation

Glossary

Note: Related terms are grouped and therefore do not appear in alphabetical order.

LEVER : A rigid bar having load, fulcrum and effort used for mechanical advantage

LINKAGES / LINKED LEVERS : Two or more levers linked to form a system of levers

INPUT : The action that starts a system. (e.g. force, switch etc)

OUTPUT : The product that results from the action of a system (e.g movement light glowing etc)

MECHANICAL ADVANTAGE : Mechanical advantage is used in machines to make work easier. Types: change of force, distance & speed

FORCE MULTIPLICATION : Occurs where the output force of a mechanism is greater than the input force.

DISTANCE MULTIPLICATION : Occurs where the output distance of a mechanism is greater than the input distance of that mechanism.

GEAR : A mechanism for transferring and changing movement, force & speed

GEAR TRAIN : Two or more gears connected in a system

DRIVER : The gear that provides the input in a gear system

DRIVEN : The output gear on a gear system

IDLER GEAR : A gear normally placed between the driver and driven so that they turn in the same direction.

BEVEL GEAR : Changes the plain (angle) of movement in gear systems (e.g. windmill turns in vertical plain and the shaft for pumping water turns in a horizontal plain i.e. a change of 900 in direction of movement.)

WORM GEAR : this is a normal gear (worm wheel) that meshes with a worm screw.

WORM SCREW : A cylinder like gear with a screw thread (The worm screw engages / meshes with the worm gear)

RACK AND PINION : A rigid bar with teeth that will engage / mesh with the teeth of a pinion (gear wheel)

MESH : The engagement of gear teeth. (The gears mesh when they are in contact with each other.)

WHEEL : Any circular thing that turns on an axle

AXLE : The shaft that supports the wheel and the movement of that wheel.

CRANK : An axle (e.g. projecting from a wheel) that is bent. (The crank is turned to make the shaft / move.)

CAM : It is a wheel that is not circular. Used to change the direction of movement of something (the follower) that lies against it. (e.g. The oval cam spins while the follower moves up and down &shy reciprocating movement)

PULLEY : A wheel with a groove in the rim for ropes used to lift weights or apply a force.

HYDRAULIC SYSTEM : A closed system that works with fluid pressure

MASTER CYLINDER : The input cylinder in a hydraulic system

SLAVE CYLINDER : The output cylinder in a hydraulic system

An example of the type of graphic expected from learners in a linkage mechanism (Inputs and outputs must be clearly indicated. The convention for fixed and loose pivots must be followed)

File:SA NC Saaste Modules 20.png

Author/s: Alison Fowkes & Deon Khan (Editor &shy Johnny Freese)

The authors acknowledge: Osman Sadeck — for the use of the data sheet from: www.wcape.school.za/sadeck/ NdoE — for Adaptation to the Grade 9: CTA (Technology) - 2003

Structures Grade 5

SAASTE Technology

Key Concepts

Modules

Activities

Grade 4 - Grade 5 - Grade 6 - Grade 7 - Grade 8 - Grade 9

Processing Grade 8/9 - Mechanical Systems Grade 9 - **Structures Grade 5** - Structures Grade 8

Conductors & Insulators - Electronic Circuits - AND & OR Gates - Circuit/Systems Diagram - Hydraulics - Hydraulics & Pneumatics - Technological Products - Preservation-1 - Identifying Materials - Properties of Materials - Preservation-2 - Electroplating - Conditioning-Strengthening/Waterproofing-1 - Conditioning-Strengthening\Waterproofing-2 - Shaping - Forming - Forces - Types of Structures - Mechanisms Worksheet

Types of Structures

GLOSSARY:

- **Structure:** consists of materials which are joined together in a specific manner
- **Frame structure:** made up of individual pieces of material &shy it forms a framework
- **Shell structure:** protects things from the outside.
- **Solid / mass structure:** consists mainly of matter.
- **Natural structure:** exists in nature.
- **Constructed structure:** is built by people

The environment we live in consists of structures .Structures are made of materials that are suitable for a certain function.

Structures which exist in nature are known as natural structures and those built by people are known as constructed structures.

There are 3 basic types of structures:

- Shell structures: protect something.
- Frame structures: form a frame work.
- Solid / mass structures: consist mostly of matter

Structures either:

- Perform a supportive role (bear loads e.g. pillars, constructed beams, crutches, towers), span gaps (e.g. bridge), protect contents (e.g. helmet, eggshell), contain or hold things (e.g. box), provide stability (foundations) .

Sometimes structures tend to collapse or fail to do their job because of failure of the materials: i.e. wrong material being used for a particular job, or because they have been designed incorrectly, or because they have been manufactured badly.

===Activity 1:=== -(approx.: 1 week (L.O. 2)

Look at the pictures and identify the type of structure it represents.

Picture	**Natural**	**Constructed**	**Shell**	**Frame**	**Solid /Mass**
Ball					
Umbrella					
Mountain					
Bicycle					
Cup					
Flower					

===ACTIVITY 2 : Research task=== - (approx. 1week (L.O 1, 3) Collect at least 2 different samples of the following materials.

