

## DESIGN TECHNOLOGY

### Overall grade boundaries

#### Higher Level

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-15	16-25	26-34	35-48	49-60	61-74	75-100

#### Standard Level

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-14	15-24	25-36	37-48	49-59	60-70	71-100

### Introduction

The November 2001 examination session is the penultimate November session under the existing Guide (1998 – 2003). Teachers, by now, will have received the new Guide (2003 – 2008) and will be starting to think of the fresh challenges that await them. The examining team is very aware of the importance of both examination papers and the subject report in facilitating the preparation of candidates for future examination sessions. A set of specimen papers with accompanying commentary will be available to enable teachers to assess the impact of the revised Guide on the evolution of the examination papers. In relation to current practice it is clear that the papers, as one would expect, do not hold any great surprises for candidates who are generally well prepared for the challenge of the papers. The G2 forms received from teachers are always extremely valuable in providing feedback to the examining team and are studied carefully during grade award meetings. As pointed out in previous reports not all schools take this opportunity to feedback comments on the paper and perhaps only feel moved to comment when they have an adverse reaction to an element of the paper. The examining team pleads again for teachers to feedback both positive and negative comments to the examining team to constructively inform the development of the subject. **No G2s were received from teachers for this session and whilst this might suggest total satisfaction with the papers the examining team would welcome comments.**

### Standard Level Paper 1

#### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-7	8-8	9-10	11-14	15-18	19-21	22-30

#### General comments

The correct answers for each question is shown below. The candidature was extremely small so to list the difficulty and discrimination indices is a meaningless exercise for this session.

Question/Answer		Question/Answer		Question/Answer	
1	B	11	B	21	D
2	D	12	D	22	B
3	A	13	A	23	C
4	C	14	C	24	D
5	D	15	D	25	D
6	C	16	B	26	A
7	A	17	A	27	C
8	C	18	C	28	B
9	B	19	A	29	B
10	A	20	C	30	B

## Standard Level Paper 2

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-3	4-7	8-12	13-16	17-21	22-25	26-40

### General comments

With a small candidature it must be realised that few comments can be made about the papers.

The data-based question (Question 1) seemed to be well-received by candidates. In some previous May and November sessions there has been some evidence that weaker candidates who have been put off by not being able to answer one element of a question and have not persisted in attempting to answer later elements of the question. There was no evidence of this problem in this session. As before, the labelling of sections of the questions as (a), (b), (c) with sub-sections labelled (i), (ii), etc. should help to signpost questions. 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 the candidates made a reasonable attempt at the paper. There was less evidence of structure in the answers to the Section B extended response questions and teachers should encourage candidates to consider some structure to help them get a balance in the answers and achieve higher marks. The dominating discriminating elements of Paper 2 continue to be Question 1, any electronic questions and the last section of the Section B questions. Electronics questions often elicit no response from candidates at a number of schools and it is clear that candidates are by no means comfortable with electronics.

Grade boundaries are determined by matching the Group Four Grade Descriptors to the evidence available from marked scripts. Papers are set in a way that ensures that they provide 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.

### Section A

To gain full marks for questions based on calculations candidates need to ensure that they state the appropriate units for the numerical answer. Where candidates are picking up data they need to ensure they understand the significance of the units stated. They may need to convert units, e.g. mm to metres, to use them in calculations. This exercise is not seen as inappropriate by the examining team

but rather, reflects the reality of design. In some cases, e.g. 1 b (ii) candidates had worked out the answer to a calculation correctly but had been sloppy by not stating the units and hence, failed to gain the marks.

### QUESTION 1

- (a) (i) This question required candidates to identify a dimension common to all the modules, i.e. height. Candidates identified height correctly.
- (ii) Candidates were required to calculate the smallest rectangular floor area into which the L-shaped unit would fit, i.e.  $((1200 + 800) \times (1600 \times (800/2))) \text{ mm}^2$ .
- (b) The question asks for ergonomic considerations other than anthropometric ones to be taken into the design of the workplace. Some candidates listed other anthropometric considerations and some listed non-ergonomic considerations.
- (c) Candidates correctly identified two criteria.
- (d) Candidates correctly identified that that the Frame A uses more materials and is more complex to manufacture and therefore is more expensive.

### QUESTION 2

Electronics questions always pose problems and not necessarily because they are difficult! Candidates were able to work out the gain required in each case and went on to complete the circuit diagram, calculating the correct value of the components.

### QUESTION 3

No problems.

