

## DESIGN TECHNOLOGY

### Overall grade boundaries

#### Higher level

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 13	14 - 24	25 - 34	35 - 47	48 - 60	61 - 72	73 - 100

#### Standard level

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 13	14 - 24	25 - 34	35 - 47	48 - 60	61 - 73	74 - 100

### Internal assessment

#### Component grade boundaries

##### Higher level

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 8	9 - 17	18 - 25	26 - 32	33 - 39	40 - 46	47 - 60

##### Standard level

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 8	9 - 17	18 - 25	26 - 32	33 - 39	40 - 46	47 - 60

### General comments

Schools continue to offer a wide variety of work, ranging from small design and make activities through to laboratory based experiments, as well as more challenging project work. Those schools that are established in the teaching of IB Design Technology or have recently attended training do well when developing a course that meets the assessment criteria. Some schools continue to adopt design and make activities for all investigations, which, due to the extensive nature of the design cycle, can sometimes be limiting when planning a course to meet the time requirements and provide ample opportunities for other learning experiences. Where this is the case, schools should consider smaller tasks in which they can develop candidate's knowledge, values, attitudes and skills which will better prepare them for the design technology project.

Small laboratory-based investigations tend to require less time than design and make tasks (typically 3-4 hours) and the integration of such assignments in to the course structure is encouraged.

Teachers are reminded that candidate work is not suitable for assessment when too much information has been provided, as the work must be of that of an individual candidate. The topics covered by the coursework **must** be entered on the form 4PSOW/DT, including an indication of the time taken for each investigation and identification of where ICT has been used. The use of ICT is encouraged further, especially when used as a modelling tool to aid development.

Teachers are also reminded that it is only necessary to send the work that has been highlighted for moderation. Most samples were presented in an organized structure, but the work to be moderated for each criterion needs to be highlighted/flagged. Schools should use the official 4PSOW/DT form as provided.

Teachers are encouraged to send an individual candidate sample per folder/folio with the form 4PSOW/DT attached. Dividers should be used to indicate the start of different investigations and work sent to moderators should be in A4 format. All photocopied work must be legible; the photocopying of pencil sketched ideas should be avoided.

## Candidate performance against each criterion

### Planning (P)

The majority of candidates were able to achieve a minimum of at least a 'Partial' for this criterion. However, some candidates did not perform well, especially when repeating a common problem set by the class teacher. When using this assessment criterion for a design project, candidates should

- consider the feasibility of the study;
- identify the user;
- analyse the situation;
- write a clear brief which identifies the intended goal;
- and produce a detailed not generic specification.

Some examples were extensive in analysing existing products, photographing the problem and in conducting market research. Specifications that consider the need to include quantitative constraints offer more detail than generic descriptors that could be applied to a range of solutions.

### Research (R)

Not all candidates had considered the need to plan data collection from a variety of sources or include a list of apparatus and order of method for an experiment that controlled variables. As a result collected data was either biased or missing critical information. For example, some candidates had been given the task to design a bookcase, but there was no evidence of data collection relating to ergonomics (the size and weight of a variety of books). Those that achieved a high mark in this section displayed evidence of focused research that had been annotated to indicate its relevance in order to solve the problem. Literature research regarding the history of products is to be discouraged as assessment opportunities are limited.

### Development (D)

This criterion lends itself to **design-based** activities, where candidates have the opportunity to generate and develop an innovative range of ideas using suitable techniques, such as sketching, CAD or modelling. Some schools continue to misinterpret the criteria and submit inappropriate work for the assessment of 'Development'. Literature research assignments are not suitable for assessment of Development.

Teachers should consider how sketching, card modelling, the use of manufactured boards, CAD and Styrofoam can be used to aid design development. The development stage is not simply making the same model using a range of techniques; it is the refinement of a solution using appropriate strategies to establish optimum materials, construction, dimensions, form and finish.

The use of more techniques to optimise a solution is encouraged. The level of detailing of the solution for it to be realized needs to be presented in an appropriate format, such as engineering drawings or patterns for textile outcomes including all information necessary (sizes, fold lines, hem lines etc.)

### Evaluation (E)

Projects which offer a limited or virtual outcome do not lend themselves well to addressing this assessment criterion, especially when it comes to testing, identifying weaknesses and suggesting realistic recommendations. Recommendations for the design project need to include a revised specification, sketched modifications and identify changes to the outcome for scaling up production. For laboratory based tasks, candidates need to evaluate the method used to collect data.

### Manipulative Skills (MS)

In most cases thorough planning had taken place, but there is a need for some schools to be more detailed in their identification of materials and processes in order to plan time effectively. If Gantt charts are used, timings need to be more detailed than weeks; candidates should ideally plan to the hour and revise the plan when changes are required.

## Recommendations for the teaching of future candidates

Please note that when assessing IA – Investigations it may not be possible to use all of the assessment criteria for each investigation. The *development* criterion is suited to IA – Investigations that adopt a design and make approach.

Schools are reminded to flag/highlight work for moderation.

Engaging with the OCC exemplar material and forums is to be encouraged by teachers in helping them understand and meet the standards of assessment.

## Higher level paper one

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 10	11 - 13	14 - 17	18 - 22	23 - 26	27 - 31	32 - 40

### General comments

Only Two G2s had been received for this paper at the time of the Grade Award meeting. The comments were considered at the grade award meeting and were used to give an indication of the quality and relative difficulty of the examination papers. At the grade award a computer analysis of candidate performance, a difficulty index (Difl) and a discrimination index (Disl) were provided.

Difl reflects the percentage of candidates getting the question right and can range from 0 to 100%. A higher Difl percentage score indicates that the question is easier; a lower Difl score means that the question more difficult.

In terms of Disl a negative discrimination index indicates that the better candidates found the question difficult and would prompt us to check the question carefully.

The Grade Award team are grateful for the input from teachers through the G2 forms as it informs the process of boundary setting and reminds all teachers to submit a G2 for each paper following an exam session.

All responses considered this paper to be of a similar standard to last year's paper and that the level of difficulty to be appropriate. They also considered the syllabus coverage to be good and that the clarity of wording was good.

One comment on the G2s suggested they had received positive comments from their candidates and that they appreciated the lack of questions requiring definition statements. There were 14 questions common to both the higher and standard level papers.

### Individual question analysis

#### Question 1

This question demonstrated that candidates had a good knowledge of the design cycle. (Difl=22.42; Disl=0.00).

#### Question 2

This question indicated that candidates knew the purpose of different drawing styles. (Difl=74.19; Disl=0.32).