- Paper
- Plastic
- Cardboard

1. Find out 3 properties of each material- (such as hard/soft, waterproof, strong/weak, etc)

2. Give 2 uses of each material

3. How or what did people in the past who did not have paper to write on do for writing material?

ASSESSMENT: RESEARCH

===ACTIVITY 3: PRACTICAL TASK=== - (approx. 1week (L.O.1) Choose from the list of material supplied and make one of the following of the structures named below. Structures: windmill, hill, box

Materials: plasticine (clay), paper, cardboard, plastic straw. (Additional materials for joining: glue /pin)

ASSESSMENT: PRACTICAL

TEST: Match the word in COLUMN A with the correct sentence in COLUMN B

COLUMN A	COLUMN B
Frame structure	Mainly consists of matter.
Constructed structure	Forms a frame work and can have a supportive role
Natural structure	Protects things
Shell structure	Exists in nature
Mass / solid structure	Is made by people

TOTAL: [5X2] **ASSESSSMENT: TEST**

===ACTIVITY 3: TECHNOLOGICAL PROCESS=== - approx. 2 weeks (L.O.1)

SITUATION

Your school is hosting its annual concert. It is expected of the Gr.5 learners to design and make some of the props for the concert using suitable materials

Use your knowledge and skills that you have gained and design and make the props .The material must be suitable for the particular structure that you will be making.

Investigate: Find out what props are needed. Then say what you will make

(Design brief): I will make a:

- .....
- .....

Design: Show 2 different designs of the product you have chosen to make.

Choose a final design and your design must include labels.

Material list Name the materials you will use.

- .....
- .....

Tool List (I will use the following tools.....) Circle the tools and add in others that you will use.

needle scissors saw glue gun cutting board ruler craft knife

- .....

Flow diagram: Complete the guided passage on how you are going to make your item.

STEP .1

- First I.....

STEP. 2

- Then I.....

STEP.3

- Afterwards I .....

STEP .4

- Then I.....

STEP .5

- Finally I.....

Structures Grade 8

Frame Structures

SITUATION:

You have received a Hi-Fi / play station. It is a very expensive piece of equipment and needs to be kept safe. You will need to use the knowledge and skills of this module to address this situation. Your solution must be a frame structures that includes at least three structural elements you have learnt. (E.g. columns, beams, arches, buttress, struts, stays, guys and ties)

Structures have FIVE BASIC FORCES that acts on it. Structural elements are used to strengthen structures that are subjected to various forces that act on it

Activity 1: Research Task

Look at pamphlets, magazines, furniture stores and various structures to get information.

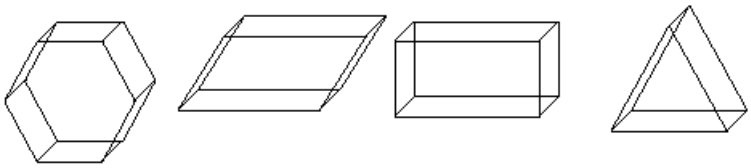
- Cut out or Draw pictures showing how structures are strengthen by various structural elements.
- Identify and Show at least 2 structural elements in each picture / drawing.
- Make an A4 poster of these structural elements with labels and present it to the class.

Place this research task in your portfolio under the section: Investigate.

Assessment: RESEARCH

Activity 2: Investigating rigidity

Investigate whether the following shapes are rigid or non-rigid.



Use the following as a guide in your investigation.

- Use sticky tape and strips of cardboard to make the shapes shown above.
- Use a small amount of force to check whether the shape is rigid or not.
- Make the non-rigid shape rigid with extra strip/s of cardboard.
- Record your results on the table below:

Draw on shape how each shape was made

	Draw on shape how each shape was made rigid.				
	The minimum number of extra strips used				
	Which shape is repeated?				

- What can you deduce from this investigation?
- Find pictures or draw sketches that demonstrate this type of strengthening in the real world.
- Paste it on an A4 page and put it together with the above activity under INVESTIGATE.

===Activity 3: Practical task=== - Group work (4 learners per group)

Collect the following materials at home or at school.

- Cardboard

- Egg containers
- Straws
- Corks
- Plastic bottles, lids, plastic containers
- Nails
- Polystyrene
- Glue
- String
- Wood
- Wool
- Skewers
- Wire
- Sucker

Design and make any article using at least 3 of the above materials and include at least 3 structural elements in the one design.

- Identify a problem, need or opportunity and write a brief
- State 2 specifications for the product.
- State the tools and materials list
- Evaluate the product against the specifications and whether the structure is stable/ rigid when a force is applied to it.
- Suggest one improvement to the product.
- You must also comment on the impact of your product on the environment.

The Technological Process

Identify the need or opportunity in the situation at the start of the module. Use the knowledge and skills that you have gained in this module to design the product within the context of the given situation.

Your project should include the following: (This could be used as a checklist to help you track the technological process.)

- Need or opportunity
- Design brief

- Specifications
- Initial Ideas
- Evaluation of initial ideas
- Complete Working drawings (point out stability by showing how the center of gravity is caterer for in the design)
- Scale model
- Your evaluation of the product (with suggestions for improvements) (evaluation must be based on criteria linked to the specifications)
- Evaluation sheets for the product (own and peer)

TEST

Name: .....

Total: 15

Authors: Regmore Daniels & Averil Nolly Contributions by Osman Sadeck Original Graphics by: Regmore Daniels & Kent Daniels - Sharna Mullins, Robyn Buckton, Tasneem Salie (Grade 9's, Grassdale High School) Editor: Osman Sadeck

Activities

SAASTE Technology

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The activities have been designed to develop specific knowledge & associated skills that form the core of the assessment standards of the various grades. These must not be considered, nor taken to be "technology" - They are only enabling activities designed specifically to assist you with ideas for the development of concepts, what needs to be taught, learnt, so that learners have a chance at success when engaging in technology. The activities are not contextualised in any module as such and are not about making a product, as our focus is on the development of concepts.

