BOTSWANA
EXAMINATIONS
COUNCIL

JUNIOR CERTIFICATE EXAMINATION

ASSESSMENT SYLLABUS

DESIGN & TECHNOLOGY
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BOTSWANA EXAMINATIONS COUNCIL

DESIGN AND TECHNOLOGY ASSESSMENT SYLLABUS

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FOREWORD

The Botswana Examinations Council is pleased to release the assessment syllabus for the revised Junior Secondary Education curriculum implemented in January 2010.

The purpose of this assessment syllabus is to guide schools, teachers and other educational institutions on what will be assessed in the subject area and how the assessment will be carried out for certification of students completing the Junior Secondary Education.

The curriculum at junior secondary level, puts emphasis on understanding and application of concepts; development of high order thinking skills (HOTS) such as inquiry, decision making, reasoning, creative, analytical, problem solving and process skills. It also calls for the acquisition of hands on experience that should increase the participation and performance of all groups e.g. groups of different abilities, learners with special needs, girls and boys.

All these skills entail more practical and challenging content and tasks that require higher levels of engagement of a learner's cognitive ability. The assessment syllabus has been designed to allow these higher order thinking skills to be assessed. It assesses what candidates know, understand and can do, enabling them to demonstrate their full potential.

The assessment syllabus is intended to promote a variety of styles of teaching, learning and assessment to enable candidates to progress to higher levels of learning. Therefore, teachers must be proficient in planning and directing a variety of learning activities. They should be conscious of the need for the students to be accountable and responsible for their own learning to some extent. They must also take into account the widening different levels of achievement which they aspire to. This implies active participation by both students and teachers, the creation of rich and diverse learning environments and the use of relevant assessment procedures to monitor the development of each learner.

It is important then that we value the student's own experiences, build upon what they know and reward them for positive achievement. This assessment syllabus is the outcome of a great deal of professional consultation and collaboration. On behalf of the Botswana Examinations Council, I wish to express my sincere gratitude to all those who contributed to the development and production of this assessment syllabus.

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Executive Secretary

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Mr. T. Moremong	Department of Secondary Education
Mr. T. Salani	Department of Teacher Training and Development
Mr. R. Kedikilwe	Department of Secondary Education
Mr. N.J Gare	Botswana Examinations Council

1. Introduction

As part of the Botswana Junior Secondary Education Programme, this Design and Technology syllabus is designed to provide a framework for the assessment of candidates who have completed the three-year course based on the revised Junior Secondary Design and Technology teaching syllabus.

The Junior Secondary Education Design and Technology Assessment Syllabus aims to afford the candidate an opportunity to fully demonstrate their potential and exhibit the knowledge and skills they possess through a variety of assessment modes. The syllabus also aims at providing information on what will be assessed and how it will be assessed with the intention of achieving comparable standards from year to year.

Candidates will be assessed on a scale of A – E. Candidates who fail to meet the minimum requirement will be awarded a U.

This syllabus should be read in conjunction with:

(a) the Junior Secondary School Design and Technology Teaching syllabus;

(b) the specimen question papers and marking schemes.

This syllabus is available for private candidates. Private candidates are allowed to carry over their coursework marks from a previous year.

The outcome of instruction in the content prescribed by the Design and Technology teaching syllabus will be assessed through a multiple-choice paper, a written paper and centre-based assessment.

2. General Aims of Assessment

The syllabus embraces the subject aims defined in the Design and Technology teaching syllabus.

The assessment syllabus has the following additional aims:

- To ensure proper assessment of all the important skills in the curriculum
- To enable both teaching and assessment to cater for all ability levels
- To provide an efficient evaluative mechanism of the curriculum
- To encourage an investigative approach to learning
- To provide internationally recognised standards
- To enable the students to realise their full potential

3. Assessment Objectives

For purposes of assessment, the behavioural outcomes of instruction in the prescribed content have been classified into three broad skill areas known as assessment objectives. Brief descriptions of the assessment objectives are given below.

