



education

Department:
Education
REPUBLIC OF SOUTH AFRICA

**COMMON TASK FOR ASSESSMENT (CTA)
GRADE 9 – 2008**

TECHNOLOGY

TEACHER'S BOOK

SECTION A

THEME:
Water for Life

Suggested Time: 5 hours

150 marks

Number of pages: 14

CONTENTS

Task/ Activity		LOs and ASs	Time/ min	Mark	Pg	Resources
	Note to teachers				3	
TASK 1	Case Study	LO 2: AS 2 LO 2: AS 3 LO 3: AS 2	30	20	4	
TASK 2	Investigation of mechanical control systems	LO 1: AS 2 LO 1: AS 15 LO 2: AS 3	40	24	5	Grade 9 Technology text books, library books, Internet, ruler, pencil and eraser.
TASK 3:	Increasing Production with Irrigation				8	
Activity 1	Design brief, specifications, constraints	LO 1: AS 5 LO 1: AS 6	20	12	8	
Activity 2	Design	LO 1: AS 7 LO 1: AS 15	20	12	9	Ruler, pencil and eraser.
Activity 3	Selection of design	LO 1: AS 8	20	6	10	
Activity 4	Make: planning	LO 1: AS 8 LO 1: AS 9	40	34	11	Ruler, pencil and eraser.
Activity 5	Make	LO 1: AS 10 LO 1: AS 11 LO 1: AS 12	70	20	12	Tools, equipment and materials for making model (e.g. rope, string, glue, cardboard, wire, dowel sticks, masonite, 3-ply, Perspex, hard board, scissors, craft knives, wire snips, pliers, hacksaws).
Activity 6	Evaluates the product	LO 1: AS 13 LO 1: AS 14	60	22	13	

NOTE TO TEACHERS

BACKGROUND

The CTA consists of two sections: Section A and Section B. Section A is allocated 150 marks and Section B is allocated 100 marks. The time allocation for Section A is 5 hours and Section B is 2 hours. Refer to the summary table on the previous page for the allocation of time, marks, LOs and ASs, and resources needed for each task. Section A consists of 3 tasks. Task 3 consists of 6 activities. All the tasks for Section A will be done under the supervision of the Technology teacher who will assess the tasks and activities on a continuous basis.

The CTA for 2008 consists of six documents. These are:

Section A

1. Learner's Book
2. Teacher's Book which includes a table summarising all the activities and the memorandum for Section A.
3. Answer Booklet

Section B

1. Learner's Book
2. Teacher's Book including the marking guidelines for Section B.
3. Answer Booklet

There are Answer Booklets for the learners for Section A and Section B. Summary sheets for the recording of marks are to be found in these booklets.

The School Management Team, in collaboration with the teacher, should ensure that all necessary resources and stationery are made available prior to the commencement of the tasks. Learners should be encouraged to use waste materials where possible when developing their models. They must each have a pen and pencil for all the tasks.

The tasks in Section A require learners to acquire and show their competencies of the Learning Outcomes. The tasks and activities in Section A and Section B will focus on the application, analysis and understanding of knowledge, skills, values and attitudes required for Grade 9. Section B should be completed under strict examination conditions according to a set national timetable.

MANAGEMENT OF THE CTA

An answer booklet should be provided for each learner. Make sure that there are a few extra copies. Learners need to have their Learner's Book and Answer Booklet available for each task and activity. A mark summary sheet is available in the booklet.

All the activities in Section A should be answered in the Answer Booklet provided. The teacher needs to put the learners into groups of 4 – 6. The group responses only need to be recorded in one of the learner's Answer Booklets. Make sure they indicate whose Answer Booklet has the group responses. Each group needs to hand in all the group members Answer Booklets together.

Make sure that all the necessary resources are available before each task or activity is started. The resources needed are listed in the summary table on the previous page.

Section A must be completed before Section B is written.