- Conductors & Insulators
- Electronic Circuits
- AND & OR Gates
- Circuit/Systems Diagram
- Hydraulics
- Hydraulics & Pneumatics
- Technological Products
- Preservation-1
- Identifying Materials
- Properties of Materials

- Preservation-2
- Electroplating
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- Conditioning-Strengthening/Waterproofing-2
- Shaping
- Forming
- Forces
- Types of Structures
- Mechanisms Worksheet

Conductors and Insulators

SAASTE Technology

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Electrical System

Grade 6

Conductors & Insulators

- Build the circuit shown above.
- Place the different objects / materials between points A and B (choose from objects available)
- Note your observations in the table below.

Object	Allows current through	Does not allow current through
Nail		
Plastic pen		
Ruler		
Paper-clip		

- Materials that allow the flow of current are called Conductors
- Materials that do not allow the flow of current are called Insulators

Answer these questions:

1. What happened when the nail was used to bridge the gap?

- .....
- .....

2. What happened when the plastic pen was used to bridge the gap?

- .....
- .....

3. What type of materials is best suited for insulators?

- .....
- .....

4. Name three useful applications of insulators.

- .....
- .....

Author: Averil Nolly Acknowledgment of graphic: Osman Sadeck Editor: Osman Sadeck

Electronic Circuits

SAASTE Technology

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Electrical System

Grade 9

Electronics

You will need the following component / Parts

Resistors (all ¼ Watt 5% carbon)

- R1 - 680 Ohm
- R2 - 4,7 K Ohm
- R3 - 2,7 M Ohm (for activity 4)

Semiconductor

- Q1 - BC337 (or equivalent)
- LED 1- 5mm
- LED 2 - 5mm infra red detector

- LED (for activity 4)

A Resistor Colour Code Chart is available on the last page of this document.

Connect / build the circuit shown in the diagram below:

File:SA NC Saaste Activities 2.png

Note: The fly lead is simply a short length (approx. 10cm) of conductive wire (with both ends stripped of insulation)

Activity 1:

Attach the loose end of the fly lead to the negative (-) side of the battery and observe the output.

Now remove the fly lead and attach to the positive (+) side of the output and observe the output.

Activity 2:

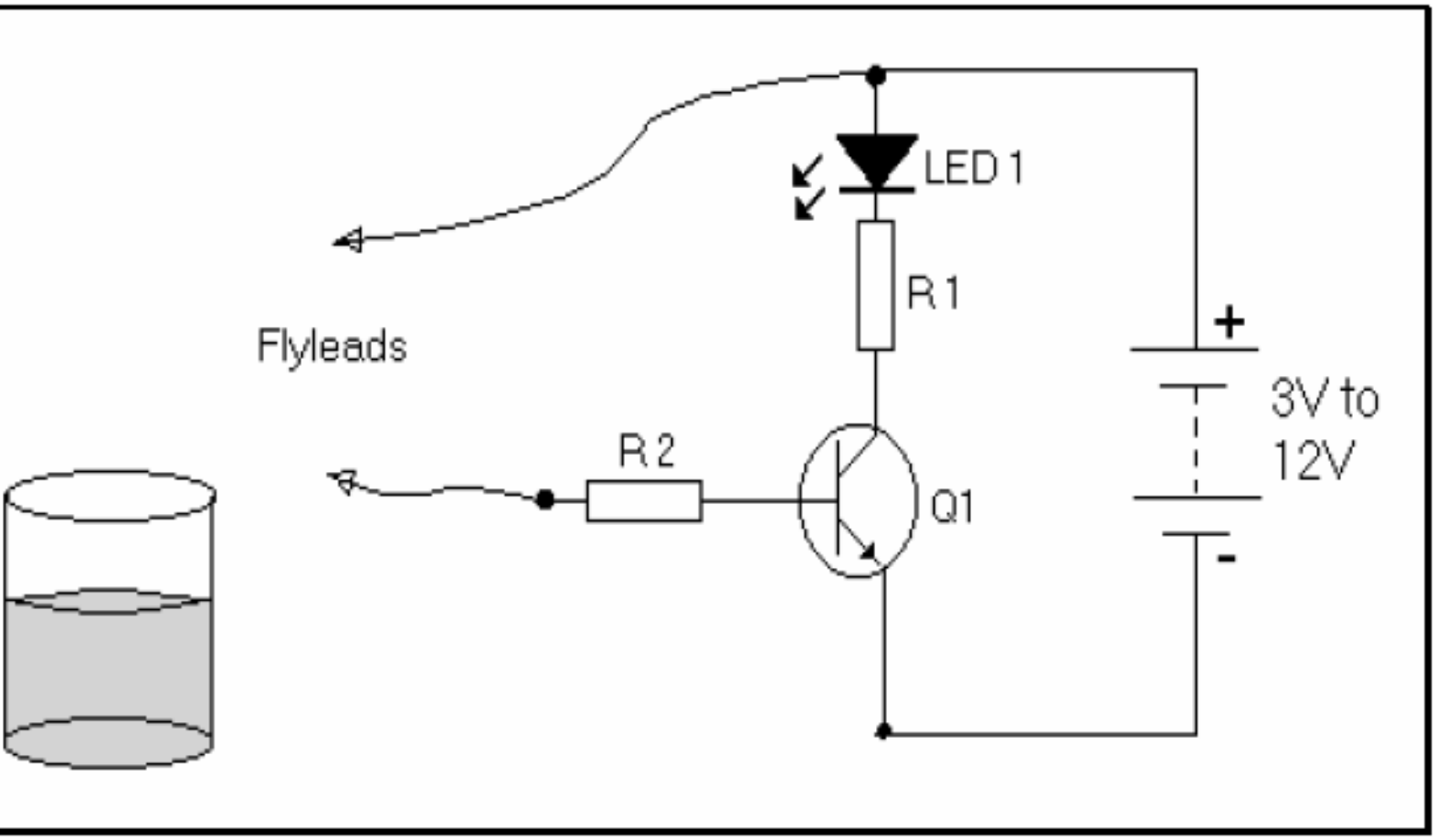
Disconnect the fly lead from the battery. Touch the end of the fly lead with your bare fingers.