#### Question 3

57 out of 93 candidates got this correct. Candidates with a good understanding of purpose of mathematical models did better in this question. This question proved to be a moderately difficult question (Difl=61.29; Disl=0.35).

**Question 4**

54 out of 93 candidates thought the answer was C and 30 answered A correctly. Candidates who understood that a designer's role is not to make the products but to design them did better in this question. This was a moderately difficult question with a high discriminator. (Difl=32.26; Disl=-.03).

**Question 5**

68 out of 93 candidates got the correct answer. This was a moderately easy question with a positive discriminator. (Difl=73.12; Disl=0.16)

**Question 6**

44 out of 93 candidates answered this question correctly. Candidates who understood the terminology and definitions did better in this question (Difl=47.31.83; Disl=0.23).

**Question 7**

This question proved to be an easier question with a moderate discriminator (Difl=91.40; Disl=0.19).

**Question 8**

This question highlighted the need for candidates to understand that all answers would affect the life cycle analysis but had to identify which one would affect it **most**. 42 out of 93 candidates answered correctly and 31 incorrectly thought the answer was A. This was a moderate question with a positive discriminator. (Difl=45.16; Disl=0.32).

**Question 11**

54 candidates answered this question correctly. This question highlighted the need for candidates to understand the properties of a range of timbers. This was a moderately easy question. (Difl=58.06; Disl=0.32).

**Question 13**

More candidates answered C rather than the correct answer D. This question highlighted a need to teach the properties of thermosetting plastics as outlined in the guide. Assessment statement 4.5.10 is an objective 3 statement so should be discussed in detail. This was a moderately difficult question with a positive discriminator (Difl=22.58.; Disl=0.29).

**Question 14**

More candidates answered C than the correct answer B. Both answer B and C were accepted due to an ambiguity in the question. The grade award team found that even though the majority of coffee tables are typically topped with laminated glass, toughened glass is used, even though rarely, and therefore a suitable material. (Difl=75.27; Disl=0.06).

**Question 16**

63 candidates answered this question and it was moderately easy. The second most popular answer was C food, which can be easily cast in moulds, for example. (Difl=67.74; Disl=0.52).

**Question 19**

This question proved to be a difficult question. The question required candidates to approach the topic holistically and work out the answer through a process of elimination. A and B could not be correct as incentives and legislation already exist. (Difl=6.45; Disl=-0.03).

**Question 20**

This question was surprisingly difficult for candidates. This was a “not” question. The same number of candidates answered A and C, However “ease of maintenance” **would** be an aspect of planned obsolescence and “style” is something that cannot be planned to last a definitive amount of time. (Difl=39.78; Disl=-0.03).

**Question 21**

50 out of 93 candidates got this correct. This question highlighted a need to understand and be able to apply the definitions in topic 7. (Difl=53.76; Disl=0.52).

**Question 22**

This was a moderately easy question and required the candidates to apply their knowledge of topic 7. (Difl=63.44; Disl=0.35).

**Question 25**

62 candidates answered this question correctly. A number of candidates thought that C was correct; however candidates must be aware that wind farms are not particularly expensive to maintain. This was a moderately easy question with no discrimination. (Difl=66.67; Disl=0.00).

**Question 26**

52 candidates thought the answer was A and 20 correctly answered B. This question was based on a straightforward topic, but tested more than one aspect of the candidates' knowledge. This question was moderately difficulty with a positive discrimination factor. (Difl=21.51; Disl=0.26)

**Question 29**

One G2 comment focussed on the fact that specific types of cam followers were not specifically mentioned in the syllabus, however, 10.2.7 reads “identify cam followers” This question illustrated a range of standard followers and proved to be a moderately easy question for candidates. (Difl=51.61; Disl=0.52)

**Question 30**

50 out of 93 candidates answered correctly. This question highlighted the importance of teaching the application of mechanisms as well as the terminology. This question was moderately easy. (Difl=53.76; Disl=0.19)

**Question 31**

More candidates thought the answer was A than the correct answer C. Many candidates did not have a good understanding of the process of lost wax casing. Teachers should be aware that when the guide says “consider” they should teach the topic in detail about the process. This question was moderately difficult with a positive discrimination factor. (Difl=23.66; Disl=0.26)

**Question 33**

This question highlighted the need to teach plastic moulding processes in detail. Making bottles would involve extruding or injection moulding a parison before blow moulding it. This question was moderately difficulty with a negative discrimination factor meaning that the more able candidates found this question difficult. (Difl=34.41; Disl=-0.03)

**Question 34**

Most candidates answered this question correctly; however, the questions with tables of choices can be difficult for some candidates. Candidates should be encouraged to practice answering this type of question. This was a moderately easy question (Difl=62.37; Disl=0.45)

**Question 37**

The case study was well received in the G2s. This was a moderately easy question which highlighted that the candidates who knew the terminology did better. (Difl=64.52; Disl=0.39)

**Question 39**

44 candidates identified the correct answer, D. The introduction to the question stated that the material was a light weight composite, therefore, was not a metal and would not need to be ductile. This question was moderately difficult with a positive discrimination factor. (Difl=47.31; Disl=0.13)

The following table provides a summary of the how each candidate answered each question, the resulting difficulty index and discrimination index.

Question	A	B	C	D	Difficulty Index	Discrimination index
1	11	72*	8	2	77.42	0.00
2	8	10	6	69*	74.19	0.32
3	8	27	57*	1	61.29	0.35
4	30*	5	54	4	32.26	-0.03
5	68*	15	1	9	73.12	0.16
6	44*	35	7	6	47.31	0.23
7	85*	3	3	2	91.40	0.19
8	31	0	42*	20	45.16	0.32
9	15	0	1	77*	82.80	0.13
10	0	83*	8	2	89.25	0.00
11	54*	7	9	23	58.06	0.32
12	2	1	3	87*	93.55	0.13
13	15	25	32	21*	22.58	0.29
14	15	28*	42*	8	75.27	0.06
15	10	54*	15	14	58.06	0.39
16	0	63*	27	3	67.74	0.52
17	7	8	74*	4	79.57	0.32
18	11	4	8	70*	75.27	0.19
19	27	37	6*	23	6.45	-0.03
20	37	18	37*	1	39.78	-0.03
21	35	50*	1	7	53.76	0.52
22	59*	4	0	30	63.44	0.35
23	1	13	78*	1	83.87	0.10
24	1	88*	3	1	94.62	0.13
25	5	23	3	62*	66.67	0.00
26	52	20*	13	8	21.51	0.26
27	9	16	58*	10	62.37	0.32
28	62*	15	11	5	66.67	0.13
29	48*	19	5	21	51.61	0.52
30	9	10	50*	24	53.76	0.19
31	58	4	9	22*	23.66	0.26
32	72*	5	10	6	77.42	0.35
33	16	43	2	32*	34.41	-0.03
34	1	29	5	58*	62.37	0.45
35	8	9	60*	16	64.52	0.39
36	4	29	52*	8	55.91	0.19
37	28	38*	12	15	40.86	0.52
38	75*	7	7	4	80.65	0.19
39	21	6	22	44*	47.31	0.13
40	2	2	2	87*	93.55	0.16

Number of candidates: 93

## Recommendations for the teaching of future candidates

It is important that objective 3 statements are taught thoroughly and that candidates are given the opportunity to discuss these topics and to apply their knowledge to real situations.