Assessment Objective 1: Knowledge and Understanding of Technical Principles and Concepts

Candidates will be assessed on their ability to recall and understand;

1.1 technological effects on society and the environment;
1.2 tools, equipment and materials and their use;
1.3 the significance of ICT in design activities;
1.4 various processes used to manipulate resistant materials;
1.5 basic principles and concepts of Design and Technology.

Assessment Objective 2: Application of Technical Principles and Concepts

Candidates will be assessed on their ability to;

2.1 use various processes that relate to resistant materials;
2.2 communicate ideas clearly in verbal, written and graphical form;
2.3 manipulate materials, tools and equipment safely;
2.4 execute sound fabrication skills in making high quality products;
2.5 exercise cost effectiveness in selection of materials when making artifacts;
2.6 cost and market their products.

Assessment Objective 3: Problem Solving

Candidates will be assessed on their ability to;

3.1 incorporate technological concepts, systems and control in problem solving;

3.2 demonstrate creativity in their work as they solve real life problems;

3.3 make informed decisions when designing and making useful products;

3.4 incorporate indigenous materials in their design products.

4. Scheme of Assessment

The JCE Design and Technology syllabus will be assessed through a multiple-choice paper, a written paper and centre-based assessment.

Paper 1	**Multiple Choice Items**		
Time	**1 hour**	**Marks**	**40**
Weighting	**20%**		

This will be a 40 item multiple-choice paper assessing knowledge, understanding and application of technical skills and concepts in Design and Technology. Each item will have four options.

Paper 2	Short-Answer and Structured Items

Time	**2 hours**	**Marks**	**60**
Weighting	**40%**		

This will be a written paper assessing knowledge, understanding and application of Design and Technology concepts and technical skills, including handling equipment, design and problem solving skills. There will be two sections in the paper, that is, Sections **A** and **B**.

Section A: This section will present short-answer items assessing candidates' ability to express themselves while demonstrating in-depth knowledge of particular concepts of the subject. Candidates will answer **all** questions. This section will be worth **20 marks**.

Section B: This section will present four structured items of 10 marks each assessing candidates' ability to present their thoughts in a constructive, logical and consistent manner while drawing on knowledge of problem solving and applying it to real life situations. This section will be worth **40 marks.**

Centre-Based Assessment

Time	**January to August in Form 3**	**Marks**	**80**
Weighting	**40%**		

The purpose of this component is to afford candidates the opportunity to demonstrate their ability to apply design and technological skills and concepts as well as problem solving skills over a period of time. Each candidate will be required to work on a project that will produce a portfolio and a product. Both the portfolio and the product must be submitted for a grade to be awarded. Candidates will be assessed by teachers during the course of study.

Candidates will be required to design and make suitable products, which conform to a given theme to be provided by Botswana Examinations Council (BEC) at the end of year 2. The product should be completed by mid-August of the final year.

Marks awarded by the centre will be moderated by BEC.

Note: See Appendix A for marking criteria for the portfolio and Appendix B for marking criteria for the product.

5. Assessment Grid

The grid below shows the assessment objectives that will be mainly assessed in each paper.

Assessment objectives	Paper 1	Paper 2	Paper 3
1.1	√	√	
1.2	√	√	
1.3	√	√	
1.4	√	√	
1.5	√	√	
2.1		√	√
2.2		√	√
2.3			√
2.4			√
2.5			√
2.6		√	√
3.1		√	√
3.2		√	√
3.3		√	√
3.4		√	√

6. Grade Descriptors

The descriptions below provide a general indication of the skill acquisition expected of candidates for the award of key grades A, C and E.

