DESIGN TECHNOLOGY

Overall grade boundaries

Higher level

Grade:	1	2	3	4	5	6	7
Mark range:	0-15	16-27	28-36	37-51	52-64	65-78	79-100

Standard level

Grade:	1	2	3	4	5	6	7
Mark range:	0-14	15-28	29-39	40-51	52-62	63-74	75-100

Introduction

The November 2004 examination session is the second November session for the new Guide. Specimen papers have been available for some time and hopefully have been helpful to teachers preparing students for the new examinations. The examining team continues to be aware of the importance of both examination papers and the subject report in facilitating the preparation of candidates for future examination sessions. This set of examination papers and the resultant report will add to the material available to support teachers in their work.

Overall numbers of candidates has increased compared with November 2003, especially at Higher Level. There were 22 candidates from 4 schools at Higher Level and 5 candidates at Standard Level from 2 schools. Two schools entered candidates at both Standard and Higher Level.

The G2 forms are extremely valuable in providing feedback to the examining team and are always studied carefully during grade award meetings. Comments from the G2s are fed back to other teachers via the subject report. Unfortunately no G2 forms were received for this examination. This significantly limits the effectiveness of the feedback from the examining team. A possible explanation of course is that there were no issues to be addressed, but there is always room for improvement. The examining team pleads again for teachers to feedback both positive and negative comments to inform the development of this still small, but growing, subject. Where teacher comments are informed by candidate reaction to the papers after the examination this would be particularly useful.

Grade boundaries are determined by matching the Grade Descriptors for Group 4 (see Online Curriculum Centre, OCC) to the evidence available from marked scripts. Each paper is set in a way that ensures that it provides enough evidence to enable the use of the Grade Descriptors and also to ensure that there is appropriate syllabus coverage and that the papers are appropriately discriminating. Grade award meetings first determine the 3/4 boundary by inspection of the scripts for each component, moving on to the 6/7 boundary and then the 2/3 boundary. Other grade boundaries are determined by interpolation from these three boundaries. The boundaries for Paper 1 are set with reference to the Paper 2 boundaries as the Papers 1 and 2 have the same syllabus coverage.

Standard level paper 1

Component grade boundaries

Grade:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Mark range:	0-7	8-12	13-17	18-20	21-22	23-25	26-30

General comments

No G2s were received. The table below indicates, in question order, how difficult questions were perceived to be as determined by candidate performance – the higher the difficulty index, the easier the question! The * shows the correct answer and the numbers represent the number of candidates providing each individual response. A discrimination index is also calculated. This compares the performance of the top 25% of candidates on a particular question with the top 25% of candidates overall and can vary between 0.00 and 1.00. With a small candidature the discrimination index is a less useful tool than it is in large entry subjects. All questions achieving a negative or low discrimination index are discussed at the grade award meeting.

Question	**A**	**B**	**C**	**D**	Difficulty Index	Discrimination Index
1	4*	1			80.00	.00
2			1	4*	80.00	1.00
3		4		1*	20.00	1.00-
4		2	3*		60.00	.00
5	1		4*		80.00	1.00
6	1	1	2	1*	20.00	.00
7	1	3*		1	60.00	1.00
8	3*	2			60.00	1.00
9	1		1	3*	60.00	1.00
10	3*	1		1	60.00	1.00
11		5*			100.00	.00
12		1		4*	80.00	1.00
13		4*	1		80.00	.00
14			5*		100.00	.00
15	3*	1		1	60.00	.00
16		5*			100.00	.00
17	*	1	2	2		.00
18	1		3*	1	60.00	1.00
19		4*		1	80.00	.00
20		1	3*	1	60.00	1.00
21	1	2*		2	40.00	1.00
22	1		4*		80.00	.00
23	3*		1	1	60.00	1.00
24		1	4*		80.00	1.00
25	1	3*		1	60.00	.00
26	1	1	1	2*	40.00	.00
27	5*				100.00	.00
28			1	4*	80.00	1.00
29	4		1*		20.00	1.00-
30		1*	4		20.00	.00

It is obvious that with such a small number of candidates that the Difficulty Index and the Discrimination index are of very limited use.

Question setters use a grid to develop the paper and allocate questions to topics according to the hour weightings as identified in the Guide (see Appendix).

Standard level paper 2

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-4	5-9	10-12	13-18	19-23	24-29	30-40

General comments

No G2s were received.

Although teachers cannot 'teach' the contexts covered in Section A Question 1, they can use past papers to expose students to this type of question and emphasize the importance of attention to detail, e.g. always including units with the answer to calculations.