All stages of manufacturing processes need to be understood thoroughly and material properties should be taught alongside their applications.

## Higher level paper two

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 5	6 - 10	11 - 16	17 - 23	24 - 31	32 - 38	39 - 60

### General comments

This paper is designed to test candidates' subject knowledge and the ability to apply the knowledge to different design contexts in a logical and concise manner. It also tests candidates' ability to analyse and use qualitative and quantitative data as well as to select and apply relevant information to answer questions. In order to do this the paper is composed of a number of questions based on given data (Section A question 1), a series of short answer questions (Section A questions 2 – 6) and a choice of one out of 3 questions in Section B. The differentiating factors when reviewing candidates' performance as evidenced in the marked scripts at the Grade Award meeting is how well candidates have answered the data-based question in Section A and the 9 mark question in Section B. Many candidates will be able to answer the short response questions in Sections A and B with good syllabus recall but only the better candidates are usually able to respond well to the extended response question in Section B requiring the construction of a detailed explanation in applying relevant information to the concepts and principles involved in the stated design contexts. In Section B question 7 was the most popular and question 9 the least popular.

For Question 1 in Section A (the data-based question) there were not many excellent answers. Most candidates seemed to be comfortable with the question as a whole but responses lacked a detailed enough focus on the objective three questions. Hence, there was a considerable bunching of marks in the middle of the range.

The nature and choice of the questions in Section B seems to have been well received but the relative weakness of answers to the 9 mark question (c.ii) caused the more able candidates to miss out on the top grade compared to the previous year.

Three G2 forms were received by the time of the Grade Award meeting. As can be gleaned from the statistics below all teachers who returned the forms thought that the paper was well presented and the questions fair to candidates. One G2 comment stated that Section A was very fair and that there was nothing misleading about the questions in Section B which prevented candidates from demonstrating their knowledge.

### Comparison with last year's paper

Much easier	A little easier	Similar standard	A little more difficult	Much more difficult
0%	0	2	0	0

**Suitability of question paper**

	<b>Too easy</b>	<b>Appropriate</b>	<b>Too difficult</b>
Level of difficulty	0	3	0

	<b>Poor</b>	<b>Satisfactory</b>	<b>Good</b>
Syllabus coverage	0	3	0
Clarity of wording	0	0	3
Presentation of paper	0	0	3

## The strengths and weaknesses of the candidates in the treatment of individual questions

### Section A

#### Question 1

This was not a particularly difficult question but candidates needed to focus on the requirements of each part as it was easy to provide generalised answers without thinking through the actual operations under discussion. There was a great deal of information to absorb and link together in order to appreciate operational requirements. In this sense the data based question was good because it differentiated well between candidates' abilities.

- a) (i) A simple calculation though not all candidates included the correct units of measurement in their answer resulting in only one mark.
  - (ii) Most candidates managed to gain one mark for this question but few successfully outlined a reason such as "safety".
- b) (i) Some candidates relied on their general knowledge of materials rather than thinking how aspects of that knowledge were relevant to the context stated.
  - (ii) Not enough candidates referred to the action of lifting the palettes i.e. the respective advantages of being able to lift the palettes on a narrower or wider edge.
- c) (i) It was easy for candidates to confuse this question with part (ii) and provide similar answers. The two parts are designed to allow candidates to think about the recognition of the pallet sizes within one location (factory) and then the wider issue of the use of pallets in different parts of the world.
  - (ii) The mark scheme for this part of the question shows a variety of marking points but the majority of candidates failed to gain all the three marks available to them because they did not plan their answer well enough, even though it was clear that they understood the question and had a general appreciation of the need for global standards.

In keeping with the accepted format for question 1 on the Higher Level paper, a second piece of data is introduced for the final eight marks of the question. In this instance, the data related to the design of the cans shown as a stack in Figure 1 rather than more data about the wooden pallets. This allows question setters to explore different aspects of the subject and also gives candidates something new to consider.

- d) (i) Very few candidates gained full marks for this question as they did not consider the exact definition of constructive discontent and how it applies to the given context. Many candidates focused on dissatisfaction with the design shown in Figure 6 but did not say why it was unsatisfactory and how this led to the designer thinking positively about another possible solution i.e. gained inspiration.
- (ii) Many candidates achieved both available marks for this question although some only gained one mark because they did not **outline one** advantage but **stated two** advantages.
- e) (i) This was a simple question as long as candidates knew the concept of 1<sup>st</sup>, 2<sup>nd</sup> and 3<sup>rd</sup> class levers – a surprising number did not!
- (ii) There was little problem with candidates appreciating the ergonomic considerations, but to gain the full three marks **one** consideration needed correct identification, description and justification.

### Question 2

- a) Most candidates found this question relatively easy to answer.
- b) Most candidates were able to discuss perception in relation to psychological factors, but not all candidates related the discussion to collecting data in order to gain the third mark.

### Question 3

- a) Not all candidates read the question carefully enough and therefore identified any impact of automation such as increased volume production. Those candidates who identified one impact of automation on “working conditions” were usually able to gain two marks.
- b) Candidates needed to focus their thinking on products produced by automation with which they were familiar so they could successfully outline how automation had improved the type and range of the product by considering the advantages to the consumer.

### Question 4

- a) This was an easy question for the majority of candidates.
- b) Most candidates could successfully differentiate between the respective functions of orthographic and isometric drawings but did not necessarily consider the appropriate stages of the design cycle for each drawing.

**Question 5**

- a) This was a straightforward question for the majority of candidates.
- b) Most candidates were able to gain at least one mark for this question but only those candidates who carefully structured their explanation gained the full three marks.

**Question 6**

- a) Most candidates knew the answer to this question but poor wording of the answer sometimes meant the understanding was not well communicated.
- b) Before writing the answer to this question candidates needed to consider carefully the objectives of *green design* and then relate the relevant objectives to a specific process e.g. injection moulding..

**Section B****Question 7**

The different parts of Q1 (a) needed careful consideration before providing answers which, though overlapping in content, were not repetitive.