**TASK 1: CASE STUDY
INDIVIDUAL ACTIVITY****(30 minutes)****LO 2: AS 2, AS 3; LO 3: AS 2****Marks: 20****THE TREADLE PUMP****Questions and answers:**

- 1.1 The introduction of the treadle pump into Zambia has improved the lives of the local people. Give two ways in which local farmers can increase their harvest by using the treadle pump.

Two of the following are given:

- **the growing season is longer**
- **allows a bigger variety of vegetables to be grown**
- **crops are being grown where nothing grew before** (2)

- 1.2 Why are treadle pumps better for the environment than motorized pumps?

They do not use fossil fuels. (1)

- 1.3 1.3.1 Name a mechanical control mechanism used in the treadle pump.

One-way valve (1)

- 1.3.2 What is this mechanism's purpose when used in a treadle pump?

Its purpose is to stop water from flowing back down the pipe into the river. (1)

- 1.3.3 What material is this mechanical control mechanism made from?

Rubber (1)

- 1.3.4 How can local farmers replace this part when needed?

Local farmers can use inner tubes from bicycle tyres. (1)

- 1.3.5 Is this re-using, recycling or re-manufacturing? Motivate your answer.

Re-using as an inner tube is being used for a different purpose. (2)

- 1.4 In point form, list three advantages of the treadle pump.

Give three of the following:

- **cheap to make**
- **easy to maintain because it uses local materials and is simple to fix**
- **increases income of farmers by extending growing season**
- **little impact on the environment** (3)

1.5 Name a disadvantage of the treadle pump.

Give one of the following:

- **needs physical effort to operate**
- **internal moveable parts do not last long.** (1)

1.6 1.6.1 What is meant by *lifespan*?

The time that a product lasts before being unusable or inedible. (1)

1.6.2 Give one way in which Zambian farmers are able to increase the lifespan of the treadle pump.

A strainer is used at the point where water comes into the pump to prevent any debris entering into the pump. (1)

1.6.3 In a short paragraph, discuss the impact that the treadle pump can have on the lives of poor farmers and the environment. Is the impact generally positive or negative? Give reasons for your opinion.

Teachers must use their discretion when marking this paragraph. Learners must state an opinion and give reasons for this. 3 marks should be allocated to the impact of the treadle pump on the farmers' lives and the environment. 2 marks should be allocated to stating whether the impact is positive or negative and the reason for this opinion. (5)

[20]

TASK 2: INVESTIGATION OF MECHANICAL CONTROL SYSTEMS INDIVIDUAL ACTIVITY

(40 minutes)

LO 1: AS 2, AS 15; LO 2: AS 3

Marks: 24

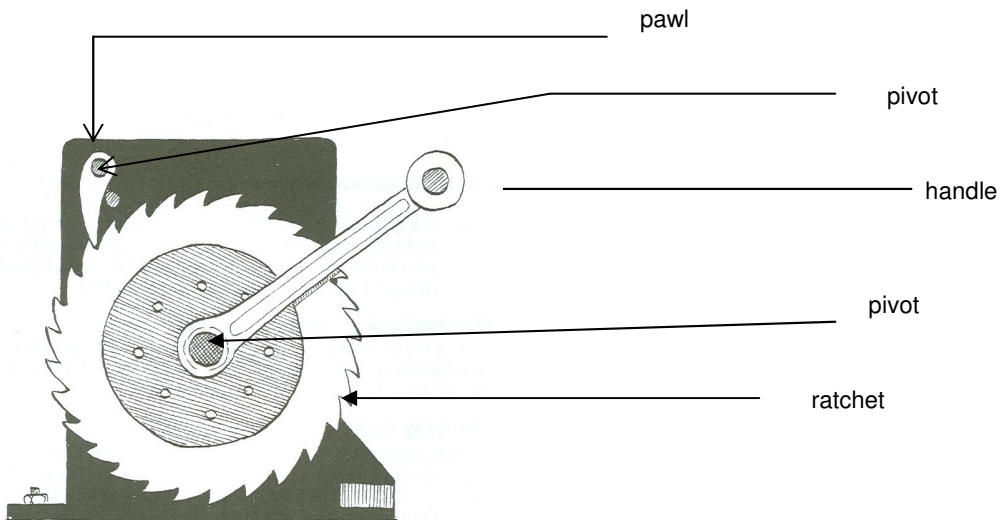
2.1 Draw a sketch of each mechanical control system. Use headings and labels to show the parts of each system. (18)