What do you observe?

- .....
- .....

Activity 3:

Connect another fly lead as shown in the circuit diagram below:



Insert both fly leads into a beaker containing water and observe the output.

Activity 4:

Use your original circuit and extend it by connecting LED 2 and R3 as shown in the circuit diagram below:

File:SA NC Saaste Activities 4.png

LED 2 - 5mm. infra red detector LED R 3 - 2,7 M

Use any remote control (from a TV, Hi-Fi etc.). Bring it close to LED 2. Press any button on the remote control and observe the output.

Note: An LED is a transducer: it converts energy from one form to another

Component data:

- R1 - Blue, grey, brown, gold
- R2 - Yellow, violet, red, gold

- R3 - Red, violet, green, gold

Note: 5, 10 or 20% resistors may be used

The colours for the 4, 7 KO resistor was worked out like this: Each number of the value of the resistor correspond to the three bands on the one end of the resistor.

4 in the first band = yellow 7 in the second band = violet K in the third band would be orange. Because there is a decimal place (comma) between the 4 & 7, we move one decimal place and now have 2 zeros which correspond to red.

Try working out the colours for the following resistors: 47 KO, 50 O, 330 O , 100 O , 560O , 390 O.

Semiconductors:

File:SA NC Saaste Activities 5.png

Transistor Q1: BC 337:

File:SA NC Saaste Activities 6.png

B-Base; C-Collector; E-Emitter

Glossary=

Resistor: An electronic component which slows reduces the current and/or creates a voltage drop

L.E.D. (Light Emitting Diode): A special diode which emits light when a current flows through it.

Transistor: An electronic component which may be used as a switch or as an amplifier. They are broadly divided into PNP and NPN (BC 337 is an NPN transistor)

Infra-red: A narrow band of the light spectrum invisible to the naked eye.

Anode: Positive

Cathode: Negative

Author: Ricardo Miller

Contributions by Osman Sadeck

Editor: Osman Sadeck

AND and OR Gates

Electrical System

Grade 8

AND & OR Logic Gates

There are two types of electrical systems, viz. Digital and Analogue. Digital systems operate on logic circuits. The logic state or logic level of a system can either be HIGH or LOW.

This high and low state is referred to as ON or 1 to represent High and OFF or 0 to represent Low. We use logic gates in electrical systems to decide in a logical way our desired output.

Understanding a logic level

The table is called a truth table. It shows the possible logic levels of the circuit by using a 1 to indicate ON and a 0 to indicate OFF.

This circuit can also be represented as a Systems Diagram as follows:

Activity 1:

Practical, truth table and systems diagram

Practical

Gather the necessary components and connect up the circuit shown below:

Truth Table

Complete the truth table alongside the circuit

This is an AND circuit &shy the lamp will only light up if S1 AND S2 are closed.

Systems Diagram

Draw a systems diagram to represent the AND circuit.

Activity 2:

Practical and truth table

Practical

Gather the necessary components and connect up the circuit shown below:

Truth Table

Complete the truth table below:

S1	**S2**	**L1**
0	0	0 (off)
1	0	
0	1	
1	1	

This is known as an OR circuit &shy for the lamp to light up either S1 OR S2 need be closed

Glossary:

Switch: a device which allows or prohibits electricity to flow.

Conductor: a material which allows electricity to flow through it. All metals are conductors.

Circuit diagram: a drawing which uses circuit symbols to represent components.

Truth Table: represents the functioning of a digital circuit. This table uses a `1' to indicate a closed switch (or an `on' lamp, motor etc.), and `0' indicates an open switch (or an `off' lamp, motor etc.).

Logic state or logic level: tell us if the system is high or low or on or off.

Analogue system: has a range of values within its limits

Digital system: have discreet values within its limits

`AND' gate: produces 1 or high when all of its inputs are 1 or high

`OR' gate: produces 1 or high when any of its inputs is 1 or high

Author: Ricardo Miller Contributions by Osman Sadeck Editor: Osman Sadeck

Circuit\Systems Diagram

SAASTE Technology

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Electricity

Grade 6

Basic Circuit Diagram & Systems Diagram

Activity on communication

File:SA NC Saaste Activities 12.png

1. Use the data sheet that is given to draw a circuit diagram of the picture of the circuit that is shown above. An example of systems diagram is shown below. The example used is opening a door.

File:SA NC Saaste Activities 12.png

2. Draw a systems diagram for the circuit above.

Author: Cheryl Jaftha Acknowledgments of graphics: Osman Sadeck & www.wcape.school.za/sadeck/ Editor: Osman Sadeck)

Hydraulics

SAASTE Technology

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Systems & Control

Grade 8

Hydraulics

Syringes can be used to change the type & size of an input movement into a different output movement

File:SA NC Saaste Activities 14.png

ACTIVITY 1

Set up the investigation illustrated by the drawing above:

- Use two 10-ml syringes with approximately 200 mm length of plastic tubing.
- Use water in the system.
- Use syringes A as the master cylinder.

1. Observe and write down what happens at syringe B:

- .....

2. Compare the distances

- .....
- .....

ACTIVITY 2

Repeat the investigation using a 60-ml syringe as the master and a 10-ml syringe as the slave.

2. Observe and note what happens.

- .....
- .....