- a) (i) Some candidates failed to gain the mark as they did not refer to the medium for providing daylight e.g. window.  
(ii) Most candidates successfully answered this question.  
(iii) Some candidates merely made a statement rather than providing an outline so they only gained one mark.
- b) (i) Nearly all candidates were able to gain at least one mark for this question.  
(ii) Some candidates did not appreciate what was required for two marks and only **stated** one advantage.
- c) (i) In a similar manner to question (b)(ii), if candidates appreciated what was required to answer a question beginning with “identify” they were usually able to provide an answer which gained them two marks rather than one.  
(ii) The question relates to the use of glass as a structural material e.g. in buildings. Most candidates understood the relevance of the concept and if they planned their response into three carefully differentiated answers they were usually able to gain the available marks.

**Question 8**

- a) (i) The majority of candidates were able to gain the mark for this question.  
(ii) Not all candidates referred to the nature/structure of LVL timber in relation to the way in which the glue helps to distribute the forces throughout the beam.  
(iii) Most candidates were able to answer this question successfully.
- b) (i) In order to gain the marks for this question, candidates needed to consider carefully the process of lamination and how it is a cost-effective process for providing large structures (compared to the use of natural timber).  
(ii) Most candidates understood the concept of “factor of safety” and were able to apply it to the context of the beam in Figure 9.

- c) (i) Most candidates were able to think of one benefit of LVL beams but did not always focus their answer to outline the benefit rather than listing as many benefits as they could think of.
- (ii) This was surprisingly answered quite poorly by many candidates. The question is based on Assessment Statement 4.3.5 in the Subject Guide which has been a feature of the course for many years as well as being a much debated topic in relation to the use of global material resources. Unfortunately, many answers did not focus on specific aspects of sustainability of timber as a resource but commented in general on sustainability issues.

### Question 9

- a) (i) A straightforward question for those candidates who had understood the glossary terms in the Subject Guide.
- (ii) Most candidates gained one mark for this question but failed to gain the second mark due to the lack of a suitable “outline”.
- (iii) Although the topic of “clean technology” has been transformed into “clean manufacturing” in the current Subject Guide, many of the assessment statements are common to both terms and clean technology is referred to in the teacher notes. Most candidates found the link between solar power and clean technology too subtle to make.
- b) (i) The majority of candidates did not know the “Bellagio Principles” and therefore could not relate them to the evaluation of a proposal for a large solar project.
- (ii) The concept of “cost per watt” seemed to confuse most candidates as they could not relate it to the cost-effectiveness of the solar project on the scale described.
- c) (i) Most candidates answered this question well.
- (ii) Surprisingly this question was not answered well by most candidates even though Life Cycle Analysis part of Topic 3. Candidates needed to focus on three of the five stages of the LCA and the relevance of suitable environmental issues at each stage.

## Recommendations for the teaching of future candidates

The key elements for success on Paper Two are the ability to deal effectively with the data based question (Question 1) in Section A and the ability to score highly on the nine mark question in Section B.

The data based question tests candidates ability to understand and select appropriate data as well as to apply it to concepts and principles taught in the course. The context for question one is not based on the syllabus so candidates should be given experience prior to sitting the examination in analysing data from unfamiliar contexts.

There will always be more data provided than is needed to answer the questions. Therefore, candidates should not be surprised by the amount of data, but simply assimilate it all and then read the questions carefully to identify which of the data they need to use. As all candidates undertake a course in Mathematics, it is assumed that they are familiar with basic mathematical calculations.

The three questions in Section B are designed to obtain wide syllabus coverage and for question setters the challenge is to ensure that the questions have parity in terms of degree of difficulty. Naturally, some questions will be more appealing to candidates depending on their preference for different topics in the syllabus and the perceived accessibility of the design context. Candidates should be encouraged to weigh up the pros and cons of each of the questions before deciding which one to answer.

## Higher level paper three

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 3	4 - 6	7 - 9	10 - 15	16 - 22	23 - 28	29 - 40

### General comments

Higher level options were marked out of 40 marks (see below). Options E and C were the most popular followed by A, D and finally B. The table below shows the format for question setters.

Question	Comments	Mark allocation
1	A data question based on core material	6 (1, 2 and 3)
2	Syllabus coverage based on extension material	3 (1 and 2)
3	A data question based on core material	4 (2 and 2)
4	Syllabus coverage based on core material.	6 (3 and 3)
5	Syllabus coverage based on extension material	6 (2, 2 and 2)
6	An extended response question based on extension material	6
7	An extended response question based on core material	9

Only 3 G2s were received for this paper by the time that the grade award meeting was convened, therefore statistical evidence of syllabus coverage and presentation is inconclusive but no particular problems were highlighted.

### Comparison with last year's paper

Much easier	A little easier	Similar standard	A little more difficult	Much more difficult
0	0	0	0	0

**Suitability of question paper**

	<b>Too easy</b>	<b>Appropriate</b>	<b>Too difficult</b>
Level of difficulty	0	3	0

	<b>Poor</b>	<b>Satisfactory</b>	<b>Good</b>
Syllabus coverage	0	1	2
Clarity of wording	0	0	3
Presentation of paper	0	0	3

## The strengths and weaknesses of the candidates in the treatment of individual questions

### OPTION A – FOOD SCIENCE AND TECHNOLOGY

#### Question 1

This was a three-part data question worth a total of six marks and based on core material.

- This question proved surprisingly difficult for candidates many of whom were unable to state the technical term “aeration”.
- Most candidates made reference to “adding air” or “makes the dough rise” but few referred to fermentation or the fact that carbon dioxide is produced.
- Most candidates achieved one or two marks for explaining that gluten needed to be replaced with an alternative, but not many candidates structured their answer carefully enough to gain all three marks.

#### Question 2

- The Millennium Development Goal of halving the proportion of people who suffer hunger was not well known by the majority of candidates.
- Most candidates achieved at least one mark for this question with the more able candidates achieving full marks relatively easily.

#### Question 3

- This proved a difficult calculation for nearly all candidates but it was a straightforward question if knowledge of assessment Statement A9.1 in the Subject Guide was known.
- Most candidates were able to answer this question though lack of clarity of communication was a barrier to gaining full marks for some candidates.

#### Question 4

Although the majority of candidates clearly understood the terms “market pull” and “technology push” not many were able to differentiate their responses in sufficient detail to gain three marks for each aspect. Many answers were convoluted.