### QUESTION 4

Good answers provided by candidates.

## Section B

At both Standard Level and Higher Level there has been an ongoing debate in the examining team about how the three quality marks awarded for Section B questions should be allocated. The practice of the three quality marks being awarded for clarity of argument (1 mark), designer's logic (1 mark) and communication (1 mark) will continue for the rest of this current phase of the Guide. However, from May 2003 the marks will be contained within the mark scheme and thus the marks indicated to candidates will be 20 rather than 17 as is currently the case.

In section B Questions 5 and 7 were not answered.

### QUESTION 6

- (a) (i) A straightforward question.
- (ii) Again a straightforward question.
- (b) No problems.
- (c) No issues.

## Standard Level Paper 3

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-4	5-9	10-16	17-21	22-26	27-31	32-45

### General comments

The format for Paper 3 options is that question 1 is a database question providing a context 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 4 marks and in the examinations from 2003 the number of marks will be increased to provide a better opportunity for candidates to demonstrate their understanding through a more extended response. It is through the 'sting in the tail' of the database question and the extended response question that the more able candidates are able to demonstrate their ability and weak candidates are discriminated from stronger candidates. Candidates responded to Options A, B and D and each option was tackled well by candidates.

## Higher Level Paper 1

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-10	11-12	13-14	15-19	20-24	25-29	30-40

### General comments

The candidature was small and so the difficulty and discrimination indices are meaningless and not included in the report for this session.

Question/Answer		Question/Answer		Question/Answer		Question/Answer	
1	B	11	A	21	D	31	A
2	B	12	C	22	A	32	D
3	A	13	C	23	C	33	C
4	D	14	A	24	C	34	B
5	D	15	C	25	D	35	A
6	B	16	B	26	D	36	D
7	A	17	D	27	C	37	C
8	C	18	D	28	D	38	A
9	B	19	C	29	B	39	A
10	B	20	B	30	B	40	C

## Higher Level Paper 2

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-5	6-10	11-13	14-21	22-28	29-36	37-52

### General comments

No G2s were received.

The data-based question (Question 1) seemed to be well-received by candidates. In some previous May and November sessions there has been some evidence that weaker candidates who have been put off by not being able to answer one element of a question and have not persisted in attempting to answer later elements of the question. In previous years the examining team have pleaded that teachers encourage candidates not to be put off and there was evidence that candidates this year are heeding this advice. There was no evidence of this problem in this session. As before, the labelling of sections of the questions as (a), (b), (c) with sub-sections labelled (i), (ii), etc. should help to signpost questions. 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 reasonable attempt at the paper. There was less evidence of structure in the answers to the Section B extended response questions and teachers should encourage candidates to consider some structure to help them get a balance in the answers and achieve higher marks. The dominating discriminating elements of the paper are Question 1, electronic questions and the last section of the Section B questions. Electronics questions often elicit no response from candidates at a number of schools and it is clear that candidates are by no means comfortable with electronics. Some schools do particularly well at this element. In the new Guide Electronics has been removed from the core into an Option – Electronic Products. This should facilitate those Schools who do Electronics and do it well.

Grade boundaries are determined by matching the Group Four Grade Descriptors to the evidence available from marked scripts. Papers are set in a way that ensures that they provide 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.

### Section A

Question one discriminated well. Again some good candidates failed to achieve high marks not because they lacked knowledge and understanding but because their answers were not precise enough. To gain full marks for questions based on calculations candidates need to ensure that they state the appropriate units for the numerical answer. Where candidates are picking up data they need to ensure they understand the significance of the units stated. They may need to convert units, e.g. mm to metres, to use them in calculations. This exercise is not seen as inappropriate by the examining team but rather, reflects the reality of design. In some cases, e.g. 1 b (ii) candidates had worked out the answer to a calculation correctly but had been sloppy by not stating the units and hence, failed to gain the marks.

### QUESTION 1

(a) (i) This question required candidates to identify a dimension common to all the modules, i.e. height. Most candidates identified height correctly.

(ii) Candidates were required to calculate the smallest rectangular floor area into which the L-shaped unit would fit, i.e.  $((1200 + 800) \times (1600 \times (800/2))) \text{ mm}^2$ . One candidate commented that the radius of the semicircular module was not given!

(b) (i) The question asks for ergonomic considerations other than anthropometric ones to be taken into the design of the workplace. Some candidates listed other anthropometric considerations and some listed non-ergonomic considerations.