2.2 Under each drawing, give the purpose of each mechanical control system and give an example of where it is used in real life. (6)

Assess each drawing according to the rubric below.

Rubric for each sketch of the pawl and ratchet, one-way valve and cam-cleat. (6 marks each)

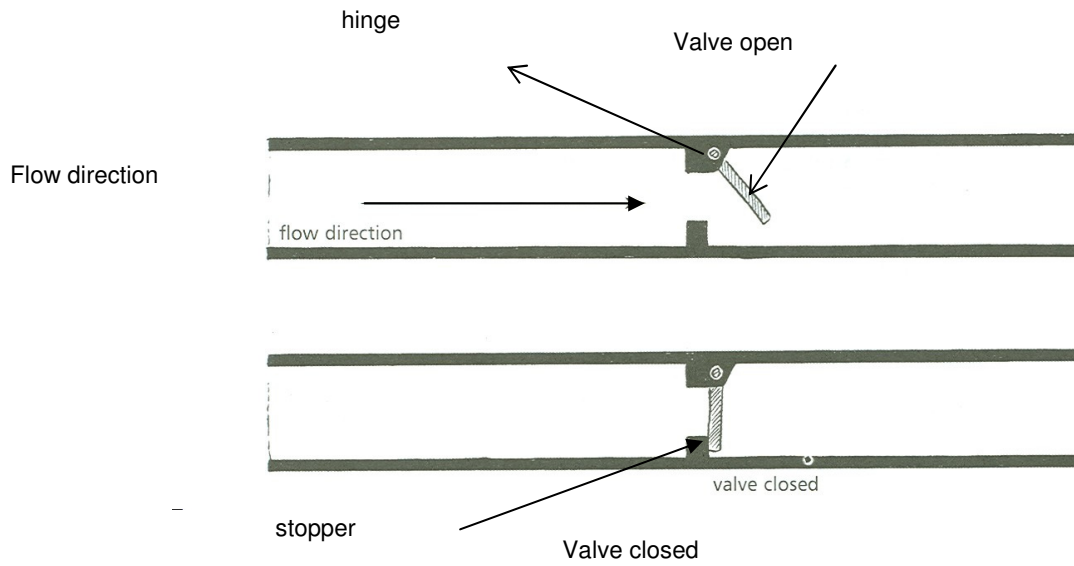
LEVEL	DESCRIPTORS	MARKS
6 – 7	Sketch clearly shows the mechanical system and how it works. Headings and labels are used. All necessary parts are labelled. Sketch is neat.	5 – 6
4 – 5	Sketch shows the mechanical system. Most headings and labels are used. Most necessary parts are labelled. Sketch is reasonably neat.	3 – 4
2 – 3	Sketch does not clearly show the mechanical system. Few headings and labels are used. Few parts are labelled.	2
1	Sketch does not clearly show the mechanical system. Headings and labels are inadequate or non-existent. One or no parts are labelled. OR no sketch has been drawn.	0 – 1



Pawl and ratchet

Purpose: The ratchet can turn one way only as the pawl stops it from turning the other way. ✓