**Question 5**

- a) Most candidates were able to state that high risk foods are susceptible to the growth of food poisoning bacteria but few candidates referred to a suitable example.
- b) Most candidates knew that chicken can harbour food poisoning bacteria and needs to be isolated from other foods in the refrigerator but not many made reference to cross-contamination via the juices of poultry dripping onto other foods if stored above them.
- c) Not many candidates referred to cheese and dairy products as high risk foods and to avoid cross-contamination they should be stored where meat juices etc. will not be in contact.

**Question 6**

- a) Nearly all candidates were able to identify an appropriate issue relating to public concern to the safety of genetically modified crops. Some candidates wrote about more than one issue without teasing out three distinct points for any of them.
- b) Similarly, most candidates understood the need for public acceptability of new food products but not that many made reference to three distinct points in their answer.

**Question 7**

Although most candidates provided a great deal of information in answer to this question, not many gained more than five marks. Many candidates spent most of their time describing what is on food labels rather than explaining the “effectiveness” of the information in altering diet.

**OPTION B – ELECTRONIC PRODUCT DESIGN**

There were no candidates for this option.

**OPTION C – CAD/CAM****Question 1**

- a) A straightforward question for the majority of candidates.
- b) This question was not answered well by the majority of candidates with few able to make reference to the tool cutting at right angles to the surface material.
- c) All candidates were able to gain marks for this question and those who astutely structured their explanation achieved maximum marks.

**Question 2**

- a) Nearly all candidates gained the mark for this question.
- b) The majority of candidates scored highly on this question.

**Question 3**

- a) Many candidates were able to identify extrusion as the correct process but hardly any made reference to the need to specify the height of the extrusion to produce the 3D image.
- b) Many candidates found this question difficult with the majority of responses being too vague in order to gain both marks.

**Question 4**

Most candidates had little difficulty in focusing on two ways in which CAD impacts on consumer choice for a kitchen design but careful consideration needed to be given to communicating three distinct points in each aspect of the discussion in order to gain full marks.

**Question 5**

- a) The majority of candidates found this question straightforward.
- b) This question was attempted well by most candidates.
- c) Surprisingly, this question was not answered as well as anticipated although most candidates were able to achieve one of the available marks.

**Question 6**

- a) This question was not tackled well by most candidates who failed to link the suitability of modelling wax for machining via a CAM system to produce a master for lost-wax casting.
- b) Many candidates achieved at least two marks for this question with the more astute candidates focusing their response on **one** issue rather than providing a list.

**Question C7**

Although most candidates had little problem writing about rapid prototyping not many set out their answer to discuss three separate benefits in sufficient detail to gain three marks for each one.

**OPTION D – TEXTILES****Question 1**

- a) This question provoked a mixed response from candidates some of whom seemed confused by the term “mandatory”.
- b) Not many candidates focused their answer on **one** reason to gain two marks.
- c) All candidates appreciated the global market for textile products and the need for easy recognition of care instructions though only a few achieved full marks by making three distinct points in a suitable explanation.

**Question 2**

- a) Candidates who were aware of the demands of wearable computing garments were able to answer this question easily.
- b) This question seemed to confuse many candidates as they failed to appreciate the need for wearable computing garments to succeed in the same market for clothes as other textile garments in order to become a major innovation.

**Question 3**

- a) Not many candidates understood the concept of “biomimetrics” and so were not able to gain any marks.
- b) This question proved accessible to nearly all candidates, many of whom were able to gain full marks.

**Question 4**

All candidates were able to attempt this question although many answers focused on the use of CAM in the textile industry in general rather than minimising waste.

**Question 5**

- a) The link between the use of the EU flower system and life cycle analysis (topic 3.2) proved difficult for most candidates and consequently few candidates gained both marks available.
- b) Surprisingly, few candidates could describe the process of “ginning”.
- c) Few candidates focused on the working environment for large scale spinning, knitting and weaving processes.

**Question 6**

- a) The concept of large multinational companies establishing manufacturing outlets in developing countries was generally well understood by candidates, many of whom achieved full marks.
- b) “Corporate social responsibility” was not a comfortable phrase for many candidates whom struggled to make the link with the answer they gave in part (a).

**Question 7**

Most candidates were able to answer this question well. As always with a 9 mark question a combination of good subject knowledge and the careful execution of this knowledge based on an explanation of three distinct factors was the key to success.

**OPTION E – HUMAN FACTORS DESIGN****Question 1**

- a) Many candidates merely repeated part of the description of the Apple iPod from the stem of the question rather than considering general characteristics of products which make them a global success.
- b) This proved to be a straightforward question for the majority of candidates
- c) Most candidates felt able to answer this question though not many referred to the fact that it is difficult for the designer to understand all users’ requirements.

**Question 2**

- a) Some answers were too vague to achieve the mark available – candidates should ensure they are familiar with the glossary of terms at the end of the Subject Guide.
- b) A large number of candidates missed the key feature of the question i.e. “early in the design cycle” and merely referred to the link between digital humans and human factors.

**Question 3**

- a) The concept of “affordance” was well understood by the majority of candidates.
- b) Most candidates were able to achieve at least one mark for this question and those candidates who referred to “conflict or “confusion” in relation to the door with the “push” sign gained full marks.

**Question 4**

This question was not answered well by the majority of candidates who did not consider what was stated by Assessment Statement E.5.8 in order to identify two ways in which human factor specialists determine adequate product safety.

**Question 5**

- a) Most candidates found this question relatively easy, although many did not gain full marks as they did not set out the human factor issue well enough but referred to wheelchair design in general.
- b) Not all candidates appreciated the need to consider appropriate research strategies but those who did usually gained full marks.
- c) This question was quite straightforward for the majority of candidates.

**Question 6**

- a) Not many candidates were able to gain full marks for this question – quite a few thought that “design for discomfort” was to stop people falling asleep and missing their flight.
- b) This was a relatively easy question for most candidates, although only those who included three distinct points in their explanation gained full marks.

**Question 7**

This was a surprisingly difficult question for many candidates even though it was clear that they knew about paper prototyping. Most candidates were able to gain a few marks for their basic understanding of the concept, but few candidates were able to develop three advantages in sufficient detail to score highly.

## Recommendations for the teaching of future candidates

Now that candidates study only one option, the examination papers are able to go into more depth. Thus, candidates need to be made aware of the theories and concepts underpinning the option material and to be able to see how these theories and concepts impact on the real world and the design process through appropriate practical work.

Ideally, the Design Project should relate to the option selected so that the project and the option are synergistic and build on each other to reinforce learning and do not lead to an exacerbation of workload issues which would be to the disadvantage of the candidate. Teachers should spend some time in helping candidates to understand how to structure their answers, especially for 6 mark and 9 mark questions. It is worth noting from the mark schemes that a mark is awarded for each distinct relevant correct point.