3. Choose the correct options. If the plunger of the master syringe is pushed down 10 mm, the plunger of the slave will have moved:

A. 10 mm B. less than 10 mm C. more than 10 mm

Complete the system diagram below:

File:SA NC Saaste Activities 15.png

1. How is the input size changed?

- .....

2. How is the input type changed?

- .....

3. How would you describe the mechanical advantage that we get from a hydraulic system?

- .....
- .....

Author: Deon Kahn Editor: Osman Sadeck

Hydraulics and Pneumatics

SAASTE Technology

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Systems & Control

Grade 7

Hydraulics & Pneumatics

Syringes can be used to demonstrate movement and the basic principles of pneumatics and hydraulics.

File:SA NC Saaste Activities 14.png

Set up the experiment as illustrated of the drawing above by doing the following:

- Connect two 10ml syringes with a 200 mm length of plastic tubing.
- Pull the plunger of syringe A completely out and push the plunger of syringe B fully in.
- Replace the plunger of syringe A and press slowly down.

Observe and write down what happens at syringe B

- .....

- .....

Complete the system diagram below:

File:SA NC Saaste Activities 16.png

Repeat the demonstration, but this time fill the system with water.

Observe and write down what happens at syringe B

- .....
- .....

Syringe A is referred to as the MASTER cylinder and Syringe B as the SLAVE cylinder.

Complete the system diagram below:

File:SA NC Saaste Activities 16.png

When syringes are filled with air we are demonstrating pneumatics. True pneumatics use compressed air. When syringes are filled with water we are demonstrating hydraulics. True hydraulics usually uses oil as the fluid.

- Which is the more effective?
- .....
- Why do you think so?
- .....
- Explain why in this case syringes A is the master and syringe B is the slave:
- .....

Author: Deon Kahn Editor: Osman Sadeck

Technological Products

Technology & Society

Grade 8

Technological Products

Three technological products are shown. Study them carefully and then answer the questions. The same questions apply to all three products.

Do this activity in groups of four.

1. What is / was the product used for?

- .....
- .....

2. Why was this product designed? Say what the need was?

- .....
- .....

3. What do we have today to satisfy this same need?

- .....
- .....

4. State what materials were used to make it.

- .....
- .....

5. Why do you think these materials were used?

- .....
- .....

6. Say why you think the choice of materials is good?

- .....
- .....

7. If you were to redesign this product what material would you use?

- .....
- .....

8. Say why you would use this material.

- .....
- .....

9. Does the design meet the intentions it was designed for?

- .....
- .....

10. If not, how can it be improved to meet the intentions?

- .....
- .....

11. What safety features do you see in the product design?

- .....
- .....

12. How did this technological solution improve the quality of the lives of the people that designed and made it?

- .....
- .....

Author: Nonzaliseko Mzizi Contributions by Osman Sadeck Editor: Osman Sadeck

Preservation-1

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Processing

Grade 6

Preservation

Materials deteriorate in different ways. Some get moldy (bread), some dry out and crack (wood), some go sour (milk), some rust (steels), etc. In the case of food it is micro-organisms that cause it to go bad. When we preserve materials we can prolong its lifespan or in some cases prevent it from deteriorating.

This activity will show us one method of preserving a food material:

You need:

- One slice of bread.
- A knife
- Either an oven, grill, braai coals (something that gives off high heat)

Cut the slice of bread into two.

Experiment 1

1. Place one piece on a window sill. (Make sure it is in a spot where it will get a lot of sun).

2. Remove it after two days and check what it looks, and feels like.

Experiment 2

1. Place the other piece of bread in the oven, on or under the grill (depending on which type you have), or over the braai coals.

2. Remove it after a few minutes. (The time will depend on how hot the heat source is). Check what it feels like and looks like.

Write down what has happened to the bread in each experiment.

Bread	**Look**	**Feel**
Bread left in the sun		
Bread heated up		

Answer these questions: (some of these words will help you: dry, evaporate, moisture, water)

1. What do you think happened to the bread?

- .....
- .....

2. How would you explain this method of preservation to anyone?

- .....
- .....

3. Name three other materials that this method of preservation could be used on.

- .....
- .....

4. Write down a method that could be used to preserve a flower.

- .....

- .....

Some information: Drying is process of removing water (moisture) from a material. In drying the moisture that comes out is not used, i.e. it goes up into the air. One way to remove moisture is by applying heat.

Authors: Nonqaba Williams & Nokwezi Mgudlwa Graphics: Osman Sadeck Editor: Osman Sadeck

Identifying Materials

SAASTE Technology

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Processing

Grade 4

IDENTIFYING MATERIALS

Look at the drawings of the objects.

1. Say what materials you think was used to make each of them. Choose from these words: wood,leather, wool, metal, paper

2. Say if you think the material is hard or soft.

3. Write down what you think the object is used for.

Material:

- .....

Hard /Soft:

- .....

Use:

- .....

Material:

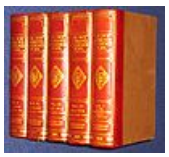
- .....

Hard /Soft:

- .....

Use:

- .....



Material:

- .....

Hard /Soft:

- .....

Use:

- .....

Material:

- .....

Hard /Soft:

- .....

Use:

- .....

Material:

- .....

Hard /Soft:

- .....

Use:

- .....

Author: Cheryl Jaftha

Editor: Osman Sadeck

Properties of Materials

SAASTE Technology

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Processing

Grade 4

Properties of Materials

Practical investigation

Look at the table below and make a tick next to the correct property that tell us more about the material.

To do this you must test the material.

Collect each of the materials and do a test to check if it is strong (does not break or tear easily), and what its mass is (is it heavy or light)

Tell your class how you tested some of the materials.