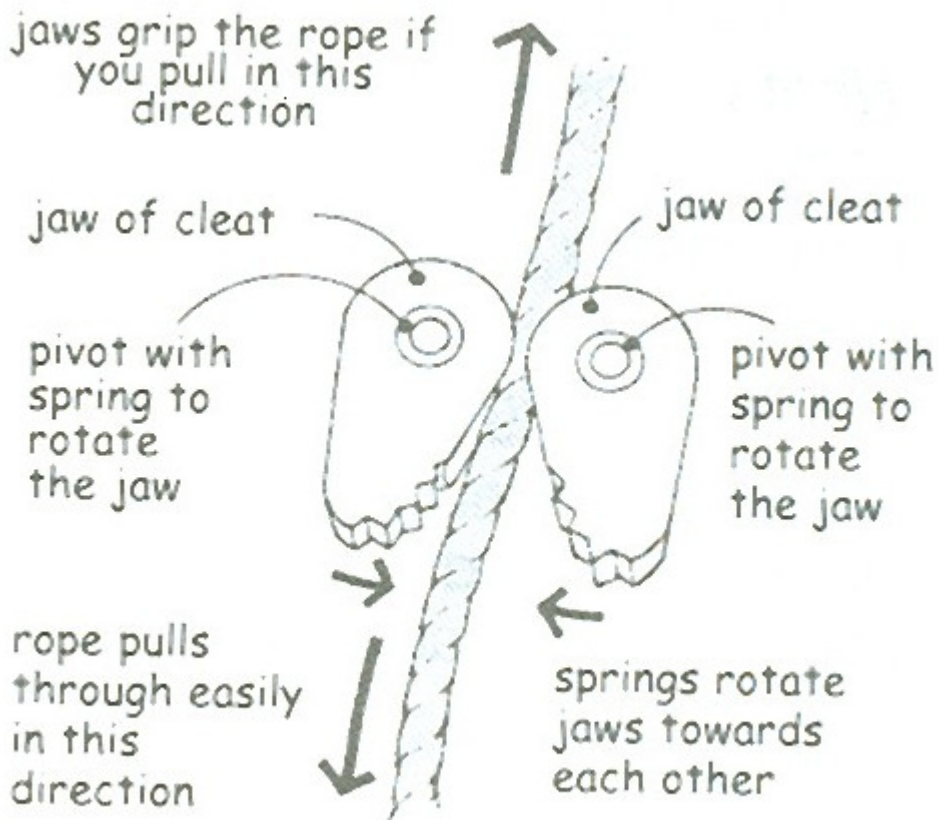
Real-life use: In a theatre to wind up curtains and then keep them up. ✓



One-way valve

Purpose: Allows the flow of liquid or gas in one direction only. ✓

Real-life use: hydraulic car jacks. ✓



Cam-cleat

Purpose: Allows the rope to be clamped. ✓

Real-life use: to hold the ropes of sails on yachts. ✓

**TASK 3: INCREASING PRODUCTION WITH IRRIGATION
INDIVIDUAL ACTIVITY****(20 minutes)****ACTIVITY 1: DESIGN BRIEF, SPECIFICATIONS AND CONSTRAINTS****LO 1: AS 5, AS 6****Marks: 12**

This activity assesses the learner's ability to analyse a problem by developing a design brief, constraints and specifications. Read through the scenario and the challenge with the learners before they start the task.

3.1 Design Brief:

Discuss and write the design brief for your task. Your brief should be a short, clear statement showing what you have to make. It also needs to state who will be using the final product, its purpose and where, in general, it will be used.

Possible answer:

Design and make a model of a cam-cleat to be used as a mechanical control system for a pulley-and-rope system to lift water in buckets from the river into a storage tank. This device is for rural farmers to assist them with irrigating their lands.

(3)

Allocate 1 mark for stating 'design and make a model of a cam-cleat'.

Allocate 1 mark for stating who the product is for e.g. rural farmers.

Allocate 1 mark for stating its purpose and where it will be used.

3.2 Constraints:

List two constraints that you will have to consider when designing and making this mechanical control system. A constraint is a factor that will limit your choice when designing.