## Standard level paper one

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 7	8 - 9	10 - 11	12 - 15	16 - 19	20 - 23	24 - 30

### General comments

One G2 had been received for this paper at the time of the Grade Award meeting. The comments were considered at the grade award meeting and were used to give an indication of the quality and relative difficulty of the examination papers. At the grade award a computer analysis of candidate performance, a difficulty index (Difl) and a discrimination index (Disl) were provided.

Difl reflects the percentage of candidates getting the question right and can range from 0 to 100%. A higher Difl percentage score means that the question is easier; a lower Difl score means that the question is more difficult. In terms of Disl a negative discrimination index means that the better candidates found the question difficult and would prompt us to check the question carefully to determine grade boundaries for the paper.

The Grade Award team are grateful for the input from teachers through the G2 forms as it informs the process of boundary setting. The one response we received indicated the level of difficulty to be appropriate and that the syllabus coverage was satisfactory. Clarity of wording was good and the presentation of the paper was good.

One comment stated that “not” questions could be confusing to candidates with English as a second language.

### Individual question analysis

#### Question 1

This question demonstrated that candidates had a good knowledge of the design cycle. (Difl=76.92; Disl=0.00).

**Question 2**

This was a relatively easy question with 15 out of 23 candidates getting it right. (Difl=57.69; Disl=0.44).

**Question 3**

19 out of 23 candidates got this right. It was considered an easier question (Difl=73.08; Disl=0.00).

**Question 5**

More candidates answered B than the correct answer C. Candidates with a good understanding of purpose of mathematical models did better in this question. This was a moderately difficult question for standard level candidates. (Difl=38.46; Disl=0.67).

**Question 6**

This was a moderately difficult question. It is important that candidates do not only understand the concept of a product cycle but also its impact on the life of a product (Difl=34.62; Disl=0.44).

**Question 7**

This question was an easier question with no discrimination (Difl=92.31; Disl=0.00).

**Question 10**

10 out of 23 candidates got this right. This question highlighted the need for candidates to be able to apply their knowledge of topic 3. Assessment statement 3.1.4 is an objective 3 statement and therefore needs to be discussed in detail. Candidates should be able to apply their knowledge within a context. This was a moderately difficult question. (Difl=38.46; Disl=0.33).

**Question 12**

More candidates answered C rather than the correct answer D. This question highlighted a need to teach the classifications of materials as outlined in the guide (Assessment statement 4.1.5). This was a moderately difficult question with a positive discriminator (Difl=23.08.; Disl=0.33).

**Question 14**

This was a difficult question. Candidates who were aware of the different super-alloys as outlined in the guide (Assessment statement 4.4.12) did better when answering this question (Difl=38.46; Disl=0.33).

**Question 15**

More candidates thought that the answer was C than the correct answer D. Candidates with a good knowledge of plastics as outlined in the guide (Assessment statement 4.4.10) performed better at this question (Difl=34.62; Disl=0.56).

**Question 16**

More candidates answered C than the correct answer B. Both answer B and C were accepted due to an ambiguity in the question. The grade award team found that even though the majority of coffee tables are typically topped with laminated glass, toughened glass is used, even though rarely, and therefore a suitable material. (Difl=69.23; Disl=-0.11).

**Question 17**

This was a moderately easy question and candidates who knew about the application of smart materials did well in this question (Difl=53.85; Disl=-0.11).

**Question 18**

This was an easier question and a good discriminator (Difl=61.54; Disl=0.44).

**Question 22**

This question proved to be a difficult question. The question required candidates to approach the topic holistically and work out the answer through a process of elimination. A and B could not be correct as incentives and legislation already exist. (Difl=7.69; Disl=0.11).

**Question 23**

Only one candidate answered this correctly. The question tested candidates' ability to apply percentiles. It is important to be able to apply ergonomic data to situations to ensure a thorough understanding of the topic 6. (Difl=63.44; Disl=0.35).

**Question 27**

8 candidates out of 23 got this question right. Candidates who had learnt and understood the terminology and application of assessment statements in topic 2 performed better when answering this question. This was a moderately difficult question with no discrimination. (Difl=30.77; Disl=0.00).

**Question 29**

6 candidates answered correctly (D) whereas 18 thought the answer was B. The Buddi would need all three properties as it would have to cope with the internal tensile stresses of distortion when it is dropped. This question was difficult with a negative discrimination factor. (Difl=23.08; Disl=-0.11)

The following table provides a summary of the how each candidate answered each question, the resulting difficulty index and discrimination index.

Question	A	B	C	D	Difficulty Index	Discrimination index
1	4	20*	0	2	76.92	0.00
2	15*	8	2	0	57.69	0.44
3	3	2	2	19*	73.08	0.00
4	6	4	1	15*	57.69	0.44
5	2	14	10*	0	38.46	0.67
6	9*	2	8	7	34.62	0.44
7	24*	1	1	0	92.31	0.00
8	10	1	9*	6	34.62	0.33
9	4	2	1	19*	73.08	0.22
10	8	5	10*	3	38.46	0.33
11	1	23*	2	0	88.46	0.00
12	4	3	13	6*	23.08	0.33
13	0	2	8	16*	61.54	0.11
14	6	10*	9	1	38.46	0.33
15	2	1	14	9*	34.62	0.56
16	4	8*	10*	4	69.23	0.11
17	3	14*	4	5	53.85	0.11
18	1	16*	8	1	61.54	0.44
19	4	2	8	12*	46.15	0.11
20	0	5	15*	6	57.69	0.56
21	3	4	4	15*	57.69	0.56
22	6	10	2*	8	7.69	0.11
23	1*	12	6	7	3.85	0.11
24	14*	3	5	4	53.85	0.78
25	8	13*	2	3	50	-0.11
26	15*	0	1	10	57.69	0.33
27	6	5	8*	7	30.77	0.00
28	2	2	21*	1	80.77	0.11
29	1	18	1	6*	23.08	-0.11
30	1	1	23*	1	88.46	0.22

Number of candidates: 26

## Standard level paper two

### Component grade boundaries

<b>Grade:</b>	1	2	3	4	5	6	7
<b>Mark range:</b>	0 - 3	4 - 7	8 - 11	12 - 16	17 - 22	23 - 27	28 - 40

### General comments

Only one G2 feedback form was received from teachers as can be seen from the information in the tables below.

The Standard Level paper follows a similar format to the Higher Level paper with a data based question in Section A followed by short answer questions and a choice of three questions in Section B. Candidates answer one of the Section B questions and the mark allocation is the same as for the Higher Level Section B question – this ensures that there is parity between the papers although the Higher Level paper examines 12 core topics rather than 7 at Standard Level.