GRADE A

Candidates should be able to;

- identify general safety precautions in order to minimise potential work hazards in the workshop;
- describe First Aid techniques in treating minor injuries;
- justify the selection and use of appropriate materials and finish;
- identify and describe the use of tools and equipment in the workshop;
- identify a problem from a situation and use a variety of design ideas to arrive at a solution;
- solve a design problem using a wide range of creative and innovative design ideas;
- communicate ideas in a concise and detailed manner using a wide range of presentation techniques;
- use appropriate construction techniques and good making skills with safety considerations.

GRADE C

Candidates should be able to;

- identify general safety precautions and possible work hazards in the workshop;
- state First Aid techniques in treating minor injuries;
- make appropriate selection and use of materials and finish;
- identify tools and equipment in the workshop;
- solve a design problem using a range of design ideas;
- communicate ideas with some aspects of presentation techniques;
- use acceptable construction techniques and making skills;
- show some safety considerations.

GRADE E

Candidates should be able to;

- recall general safety precautions in the workshop;
- show basic knowledge of First Aid techniques;
- show basic knowledge in selection and use of materials and finish;
- state tools and equipment used in the workshop;
- identify a problem from a given situation and use simple forms of communication to arrive at a solution;
- solve a design problem using limited design ideas;
- communicate ideas using limited presentation techniques;
- use limited construction techniques and making skills;
- show little safety considerations.

7. Inclusive Assessment

BEC intends to ensure all assessment offered is inclusive of all candidates regardless of their ability or challenges. This will afford all candidates the opportunity to display what they know without fear or prejudice. The assessment will therefore ensure that in the written papers items cater for all ability levels. Special needs candidates will be catered for through modification of assessments to suit visually challenged candidates, learners with hearing impairment as well as learners with learning disabilities. Candidates will also be accommodated as much as possible to gain access into the practically oriented syllabuses.

Centre are however requested to;

- inform BEC of any candidates who need special arrangements by March every year;
- ensure familiarity with the BEC special arrangements manual;
- make the necessary accommodations for learners with disabilities during the teaching and learning;
- modify learners assessments according to their various needs during the teaching and learning.

This will ensure that the special arrangements carried out by BEC do not come as a shock to candidates during examination time.

8. Coursework

Centres are expected to mark candidates' work according to the marking criteria provided by BEC (*see Appendices A and B*). The marking criteria is intended to ensure standardised marking at a national level. It is essential that the marking criteria is adhered to in order to facilitate the moderation of centre scores by BEC. Where there are indications that the marking criteria has not been adhered to, centres will be required to re-mark. BEC is responsible for the training of teachers on the application of the marking criteria.

Where there is more than one teacher in a centre, teachers are expected to standardise their marking before marking their individual students to ensure that all students are marked to a common standard. It is essential that the marking from different teaching groups in a centre is standardised for the whole centre entry. The centre marks will then be externally moderated by BEC.

Centres are required to ensure that the work presented is the candidate's own work and that the work is only carried out within the school premises.

Candidates are to follow a problem solving approach known as the Design Process to show their thought process as well as demonstrate manipulative skills by making the designed product. There are two parts to the project; **Part A** involves a **Design Portfolio** and **Part B** involves **Product Realisation** and candidates are expected to complete both parts. See *Appendix C* for a full description of the expectation.

Notes to teachers

Support to the candidates by the teacher through advice and guidance is crucial throughout the project. Guidance will be necessary in helping candidates to select a project, the scope and demand of which is appropriate to their abilities. However, each candidate should exercise their own judgement and make personal decisions in the formulation of the design and in its realisation. All practical work should be carried out entirely by the candidate, the contribution of the teacher being limited to normal guidance.

Moderation of Coursework

BEC will send individual mark sheets and summary mark sheets to centres around June every year. Centres are expected to record candidate's marks into the individual mark sheets and the summary mark sheets by the end of August in preparation for the moderation in October. The completed and signed mark sheets should be submitted to the Head of Centre by August and submitted to BEC through the moderator.