Any two of the following:

- **model must use a cam-cleat**
- **must be cheap to make**
- **must be easy to maintain**

(2)**3.3 Specifications:**

The specifications must refer to the final product that Sagna will use and not the model. You need to choose seven of the following aspects that are relevant to the final product that you are designing and then expand on these aspects:

- who the product is for (the target market)
the product is for rural farmers/ Sagna
- where the product will be used
it will be used on their lands next to a river
- what the product will do (purpose)
it will stop the buckets, which are filled with water, from slipping backwards on the pulley-and-rope system
- the appearance and aesthetics: form, colour, shape, texture, size
it needs to be neatly constructed
- the environmental impact: short and long term effects of the materials and the product itself

little impact on the environment as it uses local materials
it has a long life-span as it is easy to maintain
no fossil fuels are used

- the social impact: will your product be beneficial or have a negative impact on certain people or communities

it enables the users of the system to lift water more easily

- safety aspects for the users

the cam-cleat must be strong enough not to break or slip otherwise people could be hurt by falling buckets

- cost of materials

it must be cheap to make and maintain

- ergonomics: ease and comfort of use

the size must be suitable for most people to use

(7)

ACTIVITY 2: DESIGN INDIVIDUAL ACTIVITY

(20 minutes)

LO 1: AS 7, AS 15

Marks: 12

This activity assesses your ability to think creatively by developing a solution and to communicate effectively using free-hand sketches.

- 3.4 Decide on an initial idea of a clam-cleat for the model. Draw neat free-hand sketches. Keep in mind the constraints and specifications that you have developed. Add necessary notes and labels to make your idea clear to anyone looking at your drawing.

Next to your sketches, list the strengths and weaknesses of your idea according to the constraints and specifications that you have developed.

Rubric to assess Activity 2: Design

LEVEL	DESCRIPTORS	MARKS
6 - 7	<ul style="list-style-type: none"> Develops a creative relevant idea by drawing neat freehand sketches taking into consideration the design brief, constraints and specifications. Comprehensive labels and notes explaining the sketch are given. Mechanical control system is indicated in detail. The idea is critically evaluated with relevant strengths and weaknesses written down in detail. 	9 - 12
4 - 5	<ul style="list-style-type: none"> Develops a creative relevant idea by drawing freehand sketches taking into consideration the design brief and most of the constraints and specifications. Labels and notes explaining the drawing are included. Mechanical control system is indicated in sufficient detail. The idea is critically evaluated with most strengths and weaknesses written down. 	6 - 8
2 - 3	<ul style="list-style-type: none"> Develops an idea by drawing poor sketches taking little consideration of the design brief, constraints and/ or specifications. Basic labels and notes are included. The mechanical control system is mostly inappropriate or incomplete. The idea is critically evaluated with few strengths and weaknesses written down. 	3 - 5
1	<ul style="list-style-type: none"> Develops an inappropriate idea by drawing poor sketches with no consideration for the design brief, constraints and specifications. No labels and notes included. The mechanical control system is inappropriate, incomplete or non-existent. The idea is not evaluated. 	0 – 2

**ACTIVITY 3: SELECTION OF DESIGN
GROUP ACTIVITY**
(20 minutes)**LO 1: AS 8****Marks: 6**

3.5 The teacher must mark the group's selection according to the rubric.

Rubric to assess selection of design

LEVEL	DESCRIPTORS	MARKS
6 - 7	Choice is valid and reasons given are comprehensive, relevant and appropriate. The reasons are matched against the design brief, constraints and specifications.	5 - 6
4 - 5	Makes a good choice and reasons given are relevant. The reasons are mostly matched against the design brief, constraints and specifications.	3 - 4
2 - 3	Few reasons are given. The reasons have little correlation with the design brief, constraints and specifications.	2
1	One or no reasons are given with little correlation with the design brief, constraints and specifications.	0 – 1

**ACTIVITY 4: MAKE: PLANNING
INDIVIDUAL AND GROUP ACTIVITY**

(40 minutes)

LO 1: AS 8, AS 9

Marks: 34

3.6 Each individual will prepare a detailed drawing of the model of the mechanical control system that will be used in the device. Use correct South African conventional drawing standards.