This paper is designed to test candidates' subject knowledge and the ability to apply the knowledge to different design contexts in a logical and concise manner. It also tests candidates' ability to analyse and use qualitative and quantitative data as well as to select and apply relevant information to answer questions. The differentiating factors when reviewing candidates' performance as evidenced in the marked scripts at the Grade Award meeting is how well candidates have answered the data based question in Section A and the 9 mark question in Section B. Many candidates will be able to answer the short response questions in Sections A and B with good syllabus recall but only the better candidates are usually able to respond well to the extended response question in Section B requiring the construction of a detailed explanation in applying relevant information to the concepts and principles involved in the stated design contexts. In Section B question 5 was the most popular and question 6 the least popular though there was not a huge difference between the percentage take-up of each question.

### Comparison with last year's paper

Much easier	A little easier	Similar standard	A little more difficult	Much more difficult
0	0	1	0	0

**Suitability of question paper**

	<b>Too easy</b>	<b>Appropriate</b>	<b>Too difficult</b>
Level of difficulty	0	1	0

	<b>Poor</b>	<b>Satisfactory</b>	<b>Good</b>
Syllabus coverage	0	1	0
Clarity of wording	0	0	1
Presentation of paper	0	0	1

## The strengths and weaknesses of the candidates in the treatment of individual questions

**Section A****Question 1**

- a) (i) The majority of candidates were able to state the correct height for the carton though some missed out on the mark because they failed to include the correct units.
- (ii) This was an easy question for most candidates.
- (iii) This proved to be a surprisingly difficult calculation for the majority of candidates.
- b) (i) Many answers were quite vague and although candidates usually managed to gain one mark for stating dissatisfaction with the original carton, not many identified that this provided inspiration or impetus for re-design.
- (ii) Most candidates could correctly focus on a suitable market segment but the “outline” needed to briefly describe why the segment was appropriate.
- c) (i) This question was answered correctly by the majority of candidates.
- (ii) This question differentiated well between ability levels of candidates with the better ones able to structure their explanation to make three distinct points.

**Question 2**

- a) This question proved difficult for many candidates – although only worth one mark it required them to understand all the corporate strategies from topic 2.3 and then to apply the information to the given matrix. Clearly, not all one mark questions are easy!
- b) A considerable number of candidates failed to state a suitable “named product” even though they clearly understood what is meant by “product development” so unfortunately only two marks were gained.

**Question 3**

- a) This question was answered well by most candidates.
- b) Many candidates failed to communicate effectively the link between “value-for-money” and the internet but merely stated a benefit of using the internet for purchasing.

**Section B****Question 4**

- a) (i) Most candidates made reference to “businessmen” or something to that effect but many candidates merely **stated** the market segment rather than **identifying** it.  
(ii) For the full three marks candidates needed to ensure that they made reference to three distinct points in relation to a benefit of quality assurance to customers. Many candidates merely referred to “reliability” and “consumer satisfaction” without explaining how this would be achieved.
- b) (i) The majority of candidates understood the concept of “planned obsolescence” though not many could link it to a particular aspect of the design specification in order to gain both marks e.g. choice of materials.  
(ii) Candidates needed to consider which “design for disassembly” strategy (Assessment statement 3.1.14) applied to the given context.
- c) (i) Most candidates achieved at least one mark for this question.  
(ii) This proved to be a surprisingly difficult question for the majority of candidates, not because the concepts of “fixed and variable costs” and “break-even point” were misunderstood, but links made to specific aspects of mobile phone production were often of a very tenuous nature. It would appear that many candidates are well versed with the assessment statements and associated teacher notes but are not so astute at applying the theoretical knowledge to a variety of contexts.

**Question 5**

- a) (i) Some candidates merely wrote about aesthetic considerations in general without making reference to a specific aspect of the OMK chair.  
(ii) Although this type of question features regularly in the examination papers many candidates still struggle to compose an answer which shows the balance between form and function. The mark scheme sets out a wide variety of responses.
- b) (i) This was relatively straightforward question for the majority of candidates.  
(ii) Most candidates focused on aesthetics or decoration as a benefit, although not many of the candidates went on to say that it made the design more distinctive or stand out.
- c) (i) Many candidates interpreted this question to mean how the structure of the chair was produced i.e. joined together rather than the tubular steel itself.  
(ii) As always with this type of question candidates needed to plan their answer very carefully so that three distinct points were made for each of the three aspects of consumer evaluation, otherwise, it was easy to produce a jumbled response with a great deal of repetition.

### Question 6

This question was not as popular as questions 4 and 5 probably because the context was not as interesting, but the candidates who chose to answer the question performed better than the average.

- a) (i) This question was not answered well by many candidates. There appears to be confusion in many candidates' minds about the meaning of "robust design" and the link to the development of a "product family".  
(ii) The majority of candidates could express the meaning of a product family, although many did not make specific reference to the manufacturer or manufacturing in their answer.
- b) (i) The majority of candidates found this question straightforward.  
(ii) Although the concept of "ductility" seemed to be understood by many candidates often answers were too vague to gain both the marks.
- c) (i) This was a relatively easy question for most candidates.  
(ii) Although it was clear that the principles of *green design* were well understood by many candidates, not all were able to select appropriate principles in relation to robust design.

### Recommendations for the teaching of future candidates

The key elements for success on Paper Two are the ability to deal effectively with the data-based question (question 1) in Section A and the ability to score highly on the nine mark question in Section B.

The data based question tests candidates ability to understand and select appropriate data as well as to apply it to concepts and principles taught in the course. The context for question one is not based on the syllabus so candidates should be given experience prior to sitting the examination in analysing data from unfamiliar contexts. There will always be more data provided than is needed to answer the questions so candidates should not be surprised by the amount of data but just calmly try to assimilate it all and then read the questions carefully to see which parts of the data they need to use. As all Diploma candidates undertake a course in Mathematics, it is assumed that they are familiar with basic mathematical calculations.

The three questions in Section B are designed to obtain wide syllabus coverage and, for question setters, the challenge is to ensure that the questions have parity in terms of degree of difficulty. Naturally, some questions will be more appealing to candidates depending on their preference for different topics in the syllabus and the perceived accessibility of the design context. Candidates should be encouraged to weigh up the pros and cons of each of the questions before deciding which one to answer.

## Standard level paper three

### Component grade boundaries

Grade:	1	2	3	4	5	6	7
Mark range:	0 - 2	3 - 5	6 - 7	8 - 12	13 - 16	17 - 21	22 - 30

### General comments

No G2 feedback forms were received for this paper.