Material	Strong (does not break/tear easily)	Mass (Light / heavy)
Fabric		
Paper		
Wood		
Cork		
Metal		
Plastic		
Knitting wool		
Leather		
Cardboard		

Author: Cheryl Jaftha

Editor: Osman Sadeck

Preservation-2

SAASTE Technology

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Processing

Grade 6

Preserving

Wind, heat, water are some of the main causes of materials deteriorating. One of the ways to preserve these materials is to treat them with a preservative.

The material we will work with is wood.

You will need:

- Wooden peg, small piece of wood, wooden coaster, wooden spoon, wooden cutting board, classroom desk.
- Varnish, wax polish, silicone spray, cooking oil, lacquer, paint.
- Brushes, pieces of cloth, newspaper.

About preservatives

The technique you use will depend on:

- the condition of the article
- the type of preservative used

The choice of preservative will depend on:

- the type of article
- the intended use of the article

How to apply preservatives:

- In most case it is advisable to sandpaper the article first.
- If you are using paint, varnish, lacquer, etc use a clean brush and apply thin coats. Allow to dry between coats and sand lightly before applying the next coat.
- If you are using wax, apply with a clean cloth. Use a circular motion and finish off with straight strokes. You could also "buff" (shine) the article with a dry cloth.
- If you are using oil you could pour a little onto the article and then using a clean cloth rub the oil into the article. Wipe off any excess oil.
- If you are using sprays, apply thin coats. Sand in between coats.

Think and Do activity:

Think: Complete the table below to show what preservative you will use for each article, give a reason and say how you will do it.

Article	**Type of preservative**	**Reason for use**	**Technique to apply preservative**
Wooden peg			
Wooden spoon			
Wooden coaster			
Classroom desk			
Wooden cutting board			

Do: Select the wooden spoon and the wooden peg and do the preservation.

Author: Cheryl Jaftha

Editor: Osman Sadeck

Electroplating

SAASTE Technology

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Processing

Grade 9

ELECTROPLATING

Electroplating is the process of producing a thin metallic coating on a surface of a metal object. This process has wide application in industry, e.g. used as a protective coating to prevent corrosion (chrome plating), to enhance the aesthetics / appearance (copper plating). The process of electroplating involves: Immersing an object to be plated as well as an electrode in a salt of metal solution, sending an electric current through it causing the free metal ions (charged atoms) to be deposited on the object.

Copper plating

The following process gives the basics of electroplating and is not a guide for doing practical industrial electro plating.

You will need

- A plastic or glass container (non metal)

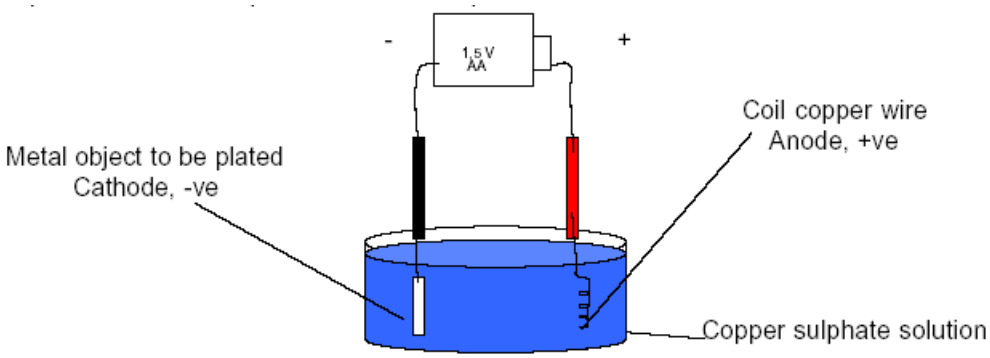
- (1.5 V cell)
- Two length of copper wire
- One coil of copper wire
- A metal object to copper plate (spoon, nail)
- Plastic spoon
- Copper sulphate (the metal salt,) available at most chemist

Copper sulphate is poisonous if swallowed

1. Add 1 teaspoon of copper sulphate to water to make up a solution (about to 400ml.)

2. Strip & connect ve lead to object that must be copper plated and place in solution. (For good results make sure object is clean.)

3. Strip coil, connect to positive lead and place coil into the solution



Within a minute the object becomes coated with copper.The electric current splits the COPPER sulphate. The COPPER is deposited on the metal object.

For you to find out:

- Is it possible to electro plate on a non-metallic object? Please explain your answer.
- Silver plating, chrome plating, and gold plating are examples of electroplating in industry. The picture shows a watch that was chrome plated. Parts of the plating are eroding. Say what can be done to recoat it. Use the word electroplating in your answer. In the real world getting rid of chemical waste in electro plating is huge problem. What effect does the waste chemical have on the environment?

Author: Robert Solomon

Editor: Osman Sadeck

Conditioning-Strengthening\Waterproofing-1

Processing

Grade 7

Conditioning - Strengthening & Waterproofing

Research Task

Find out what is done or can be done to the following materials to:

- Strengthen them and,
- Waterproof them.

Write your information in the appropriate cells in the table.

A cell is each of the blocks in the table. A row is a horizontal (left to right) set of cells. A column is a vertical (up and down) set of cells.

Material	Strengthened	Waterproof
Paper		
Wood		
Metal		
Textile		

Author: Averil Nolly

Editor: Osman Sadeck

Conditioning-Strengthening\Waterproofing-2

SAASTE Technology

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Processing

Grade 7

Conditioning - Strengthening & Waterproofing

Conditioning is the process of changing the internal properties of a material. E.g. a piece of steel can be magnetised. There are two basic forms of conditioning; mechanical conditioning (when metal is hammered it becomes harder - clay that is fired becomes harder and stronger), and chemical conditioning (when we mix resin and hardener heat is given off (exothermic reaction) as the chemical reaction takes place. The product is hard and strong) There are a range of processes that can be carried out to condition a material; e.g. coating, mixing, impregnating, applying pressure, heat, energy, etc.