You need to:

- use a heading and labels;
- include dimensions;
- label on the drawing the materials you will be using to make the model of the mechanical control system;
- use arrows to show how the cam-cleat works.

(10)

Rubric to assess detailed drawings

LEVEL	DESCRIPTORS	MARKS
7	Detailed drawings of the model are developed using an appropriate range of available media. Drawings clearly communicate the idea. Drawings have relevant headings and detailed labels and notes. Dimensions are realistic. Materials to be used in the model are labelled. Arrows are used to show how the cleat works.	8 - 10
6	Reasonably detailed drawings of the model are developed using a good range of media. Drawings communicate the idea. Drawings have relevant headings and labels and notes. Most dimensions are included and are realistic. Materials to be used in the model are labelled. Arrows are used to show how the cleat works.	7
5	Drawings of the model are developed using a range of media. Drawings communicate the idea. Drawings have relevant headings and labels and notes. Few dimensions are included. Most materials to be used in the model are labelled. Arrows mostly demonstrate how the cleat works.	6
4	Drawings of the model are developed using a limited range of media. Drawings communicate the idea. Drawings have headings and basic labels and notes. One or two dimensions are included. Some of the materials to be used in the model are labelled. There is an attempt to show how the cleat works by using arrows.	5
3	Basic drawings of the model are developed. Drawing has heading, but labels and notes are not sufficient to communicate the idea clearly. One or two dimensions are included. One material to be used in the model is labelled. No arrows are used.	4
2	Develops basic drawing of the model. Headings, labels and notes are scarce and uninformative. The idea is not clearly communicated. There are no dimensions. No materials to be used in the model are labelled. No arrows are used.	3
1	Develops an inappropriate drawing. Headings, labels and notes are inappropriate or not included. The idea is not communicated. No dimensions are included. Drawings communicate the idea. No materials to be used in the model are labelled. No arrows are used. Or no drawing is handed in.	0 – 2

3.7 Develop a detailed **flowchart** to show the sequence of activities needed for the making process. (10)

Rubric to assess flowchart:

LEVEL	DESCRIPTORS	MARKS
6 – 7	<ul style="list-style-type: none"> • A comprehensive flowchart is developed showing a detailed and logical sequence of activities. • The steps are clear, precise and easy to follow. • The flowchart focuses on the making process of the model. • The flowchart uses correct symbols. • No progression evident. • Approximate time needed for each activity is included, not exceeding 1 hour. 	7 – 10
4 – 5	<ul style="list-style-type: none"> • A relevant flowchart showing a reasonably detailed and logical sequence of activities is developed. • The steps are clear and easy to follow. • The flowchart focuses on the making process of the model. • The flowchart uses mostly correct symbols. • No progression evident • Approximate time for each activity is included, in total a maximum of 1 hour. 	5 – 6
2 – 3	<ul style="list-style-type: none"> • A basic flowchart is developed. • Instructions are difficult to understand. • The flowchart focuses partially on the making process of the model. • The flowchart uses few correct symbols. • No progression evident. • A time schedule has been included but the allocation of time is not detailed and realistic. 	3 – 4
1	<ul style="list-style-type: none"> • A simple flowchart is developed but the steps are not in logical sequence. • The instructions are not clear and are very difficult to understand and follow. • The flowchart does not focus on the making process of the model. • The flowchart does not use correct symbols. • No progression evident. • There is little or no breakdown of time allocated. 	0 – 2

3.8 List the materials that you will need for the model.

Learners need to list relevant materials according to their design. The materials need to be available and they must be appropriate for making a cam-cleat. (8)

3.9 List the tools that you will need to make the model.

Learners need to make a comprehensive list of all the necessary and appropriate tools that will be required to realise their design. (6)

**ACTIVITY 5: MAKE
GROUP ACTIVITY****(70 minutes)****LO 1: AS 10, AS 11, AS 12****Marks: 20**

The teacher must make sure that all the necessary materials and tools are available to learners for this activity.