Teachers need to continue to encourage candidates to persist with all sections of all questions. A number of weaker candidates appeared to have difficulty with the first parts of a question and then not persist with the remainder of the question. Mark allocations and the action verbs are important indicators of the nature and extent expected in answers. It is worth teachers emphasising this to candidates.

In general candidates made a good attempt at the paper. It was pleasing to see that better candidates had structured their answers according to an understanding of the action verbs and the marks awarded for the question.

Section A - Question 1

Most candidates did well on Question 1. Units of measurement were included where appropriate.

An element of design logic was missing from some candidates answers. For example in answer to Question (b)(iii) some students stated that the reason for two doors was for ventilation, very unlikely for a storeroom. This is an example of the type of information that cannot be directly taught, but is developed over time by students exploring a range of design contexts.

Question (c)(ii) asked candidates to *explain*, and was worth three marks. A number of candidates explained in two points and consequently only received two marks. Teachers need to reinforce with students the importance of matching the points available to the answer.

Section A - Questions 2 and 3

These posed no particular problems for candidates and were good discriminators. Some candidates did not read the questions carefully enough. For example in Question 2 (b), some students related their answer to the density of the product rather than the packaging. A number of answers to Question 3 (b) referred to the washing machine cycle, reflecting an inadequate consideration of 'pre-production'.

Section B - Questions 4, 5 and 6

Three candidates answered Question 4 and one answered Question 5.

The extended response question is a major challenge to many candidates and some preparation is needed for this. A framework for answers helps guide candidates towards a balanced answer and the achievement of a good mark. Planning helps and, for candidates who clearly thought about their answer and jotted down some notes which were crossed out afterwards, there was the reward of a well-structured answer. Many candidates go into a 'stream of consciousness' and just waffle on rather than answering the questions as set. Such answers are extremely difficult to mark and whilst examiners search hard for anything relevant, it is often very difficult to find anything that corresponds to the required material. A table or bullet points helps organise a response and candidates using such devices generally achieve higher marks by being able to identify clearly different points in their responses related to the marks available.

Again there were numerous answers that indicated the candidate had not adequately studied the question. For example 4(a)(i) requested physical properties, but a number of answers related to design considerations.

The answers to Question 4(a)(iii) reflected a limited understanding of ductility by many candidates.
All candidates were able to list the 3 methods of joining required for Question 4(c), but not all followed with an adequate discussion and so lost marks. For this type of question the marker would expect to see at least 2 distinct points in each discussion of the three methods, thereby providing a breakdown of the nine marks. Teachers should make sure their students are aware of this expectation.

Standard level paper 3

Component grade boundaries

Grade:	**1**	**2**	**3**	**4**	**5**	**6**	**7**
Mark range:	0-3	4-6	7-8	9-12	13-16	17-20	21-30

General comments

Again the format for each of the Paper 3 options is that question 1 is a database question providing data in the form of a table, bar chart, photograph, flow chart, etc.. The database acts as a stimulus and context for the question. The last question in each option is an extended response question worth 6 marks to provide a better opportunity for candidates to demonstrate their understanding. It is through the 'sting in the tail' of the database question and the extended response question that the more able candidates can demonstrate their ability and weak candidates can be better discriminated from stronger candidates.

No G2s were received.

Candidates attempted option A, B, C and E. Some candidates from the same school chose different options, which seems to indicate that they need instruction from their teacher about how to attempt this paper.

Higher level paper 1

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-10	11-12	13-15	16-21	22-27	28-33	34-39

General comments

No G2s were received for this component.

The table below includes the number of candidates selecting each response and the difficulty index of each question. A lower difficulty index indicates a harder question. The correct response is indicated with an *.

Question	**A**	**B**	**C**	**D**	Difficulty Index	Discrimination Index
1	22*				100.00	.00
2	6	9	1	6*	27.27	.00
3	1		19*	2	86.36	.28
4	2	16*	2	2	72.72	.57
5	1	1	4	16*	72.72	.00
6		3	2	17*	77.27	.57
7		21*	1		95.45	.14
8		20*	1	1	90.90	.14
9	12*	5	1	4	54.54	.14-
10	16*	2	3	1	72.72	.71
11	2	19*		1	86.36	.42
12		1	20*	1	90.90	.28
13	4	7*	6	5	31.81	.14
14	6	14*		2	63.63	.28-
15	19*	1	1	1	86.36	.28
16	2	20*			90.90	.28
17	17*	2	2	1	77.27	.14
18		6	12*	4	54.54	.14
19	12	1	5*	4	22.72	.28
20	14*		7	1	63.63	.14
21	3	1	4	14*	63.63	.42
22	deleted					
23	2	7	10*	3	45.45	.85
24	4	9	2	7*	31.81	.42
25	2	1	19*		86.36	.42
26	3	2	1	16*	72.72	.57
27		2	11*	9	50.00	.85
28	2	17*	3		77.27	.57
29	3	2	1	16*	72.72	.14
30	17*	2	3		77.27	.28-
31		5	9	8*	36.36	.57
32	11		10*	1	45.45	.85
33	1	14*	6	1	63.63	.71

34	1	2	19*		86.36	.42
35	1	3	3	15*	68.18	.71
36	15*	1		6	68.18	.85
37	12*	3		7	54.54	.71
38	2		17*	3	77.27	.14
39	18*	1		3	81.81	.42
40		4	1	17*	77.27	.14

The general comments on Paper 1s for the Standard Level paper apply equally to the Higher Level paper and will not be repeated here.