This activity will focus on the PROCESSING SKILLS of: Coating and Impregnating

You will need: ·

- Glossy magazine paper / newspaper / tissue or toilet paper / small piece of sponge.
- Wood varnish / wood glue / Nail polish

- Optional:
  - Toothpicks
  - Paints
  - String

Activity

Cut the material into five (5) squares 50 X 50. Cut the sponge into two small pieces Leave one (1) square uncoated. Leave one piece of sponge plain.

Coating

1. Paint on the varnish onto test piece 1

2. Paint on the wood glue onto test piece 2

3. Leave to dry completely.

Impregnating

1. Dip test piece 3 into the varnish.

2. Dip test piece 4 into the wood glue.

3. Dip the piece of sponge into the varnish.

4. Leave to dry completely. · Conduct tests to check for waterproofing and strength of all the test pieces and compare to the originals. · Decide on a suitable way to communicate this information to your teacher. (graph , table, paragraph, drawings, etc)

Optional activity:

You can combine the knowledge and skill you have learnt in the activity above by trying the following. It is a practical task where you can combine strengthening and waterproofing into a small product. ·

- Cut a piece of your paper (glossy magazine preferably) according to the template given.
- Apply glue to one side of the template and roll onto the toothpick. Start rolling from the wide side.
- Remove the toothpick and allow to dry.
- Coat the finished product with varnish / nail polish.

- Suggest three uses for the product that you made.

Author: Cheryl Jaftha

Contributions by Osman Sadeck

Reference: Living with Technology: 1993

Shaping

SAASTE Technology

Key Concepts

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Processing

Grade 5

Shaping

In the process of "Shaping" some of the material is removed (taken away). I.e. certain processes are carried out to remove the material. E.g. cutting, filing, sandpapering, grinding, planning, turning, drilling, etc.

You will practice the following PROCESSING SKILLS: Cutting, filing, sandpapering and drilling

You will need:

- ·A piece of plastic (Perspex, ice-cream tub, milk bottle, etc)
- Scissors,
- junior hacksaw,
- snips,

- files,
- hand drill + drill bits,
- sandpaper

Activity 1

This is an investigation on plastics. 1. Feel and look at the plastics, and share what you notice about each one in your own words.

2. What do you think plastic is made of?

3. Name 4 things that plastic is used for.

Activity 2

This is a communication and a practical activity. We have given you two rectangular shapes below. Do the following:

A:

1. Draw a "geometrical" shape in the first rectangle

2. In the second rectangle draw a "free form" shape.

B: 1. Choose one of the shapes and transfer it to your piece of plastic. (Write down how you are going to do this)

2. Smoothen the cut out shape. (Write down how you are going to do this)

3. Drill a hole wherever you want to on the plastic shape that you have made.

4. Write down 3 things that this "product" you have made can be used for.

Please remember and practice all safety precautions when working with tools and materials.

Author: Averil Nolly

Editor: Osman Sadeck

Forming

Forming

In the process of "forming" all of the material is used to make the product. This means that no material is removed (taken away) e.g. nothing is cut, filed, sandpapered etc. The simple process used in this activity is casting.

You will practice the following PROCESSING SKILLS **Mixing** and **combining** and **joining**

You will need:

- A small mould
- Yellow stone (plaster of paris)
- Water
- Spoon

Optional:

- Small magnet
- Brooch pin
- Small cup hook
- Straw
- toothpicks
- Paints
- Glue (Bostik)

How to cast

1. Fill the mould half with water.

2. Slowly add some yellow stone (enough to fill the mould) and mix well.

3. Allow to set for 25 minutes and turn out.

Or alternatively

1. Mix the plaster of paris with water in a separate container.

2. Pour the mixture into the mould

3. Allow to set.

Optional activity:

Once you have cast your object you can turn it into a useable work of art. You could:

- Decide on any creative use for your casting,

OR

- Glue on the magnet to make a fridge magnet,
- Glue the brooch pin and make it a brooch,
- Use the cup hook or straw to make a pendant (the challenge is deciding when and how to use the cup hook and straw)