(ii) Those candidates that worked out that \$2000 is +14.3% more than \$1750 and then consulted the table were able to easily arrive at the correct answer. There were more time-consuming ways of getting the right answer!

(c) (i) Most candidates correctly identified two criteria.

(ii) This question proved more discriminating.

(iii) Better candidates correctly identified that that the Frame A is a cantilever and thus the forces are not easily distributed along the frame in contrast to Frame B.

### QUESTION 2

Electronics questions always poses problems and not necessarily because they are difficult! About half the candidates were able to work out the gain required in each case. A very small number of candidates were able to complete the circuit diagram and calculate the correct value of the components. Sometimes examiners get the impression that candidates do not even attempt electronics questions.

### QUESTION 3

A straightforward question which posed a problem to a remarkable number of candidates.

### QUESTION 4

No particular problems were posed by this question.

## Section B

At both Standard Level and Higher Level there has been an ongoing debate in the examining team about how the three quality marks awarded for Section B questions should be allocated. The practice of the three quality marks being awarded for clarity of argument (1 mark), designer's logic (1 mark) and communication (1 mark) will continue for the rest of this current phase of the Guide. However, from May 2003 the marks will be contained within the mark scheme and thus the marks indicated to candidates will be 20 rather than 17 as is currently the case.

In section B Question 6 and 7 were much more popular than Question 5. Although those candidates who chose to answer question 5 were able to achieve good marks.

### QUESTION 5

(a) (i) A straightforward definition. Most candidates were able to achieve this.

(ii) A reasonably straightforward calculation. Candidates generally were able to convert from mm to m without problems.

(b) No problem to candidates.

(c) This was not well answered. Design questions usually seem to excite candidates who relish the opportunity to demonstrate their ability. Diagrams were not of a high quality for the small number of candidates answering this question.

### QUESTION 6

- (a) (i) A straightforward question.
- (ii) Again a straightforward question for most candidates.
- (b) No problem to candidates.
- (c) Candidates would have been well-advised to consider this question in two parts – one part about maximising the life of the product, the other minimising energy use. Candidates who did not structure their answer tended to waffle on and generally did not achieve such high marks.

### QUESTION 7

- (a) A straightforward circuit symbol was required.
- (b) (i) This caused more problems than would have been expected.
- (ii) Most candidates were able to identify an appropriate sensor.
- (c) Most candidates were able to identify two safety criteria.
- (d) This question was poorly answered by candidates. Again design questions normally invoke an enthusiastic response – not so this time!

## Higher Level Paper 3

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-4	5-8	9-13	14-19	20-25	26-31	32-40

### General comments

A general criticism of candidates in this session is that the use of specific technical terms that characterises the '7' student was rather limited. This was accompanied by a fairly widespread lack of precision in answers, especially with higher order questions. As new schools come on line in November there is now selection of each of the options at Higher Level (D, E, F and G).

### Option D - Food technology

#### QUESTION D1

- (a) Answered correctly by most candidates.
- (b) Well-described by most candidates.
- (c) Reasonable responses provided by most candidates.

#### QUESTION D2

Most candidates identified that food irradiation destroys micro-organisms and pests which lead to food spoilage. Thus, food irradiation enhances shelf-life.

### **QUESTION D3**

Some candidates do not seem to understand the term lifestyle issue. Most candidates answered the question well.

### **QUESTION D4**

Responses were generally well structured into advantages, disadvantages and then a balancing statement weighing up the advantages and disadvantages.

## **Option E – Computer aided design and manufacturing**

### **QUESTION E1**

This question discriminated well between weaker and stronger candidates. Part (a) required candidates to suggest why increased productivity is a benefit of CAD. Part (b) asked candidates to identify a reason why the use of CAD increased staff morale. This was more discriminating. Part (c) was extremely discriminating although good candidates achieved full marks.

### **QUESTION E2**

This question did not pose problems although it was not necessarily easy for all candidates, some of whom did not seem to understand the difference between NC and CNC.

### **QUESTION E3**

Straightforward for most candidates.

### **QUESTION E4**

Candidates used interesting examples of domestic products, e.g. toys to illustrate their discussion of fuzzy logic and expert systems. Again structure helps the balance of the answer.

## **Option F - Invention, innovation and design**

### **QUESTION F1**

- (a) No problems.
- (b) Similarly, no problems.
- (c) No problems.

### **QUESTION F2**

Straightforward.