As for the higher level paper, options E and C were the most popular followed by A, D and finally B.

Question	Comments	Mark allocation
1	As higher level question 1 - a data question based on core material.	6 (1, 2 and 3)
2	Syllabus coverage based on core material.	3 (1 and 2)
3	As higher level question 3 – a data question based on core material.	4 (2 and 2)
4	Syllabus coverage based on core material.	6 (3 and 3)
5	As higher level question 4 - an extended response question based on core material.	6
6	As higher level question 7 - an extended response question based on core material.	9

It was anticipated that through an appropriate design of the scheme of work that teachers would be able to explore core material through the options. Obviously different options lend themselves to different topics to a greater or lesser extent

### The strengths and weaknesses of the candidates in the treatment of individual questions

#### OPTION A

##### Question 1

This was a three-part data question worth a total of six marks and based on core material.

- This question proved surprisingly difficult for candidates many of whom were unable to state the technical term “aeration”.
- Most candidates made reference to “adding air” or “makes the dough rise” but few referred to fermentation or the fact that carbon dioxide is produced.

- c) Most candidates achieved one or two marks for explaining that gluten needed to be replaced with an alternative, but not many candidates structured their answer carefully enough to gain all three marks.

### **Question 2**

- a) Many candidates failed to gain the mark as the definition stated was too vague and just referred to the presence of water in food.
- b) Surprisingly, not many candidates were able to list two methods of food preservation which reduce the water activity of foods.

### **Question 3**

- a) This proved a difficult calculation for nearly all candidates but it was a straightforward question if the candidate had a good understanding of assessment statement A9.1.
- b) Most candidates were able to answer this question, although lack of clarity of communication was a barrier to gaining full marks for some candidates.

### **Question 4**

Very few candidates were able to tackle this question successfully suggesting that an understanding of the technology associated with food was not well assimilated in the minds of most candidates.

### **Question 5**

Although the majority of candidates clearly understood the terms “market pull” and “technology push” not many were able to differentiate their responses in sufficient detail to gain three marks for each aspect. Many answers were convoluted.

### **Question 6**

Although most candidates provided a great deal of information in answer to this question, not many gained more than five marks. Many candidates spent most of their time describing what is on food labels rather than explaining the “effectiveness” of the information in altering diet.

## **OPTION B – ELECTRONIC PRODUCT DESIGN**

There were no candidates for this option.

## **OPTION C – CAD/CAM**

### **Question 1**

- a) A straightforward question for the majority of candidates.
- b) This question was not answered well by the majority of candidates with few able to make reference to the tool cutting at right angles to the surface material.
- c) All candidates were able to gain marks for this question and those who astutely structured their explanation achieved maximum marks.

**Question 2**

- a) Not all candidates made reference to the X, Y and Z.
- b) Most candidates achieved at least one mark for this question with the more able candidates appreciating the type of response required to achieve both marks.

**Question 3**

- a) Many candidates were able to identify extrusion as the correct process but few made reference to the need to specify the height of the extrusion to produce the 3D Image.
- b) Many candidates found this question difficult with the majority of responses being too vague in order to gain both marks.

**Question 4**

This was a straightforward question for the majority of candidates.

**Question 5**

Most candidates had little difficulty in focusing on two ways in which CAD impacts on consumer choice for a kitchen design, but careful consideration needed to be given to communicating three distinct points in each aspect of the discussion in order to gain full marks.

**Question 6**

Although most candidates had little problem writing about rapid prototyping, not many set out their answer to discuss three separate benefits in sufficient detail to gain three marks for each one.

**OPTION D - TEXTILES****Question 1**

- a) This question provoked a mixed response from candidates, some of whom seemed confused by the term “mandatory”.
- b) Not many candidates focused their answer on **one** reason to gain two marks.
- c) All candidates appreciated the global market for textile products and the need for easy recognition of care instructions though only a few achieved full marks by making three distinct points in a suitable explanation.

**Question 2**

- a) This was a straightforward question for most candidates.
- b) Candidates struggled to make the connection between the importance of silk production and historical trade routes such as the “silk road”.

**Question 3**

- a) Not many candidates understood the concept of “biomimetrics” and so were not able to gain any marks.
- b) This question proved very accessible to nearly all candidates, many of whom were able to gain full marks.

**Question 4**

This question posed few problems for the majority of candidates.

**Question 5**

All candidates were able to attempt this question, although many answers focused on the use of CAM in the textile industry in general rather than the minimising waste issue.

**Question 6**

Most candidates were able to answer this question reasonably well. As always with a 9 mark question a combination of good subject knowledge and the careful execution of this knowledge based on an explanation of three distinct factors was the key to success

**OPTION E – HUMAN FACTORS DESIGN****Question 1**

- a) Many candidates merely repeated part of the description of the Apple iPod from the stem of the question rather than considering general characteristics of products which make them a global success.
- b) This proved to be quite a straightforward question for the majority of candidates
- c) Most candidates felt able to answer this question though not many referred to the difficulty for the designer to understand all users' requirements.

**Question 2**

- a) Surprisingly, not many candidates were able to provide a precise enough definition of *population stereotype* to gain the available mark.
- b) Although many candidates did not define *population stereotype* accurately enough for the mark in part (a), they clearly understood the concept and were able to relate it to the context of control of products.

**Question 3**

- a) The concept of “affordance” was well understood by the majority of candidates.
- b) Most candidates were able to achieve at least one mark for this question and those candidates who referred to “conflict or “confusion” in relation to the door with the “push” sign gained full marks.

**Question 4**

Not all candidates referred to data in their answer but listed body parts although many candidates found the question relatively easy.

**Question 5**

This question was not answered well by the majority of candidates who did not consider assessment statement E.5.8 in the Subject Guide in order to identify two ways in which human factor specialists determine adequate product safety.

**Question 6**

This was a surprisingly difficult question for many candidates even though it was clear that they knew about paper prototyping. Most candidates were able to gain a few marks for their basic understanding of the concept, but few candidates were able to develop three advantages in sufficient detail to score highly.

**Recommendations for the teaching of future candidates**

Now that candidates study only one option, the examination papers are able to go into more depth than previously. Thus, candidates need to be made aware of the theories and concepts underpinning the optional material and to be able to see how these theories and concepts impact on the real world and the design process through appropriate practical work. Ideally, the Design Project should relate to the option selected so that the project and the option are synergistic and build on each other to reinforce learning and do not lead to an exacerbation of workload issues which would be to the disadvantage of the candidate. Teachers should spend some time in helping candidates to understand how to structure their answers, especially for 6 mark and 9 mark questions. It is worth noting from the mark schemes that a mark is awarded for each distinct relevant correct point.