Author: Cheryl Jaftha

Editor: Osman Sadeck

Forces

SAASTE Technology

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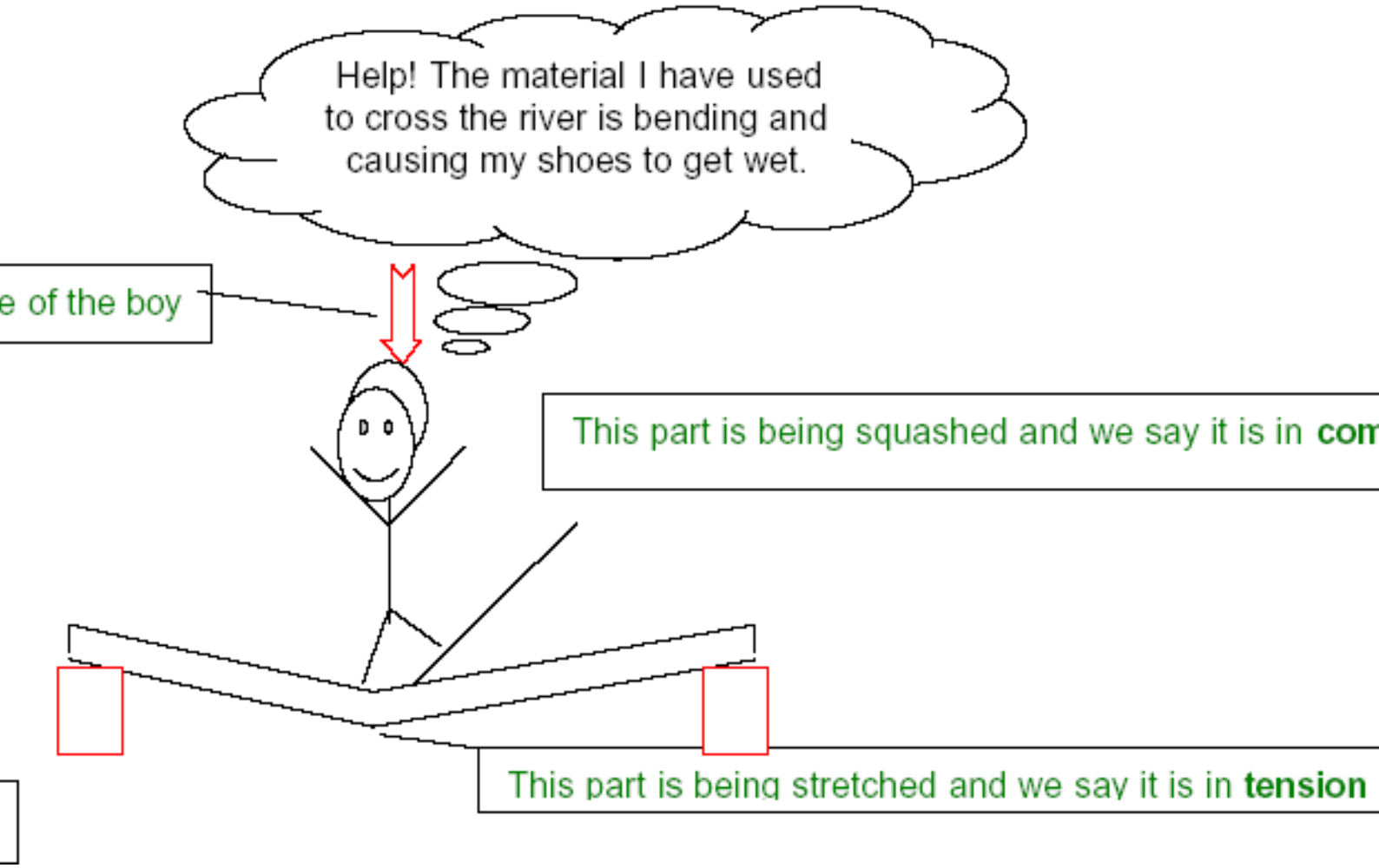
Structures

Grade 8

Understanding Forces



When a material bends the two forces we talked about above can be seen in the material

Use an eraser (or similar object) and draw evenly spaced lines on the side. Bend, by applying upward pressure with the thumbs at arrow A and downward pressure at arrows B.

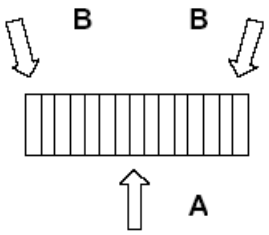


Fig: 2

Observe and write down what happens to the lines at the top and bottom of the eraser.

Refer to Fig: 1 and answer these questions. 1. What is causing the bending in the material?

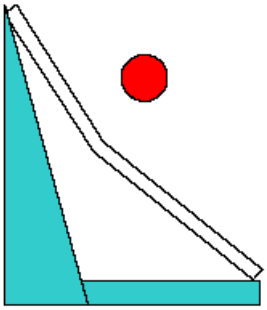
- .....

- .....

2. What would you call the OBJECT that is being bent?

- .....
- .....

3. The drawing below shows a piece of metal which was struck by a cricket ball. Use your knowledge of forces and indicate on the drawing, where the metal has experienced the forces of compression and tension.



4. A material that is being stretched is said to be in:

- .....
- .....

5. A material that is being squashed is said to be in:

- .....
- .....

Author: Deon Kahn

Editor: Osman Sadeck

Types of Structures

Types of Structures

Structures are either natural (are found in nature) or constructed (are made by people). There are three types of structures;

1. Frame: made of separate members (usually thin pieces) put together.
2. Shell: encloses or contains its contents
3. Solid (mass): made almost entirely of matter.

Author: Averil Nolly

Editor: Osman Sadeck

Mechanisms Worksheet

SAASTE Technology

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Systems & Control

Grade 9

Mechanisms Worksheet

1. Make a labelled sketch to show the three specific components of a lever. (The parts that tell us about the input, process and output)

2. Indicate on the picture of the jack below, the three components referred to above. 3. Work out the mechanical advantage of the above jack, given the following information

Effort = 20N Load = 40kg **MA =load/effort**

- .....
- .....
- .....

Always convert mass into force xkg x 10 = yN

4. Determine the moment so that the lever is balanced.

- .....
- .....

A mass of 35kg is placed 2m from the fulcrum. How much effort is needed to balance the mass if the effort is 5m away from the fulcrum? (Hint: for the lever to balance the moments need to be equal) Moment = effort X distance

- .....
- .....

5. Using the illustration below to indicate the input and output direction. (Make use of the acceptable convention symbols to indicate your answer) 5.1 Which gear will move faster?

- .....

6. Explain your understanding of the terms "loose pivot" and "fixed pivot"

- .....
- .....
- .....

Author: Alison Fowkes

Editor: Osman Sadeck