### **QUESTION F3**

This question discriminated well between weaker and stronger candidates. Good candidates were able to provide good explanations with suitable examples.

#### **QUESTION F4**

Email, Internet, PC augmentation and mobile phones were, perhaps predictably, the modern communications were the most commonly identified. Candidates generally were able to produce answers balancing advantages and disadvantages for disabled people.

#### **Option G - Health by design**

##### **QUESTION G1**

Posed few problems but was reasonably discriminating.

##### **QUESTION G2**

Straightforward.

##### **QUESTION G3**

Poorly answered although straightforward.

##### **QUESTION G4**

Those candidates establishing a framework for their answers achieved higher marks. A clear framework helps the candidates provide information coherently and reduces the chance of missing important points. It also helps to demonstrate the balance of the answer and reduces the chances of repetition.

### **Conclusion**

The action verbs (e.g. state, outline, describe, explain) are reasonably understood by candidates although new Schools would be wise to reinforce their meanings with candidates. There was more evidence to suggest that candidates recognise the significance of the mark weighting and space provided in relation to the expectations of the answer.

Good candidates took the advice from previous reports of 'sign-posting' answers with headings and bullet points or using tables to identify distinct points. Teachers should continue to stress this to candidates and encourage candidates 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' earning the additional 'quality marks' on offer for each of the three questions on Paper 2 Section B at Higher Level and Standard Level.

Teachers should continue to familiarise themselves with the Group 4 Grade Descriptors. 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.

With more new schools participating each May and November the subject continues to grow. The overall evidence of the November 2001 session is that candidates were well prepared for the examinations, presumably benefiting from this being the penultimate November session and the eighth set of examination papers for this Guide.

The single most significant change in the new Guide (for examination 2003 – 2008) is the shift towards ‘greenness’. This will be reflected throughout the various assessment elements of the programme. The examining team is working to provide a set of specimen papers for teachers and candidates. Paper 2 will become even more of an opportunity for candidates to apply science in demonstrating their ability to make and justify design decisions.

## Internal Assessment (IA)

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0-4	5-7	8-10	11-13	14-15	16-18	19-24

The complex administrative arrangements confound new centres although existing centres generally cope well. The most common problems are not clearly labelling parts of the folio work relating to the assessment criteria and not highlighting a spread of marks on the 4/PSOW form.

Addressing the Planning (a) criteria continues to be a problem for many centres. It is essential that candidates be given the opportunity to form their own hypothesis. There is no problem with a group working on a common theme or design context as long as it allows individuals to develop their own design brief or state the aims and objectives of the task. In the new subject guide, Topic One places a greater focus on the difference between design brief and specifications, which should help those students who find it difficult to differentiate between the two.

Planning (b) related to design project work is often used to describe the realisation stages after they have been completed, rather than at the planning stage. Candidates should be familiar with the criteria used to assess practical work and ensure that they have sufficient evidence to satisfy it. This is especially important with the design project as it is a compulsory element of coursework assessment and must satisfy all the criteria.

Some centres place great emphasis on the use of the Group Four project as evidence for all the assessment criteria. This is not a problem as long as there is clear evidence of the individual input into the project by each candidate. In some cases a common objective was stated for all candidates and it was not possible for the moderator to identify the contribution made by the candidate selected for moderation.

If Planning (a) is weak this often leads to a poor evaluation section as the two elements are closely linked. This is especially the case with the Design Project where the evaluation needs to focus on to what degree the brief and specifications have been achieved.

The revised marking matrix addresses the problem of many candidates achieving 0 having produced some valid work, thereby not differentiating them from those candidates who have done nothing of value.

Compiling a balanced practical programme is essential to address the aims and objectives of the subject. The timing of the design project in the programme is crucial - too early in the course and students lack sufficient experience of utilising the design process, too late, and often there is insufficient time to devote to it. The better design projects evolved from courses where there had been sufficient lead-time for students to gain knowledge and skills prior to tackling it.

It should be noted that as Design Technology is a Group Four subject it shares common aims and objectives with other the Group Four subjects. When choosing design projects the attention should be paid to the appropriateness of the project for satisfying these aims and objectives.

Work submitted, as part of the practical programme should be practical in nature, not merely literature-based research, for example a description of the historical development of a product.

It is pleasing to be able to record the considerable progress made by many centres in developing interesting and challenging practical programmes. It is clear from written examinations that candidates experiencing a good practical programme and understanding the principles and practices of the subject were well placed for answering questions on the written papers.