Question 22

This question was deleted from the paper because of possible ambiguities in the answer.

The mean for Paper 1 has been noted in past reports, and is included below in order to indicate the trend in increasing means.

Mean	Year
23.0	2000
21.5	2001
19.0	2002
23.4	2003
26.5	2004

Higher level paper 2

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-6	7-13	14-18	19-27	28-36	37-45	46-60

General Comments

No G2s were received for this paper.

Section A

Each question within Section A is separate and does not assume understanding from previous questions. The use of parts (a), (b), (c) and sub-sections (i) and (ii) should provide some sign-posting to candidates about the structure of the question and the shift from one focus to the next. It is by no means clear that all candidates understand the significance of this. Teachers must continue to emphasise this to candidates and encourage them that if they falter on one part of Section A for whatever reason they should carry on with other parts which will explore different issues.

Question 1

Question 1 is a data question. This question posed no significant problems for candidates. Some minor issues to note included:

In Question a(ii) some candidates did not provide an answer to the nearest minute.
Question b(i) was well answered, the key concepts being equilibrium and stability.
Question c(i) required design considerations, many candidates referred to other considerations.

Question 2, 3, 4 and 5

These questions provided syllabus coverage and represented good discrimination.

Many answers to Question 29(a) discussed production rather than thinking.
A number of answers to 3(b) were not specifically related to scientific knowledge nor to evaluation.

Section B

Parity of Section B questions and syllabus coverage remain conflicting constraints. The examining team continues to try hard to produce equally difficult questions whilst achieving syllabus coverage. The majority of candidates however chose to answer Question 7, at least indicating they felt more familiar with this context.

The extended response in section (c) (ii) continues to be a good discriminator. With some candidates it remains clear that they do not approach their answer in a logical and structured manner. If three points are requested, then three subheadings or paragraphs should be clear in the answer. Even candidates who do well in the shorter answer questions but do not provide an organized answer to this question lose marks. Teachers need to provide students with guidance in this area.

Higher level paper 3

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-5	6-10	11-13	14-20	21-26	27-33	34-40

General comments

No G2s were received.

Reasonable discrimination was achieved throughout the paper with a good spread of marks.

All candidates chose Options E and F except for 4 who chose to answer Option G. Option D and Option H were notably unpopular.

Unlike past years, all candidates clearly indicated the two options they were answering.

Candidates seemed well prepared for the extended response questions and provided balanced and well organized answers. For those candidates who knew their content reasonably well, marks were lost for two main reasons:
Not reading and understanding the question well,
Not structuring their extended answers.

It was noticed again that where candidates go onto an additional sheet to answer the extended response question that it is only those candidates who were using a framework to structure their answers who were picking up marks on the additional sheets. Again, volume is no indicator of quality!

There was no indication of any differences in performance across the different options, particularly in the extended response question, which is pleasing.

Overall the Paper 3s produced a good spread of marks and addressed the upward drift of marks, which had become a feature of later papers examining the previous version of the Guide. The mean for the Higher Level Paper 3 in 2003 was 24.7 and in 2004 was 23.5

In teaching the options teachers are advised not to leave the options to last but to incorporate the option into the core and particularly into the practical work so candidates have some 'hands on' experience of the option.

Higher and standard level internal assessment (IA)

Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0-5	6-11	12-15	16-19	20-23	24-27	28-36

The range and suitability of the work submitted

The number of schools opting to take Design and Technology in the November session is very few. Most schools submitted work of a suitable nature, but closer examination of the assessment criteria is required if candidates are to obtain higher marks. Work ranged from "design and make" activities through to smaller laboratory based experiments. The schools that adopted to use the "design and make" route do seem to have fared better when addressing the assessment criteria. As marks need to be highlighted on the form for each assessment heading, one of the marks must be for the design project and the other for any of the other investigations. All work that has been highlighted should be sent for moderation. Where moderation could not happen more evidence of work was requested from the schools. In a number of schools there is still some confusion over what should be contained within the project report and logbook. The logbook is not formally assessed, but reference should be made to pages throughout the report. Work was submitted in different formats, and where the reports are clearly labeled to address the assessment criteria candidates have generally scored well. Some of the work submitted was disorganised.