Before conducting the moderation, the moderator will ensure that:

- the marking criteria have been applied;
- the marking is accurate and consistent;
- the marking has been standardised if more than one marker has been used.

9. Appendix A: Marking criteria for portfolio

Topic	*Skill*	*Levels of Response*	*Mark*	*Max Mark*
Theme	Demonstrate a clear understanding of the theme.	No analysis of the theme	0	**10**
		Definition and source	1	
		Correct illustration of **three** products/activities related to the aspects. *(at least **one** product/activity per aspect*	3	
		Correct explanation of **three** products/activities.*(at least **one** product/activity per aspect)*	3	
		Examination of **one** area of interest		
		No area examined	0	
		One area examined	2	
		Evidence of understanding the theme	1	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Situation	Derive a situation from the theme analysis	No statement of the situation	0	**2**
		Clear statement of the situation	1	
		Clear statement of the situation that relates to the area of interest	1	
Problem	Identify a problem from the situation.	No statement of the problem.	0	**2**
		Clear statement of the problem	1	
		Clear statement of the problem that relates to the situation	1	
Brief	Formulate a brief from the problem.	No statement of the brief/ Preconceived/naming the product	0	**2**
		Clear statement of the brief	1	
		Clear and concise statement of intent that relates to the problem	1	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Specifications	Formulate relevant specifications in order to guide the design activity	No specifications/ irrelevant/ unjustified	0	**5**
		One specification	1	
		Two specifications	2	
		Three specifications	3	
		Four specifications	4	
		Five or **more** specifications	5	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Exploration of ideas	Generate a variety of possible solutions to a given problem.	No solution / irrelevant	0	**6**
		Two existing ideas analysed	1	
		Two different initial ideas	2	
		Candidates must have two different initial ideas to be considered for the marks below:		
		Graphical illustration	1	
		Function	1	
		Justification of chosen idea	1	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Development of chosen solution	Show logical progression of all the aspects of development	No development of chosen solution.	0	**8**
		Methods of construction		
		Alternative methods considered	1	
		Justification of choice	1	
		Materials		
		Alternative materials considered	1	
		Justification of choice	1	
		Safety		
		No safety consideration	0	
		Some safety consideration	1	
		Presentation drawing		
		pictorial drawing not rendered	0	
		pictorial drawing well rendered but not proportioned	1	
		pictorial drawing well rendered and proportioned	2	
		Logical progression of all aspects of the development	1	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Working	Produce a detailed working drawing using conventional methods.	***Working drawing to be done using the presentation drawing***		**4**
		No working drawing/irrelevant	0	
		Correct views		
		Front view	1	
		End view	1	
		Plan	1	
		Dimensions	1	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Production plan	Produce a detailed and sequential production plan of the intended product	No production plan/irrelevant	0	**6**
		Time allocation		
		Unrealistic/little	0	
		Realistic	1	
		Material list		
		No material list	0	
		Parts listed but some items missing/ incorrect sizes	1	
		All parts listed with correct sizes	2	
		Tools		
		No tools mentioned/insufficient	0	
		Sufficient tools mentioned	1	
		Sequential production plan		
		- No sequence	0	
		- Little planning	1	
		- Adequate planning	2	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Presentation	Present all components of the portfolio in a clear, attractive and logical way	No portfolio	0	**5**
		Presentation techniques		
		Four to **five** techniques	1	
		Six or **more** techniques	2	
		Sequencing of the design process	1	
		Good written communication skills	1	
		Portfolio presentation	1	

10. Appendix B: Marking Criteria for Product

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Suitability for purpose	Show how the outcomes satisfy the requirements	Does not meet the requirements of the brief/specifications	0	**5**
		Meets the brief	1	
		Meets **one** specification	1	
		Meets **two** specifications	2	
		Meets **three** specifications	3	
		Meets **four** or **more** specifications	4	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Manufacturing skills	Produce a quality product	**Range of skills displayed**		**16**
		1 - 3 skills	1	
		4 skills	2	
		5 skills	3	
		6 or more skills	4	
		Standard of making skills		
		Unacceptable	0	