Suggested materials: string, rope, glue, cardboard, wire, dowel sticks, masonite, 3-ply, Perspex, hard board.

Suggested tools: scissors, hacksaws, craft knives, wire snips, pliers.

The teacher must assess the group during the making process.

- 3.10 In your groups construct the model according to your final design and follow the steps in the flowchart you have developed. If there are any changes to be made to the flowchart, these need to be recorded and reasons need to be given. Work safely and use the tools correctly. (20)

Rubric for the making process:

LEVEL	DESCRIPTORS	MARKS
6 – 7	The group completed the model in the allocated time. The group worked safely and worked with the tools and materials with precision, control and efficiency. Measuring and checking procedures were used to monitor quality and changes. Flowchart was followed and changes with reasons were written down. There was little wastage of materials. Work space was left clean and tidy.	14 – 20
4 – 5	The group completed most of the model in the allocated time. The group worked reasonably safely and worked with most of the tools and materials with precision, control and efficiency. Some measuring and checking procedures were used to monitor quality and changes. Flowchart was mostly followed. Changes and reasons were written down. There was little wastage of materials. Work space was left reasonably clean and tidy.	10 – 13
2 – 3	Extra time (more than 30 min) was needed to complete the model. The group did not follow the correct safety procedures and some tools were not used correctly. Flowchart was not adhered to. Work space was left untidy.	5 – 9
1	The model was not completed. Safety procedures were not observed. Work space was left untidy. Measuring and checking procedures were non-existent. Flowchart was not followed. OR no making process occurred.	0 – 4

**ACTIVITY 6: EVALUATES THE PRODUCT
INDIVIDUAL AND GROUP ACTIVITY****(60 minutes)****LO 1: AS 13, AS 14****Marks: 22**

This activity will assess your individual ability to develop self-generated criteria and your group's ability to test and evaluate a product.

- 3.11 Use the rubric below to assess each group's list of criteria. Suggested criteria are:
- the model uses a clam-cleat
 - the clam-cleat works well all the time
 - the rope (string) is easy to insert into the clam-cleat and easy to release
 - the model is well made

Rubric to assess self-generated criteria:

LEVEL	DESCRIPTORS	MARKS
6 – 7	<ul style="list-style-type: none"> • Criteria are linked directly to the design brief, constraints and specifications. • Criteria are appropriate and relevant to the task. • Weighting of criteria is appropriate. 	4 – 5
4 – 5	<ul style="list-style-type: none"> • Most criteria are linked directly to the design brief, constraints and specifications. • Most criteria are appropriate and relevant to the task. • Weighting of criteria is mostly appropriate. 	3
2 – 3	<ul style="list-style-type: none"> • Few criteria are linked to design brief, constraints and specifications. • Few criteria are appropriate and relevant to the task. • Weighting of criteria is not appropriate. 	2
1	<ul style="list-style-type: none"> • Only one criterion is given. • Criteria are not appropriate or relevant. • No weighting is apparent. • OR the criteria have not been filled in. 	0 – 1

3.12 In your groups using the criteria that your group have developed, evaluate the model of another group.

The teacher needs to make sure that the evaluation of the models is valid.

Allocate a mark out of 12 for the model. The group that made the model will be allocated this mark.

The same mark is given to each member of the group. Fill this mark in on each learner's summary mark sheet.

(12)

3.13 In your groups think of **three** areas, by referring to three different aspects of your completed model, that you would improve or modify that would result in a more effective or better quality end-product, should you ever make the model again. Explain in detail by answering the question: 'If I ever had to make the model again, I would improve (what) ..., because (why) ..., by doing the following (how) ...'

(5)

This is a group activity. The responses need to be well thought out and relevant. Each member of the group will get the same mark, so they need to discuss their responses in detail.

TOTAL MARKS [150]