Candidate performance against each criterion

P1anning (a): Most candidates seem to fare well in this section, but candidates had lost marks where all of the criteria had not been addressed under each aspect. Common errors included a repetition of a problem set by the class teacher and the omission of any reference to built in constraints. When using the design project assessment criteria, students should produce a justified specification.

P1anning (b): Most candidates displayed evidence of planning, but methods did not always involve the control of variables. Those who included annotated diagrams did seem to fare better. When considering the design project some candidates omitted a detailed plan of action and material list. Those who had written their plan in retrospect failed to address some of the

assessment criteria. Evidence of ongoing work could be in the form of photographs and annotation.

Data Collection: Smaller investigations where candidates had to collect raw quantitative data offered ample opportunity to address all aspects of this assessment criterion. Where candidates had completed a literature search, the data did not allow sufficient identification of uncertainties and errors. The design project allowed candidates to address most research issues, but some marks were lost where candidates had omitted essential data to solve the problem.

Data Processing and Presentation: Most candidates addressed most aspects of this assessment criterion. A good range of ideas was presented by most, but detailed annotation and careful presentation was not always considered. Drawings and evidence of modeling should be presented in an appropriate format. Ideas were not always supported by an evaluation against the design specification. Some candidates developed their chosen idea by using a range of sketches and modelling, but in most cases the quality of working drawings did not offer sufficient detail for the product to be realized.

Conclusion and Evaluation: In most instances insufficient time had been allocated to this criterion. Insufficient time had been devoted to completing a thorough evaluation/conclusion. Some candidates only offered superficial personal evaluations with no consideration being made to address the specification and suggest realistic improvements. The more organised candidates did leave adequate time to address the criterion to a satisfactory standard.

CONCLUSION

The continued increase in the candidature for the subject is perhaps the single most pleasing feature of this examination session. Congratulations to all candidates on their success and to teachers in facilitating this success.

The understanding of the action verbs (e.g. state, list, outline, describe, explain – see pages 8 and 9 of the Guide) seems to be continuing to increase in relation to required responses to questions. It also seems that more candidates are recognising the significance of the mark weighting in relation to the expectations of the answer, though there are still some candidates who do not use this link. Familiarity with the way that the paper is constructed and particularly the way that action verbs signal expectations is an important part of candidate preparation and cannot be over-emphasised.

Teachers should continue to stress the importance of 'sign-posting' answers with headings and bullet points or using tables to identify distinct points. Candidates should also be encouraged to confirm their understanding of the extent of the answer required by checking the mark allocation for the question. Answers from better candidates were notably more succinct, used appropriate terminology, provided clear and well-annotated diagrams where appropriate and structured their answers demonstrating a 'designer's logic' (see the Grade Descriptor for Grade 7).

Teachers should continue to familiarise themselves with the Group 4 Grade Descriptors (see Appendix 2). The examining team continues to strive to:

- ensure appropriate syllabus coverage;
- use accessible design contexts understandable around the globe;
- ensure parity between optional questions;
- make the expression of questions as straightforward as possible (particularly for second language candidates);

- ensure that the various examination elements discriminate appropriately between stronger and weaker candidates
- ensure that there are opportunities for candidates to provide evidence for the different aspects of the Group 4 Grade Descriptors within the examination papers to enable the Grade Descriptors to be used in the setting of the grade boundaries at the Grade Award meeting.

Candidates were well prepared for the examinations, and with more new schools participating each year the subject continues to grow.

APPENDIX

Standard Level (SL) Paper 1

This comprises 30 multiple choice questions (MCQs) across the 6 topics comprising the SL core. To ensure appropriate coverage of the syllabus the number of MCQs on each topic should reflect the teaching hours for each topic, as identified in the Design Technology Guide and indicated in the table below:

Topic	Teaching hours	Number of MCQs
1	15	7
2	11	5
3	6	3
4	8	4
5	9	4
6	16	7
Total	**65**	**30**

Higher Level (HL) Paper 1

This comprises 40 MCQs across the 9 topics comprising the HL core. Again, to ensure appropriate coverage of the syllabus the number of MCQs on each topic should reflect the teaching hours for each topic, as identified in the Design Technology Guide and indicated in the table below:

Topic	Teaching hours	Number of MCQs
1	15	4
2	11	3
3	6	2
4	8	3
5	9	3
6	16	5
7	15	6
8	19	8
9	15	6
Total	**114**	**40**

15 of the questions on topics 1 – 6 are common to SL and HL papers to enable comparison of achievement by SL and HL candidates.