		Low	1	
		Limited	2	
		Good	4	
		Proficient	6	
		Construction methods		
		All appropriate	1	
		Precision and accuracy		
		Minor inaccuracies	1	
		Accurate and precise	2	
		Safety considerations		
		All safety aspects considered	1	
		Appearance		
		Finish not well done	1	
		Aesthetically appealing finish	2	

Topic	*Skill*	*Levels of Response*	*Mark*	*Max. Mark*
Use of materials	Make sound judgment in choice of materials	**Use of materials**		**2**
		Not economic and unsuitable	0	
		Economic	1	
		suitable	1	
Evaluation	Appraise their products in line with the brief and specification	No evaluation/irrelevant	0	**7**
		Reference to brief		
		No reference made	0	
		Reference made	1	
		Reference to specifications		
		No reference made	0	
		Reference made to 1-3 specifications	1	
		Reference made to 4-5 specifications	2	
		Evidence of testing		
		No evidence of testing/superficial testing	0	
		Some testing done	1	
		Testing done with objectivity	2	
		Modifications		
		No acknowledgement made	0	
		Acknowledgement made	1	
		Improvements		

		None suggested	0	
		Some suggested and explained	1	

11. Appendix C: Description of Design Process

Part A: Design Portfolio

The size of the portfolio should be A3 and should consist mainly of illustrations and drawings, supplemented where necessary by written notes. Photographs should be included to provide evidence and authenticity of work. Pages should be numbered, and a List of Contents, referenced with page numbers, should be included. The Portfolio should include the following sections in the order given:

1. Theme analysis

The identification and brief analysis of a minimum of three products and/or systems that can be found in the community. One of these products and/or systems should be analysed critically leading to a range of real-life situations.

2. Situation

A statement of the situation identified by candidates derived and linked to the area of interest. The statement must **not** be combined with the problem but should identify a design concern.

3. Problem

A clear statement of the problem to be solved without including possible solutions. The problem must be derived from the situation.

4. Brief

An identified design task which should be described in relevant terms addressing the problem. Candidates must **not** state the name of the product to be made.

5. Specification

A list of five design specifications that will set the parameters and limitations for the design. The specifications must be itemised and fully justified as requirements which must be met by the solution.

6. Exploration of ideas

Exploration of a range of ideas for meeting the Brief and the Specification. There should be two existing ideas and two initial ideas.

7. Development of a chosen solution

A detailed development of the selected idea, including justification of shape, form, materials and constructions to be used. This should also include a rendered presentation drawing of the final design in any pictorial form.

8. Working drawing

An Orthographic drawing(s) of the intended solution. Part drawings and developments may be used for more complicated solutions. Candidates should indicate whether the product is a scale model or full size. A symbol of projection should be indicated.

9. Production Plan

Identified sequential stages and processes to be carried out in the construction of the solution. Candidates are also expected to provide material lists and time charts.

10. Communication

Candidates must show clearly a range of graphic communication skills, including appropriate use of colour, as well as good written communication throughout the portfolio. This should also include portfolio organisation.

Part B: Product Realisation

1. Manufacturing Skills

The making of the product should involve and display a range of skills which have been learned. The product can be made from a single material or from a range of appropriate resistant materials.

Candidates are advised to avoid products which are large or costly.

2. Suitability

The product will be assessed against the brief. Candidates are expected to demonstrate good use of materials. The product should reflect on the proposed solution and show sensitivity to the use of materials.

3. Evaluation

This will be a report, based mainly on how the product matches the design requirements as identified in the Brief and Specification. There should be evidence of testing to check if the product solves the problem which was identified.

Candidates are also expected to identify both good and bad features of their design. Candidates should indicate and justify changes made during realisation. Candidates should also indicate any possible improvements if they were to make the product again.

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