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General Certificate of Secondary Education

Design and Technology: Product Design

Report on the Examination

2006 examination – June series

- 3544 Full Course

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Full Course

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Design and Technology: Product Design

Foundation Tier

General Comments

The examination paper allowed candidates to demonstrate their knowledge in a range of material areas and candidates took advantage of this using examples from resistant materials, food and textiles. Resistant materials seemed the most popular area studied.

It was pleasing to note that, as last year, the vast majority of candidates attempted most questions on the paper. The communication skills shown by the candidates were sometimes disappointing and a lot of very poor graphics was seen. A significant number of candidates used only a pen to answer the paper which disadvantaged them when marks were awarded for communication. Too many scripts used no colour at all and centres are advised to remind candidates of the basic equipment they must bring to the examination as stated in the rubric. There is still a lack of technical vocabulary being used and far too many generic terms are used in the answers.

Question 1

(a) This question asked for a correct choice of material for the product and selection of recyclable or non-recyclable. Many candidates were unclear about the terms but did manage to select two products often by guesswork. A significant number of candidates answered all six products which was not penalised and this allowed them to score reasonable marks.

(b) (i) The vast majority of candidates correctly selected cotton and lycra as a composite material. Other popular correct answers were copper and zinc and copper and aluminium.

(ii) Where candidates had selected cotton and lycra they could usually name a clothing product and state that the lycra made the garment stretch. For the alloys, candidates were much less clear about products made from the alloy and what properties the alloy has. A significant number of answers incorrectly chose wood fibres and glass as a composite and then used window frames as their product choice.

Question 2

(a) Parts (i) and ii) were well answered in a lot of cases. Candidates often provided extended answers explaining how questionnaires, product analysis, design specifications and market research helped when designing.

(b) Many candidates could name a range of areas where ICT could be used in the design folder. Popular correct answers were use of graphs and charts, the use of the internet for research, computer graphics such as 2D Design Tools and ProDesktop and word processing of text.

Question 3

(a) (i) Generally well answered with reasons such as lightweight and top heavy the most frequent answer. Where candidates expanded their answers full marks were awarded.

(ii) Most candidates could give a special quality of a hot drinks container. The most popular correct answer was insulation.

(iii) Explanations of why the quality is important were often not developed. Responses which focused on protecting the user and keeping the drink warm scored full marks.

(iv) Many candidates correctly identified expanded polystyrene as a suitable material for a drinks cup.

(b) (i) A wide range of responses were seen with a variety of presentation techniques. Some candidates did not read the question carefully and so did not include all the details needed to access the marks. Most candidates could draw four suitably positioned holes to secure the drinks and the vast majority were circular. Some then sensibly dimensioned these holes between 70-80mm and credit was given for this. The quality of drawings varied a great deal. When the candidates had to show how the carrier could be made more rigid some detail of flaps, or locking tabs was needed. There were very few good answers which added to the drawing given. The majority of candidates did correctly identify a suitable position for the logo on the side or top of the carrier.

(ii) Some good logos were seen. Commercial considerations were expected and logos which used a wide range of colours or had little visual impact lost marks.

(c) (i) Candidates had some difficulties in naming a commercial printing process such as lithography. Some credit was given for a school based printing process such as laser printing but these responses were in the minority.

(ii) Candidates had some difficulties with this question. Very few had any knowledge of commercial cutting and creasing of packages using die cutting. Where the question was attempted, most candidates drew a net which could be cut out in school which could not access the higher marks.

Question 4

(a) On the whole well answered with some candidates scoring full marks.

(b) Many answers described changes in the cameras or mobile phones rather than providing a more general response focusing on technological push and market pull.

Question 5

(a) Few candidates could explain how they had used modelling in their work. Acceptable answers could have included physical or virtual modelling in any material area. The quality of sketching was poor with many candidates drawing very basic sketches with a few labels. Hardly any answers talked about 2D modelling using ProDesktop which could have scored highly. Common answers focused on making rather than modelling with candidates sketching a product they had prototyped. This could not access the top marks.

(b) There were a minority of candidates who could explain a sensible physical test which had measurable outcomes. Candidates commonly wrote about evaluation and carrying out a check against the specification or a questionnaire.

Question 6

(a) (i) Most candidates could select a suitable material and popular answers were acrylic and MDF. Some good food examples were also seen. Generic names such as fabric or wood were not acceptable. A minority of candidates misunderstood this question and thought it was about building a house and examples of brick and cement were seen.

(ii) Sensible reasons relating to production, cost or availability of the material were in the majority.

(b) Many candidates found it difficult to score highly on this question.

(i) The processes selected usually focused on one off manufacturing, such as sawing the shapes out, rather than the production of a batch of 50. The candidates who described a repeatable process, such as the use of moulds, jigs formers or CAD/ CAM, were in the minority. Where candidates had accessed CAD/CAM they responded well.

(ii) Most candidates could correctly name tools and equipment.

(iii) The quality of communication was very variable with a clearly laid out sequential process seen in only a minority of scripts.

(c) The majority of candidates simply drew three windows and a door on the house with no explanation of how the decoration would be applied to 50. Where candidates did have experience of CAD/CAM they could score high marks.

(d) The most common answer seen was the use of a template which scored 1 mark. Full responses which considered how QA is applied through the choice of process such as CAM were rarely seen.

(e) Generally well answered. The safety rules given were sometimes generic such as no running in the workshop or wear an apron which was not acceptable. Typical correct responses focused on the candidates' choice of process in part (b) and answers relating to the use of goggles, guards and tying hair back were frequently seen.

Question 7

(a) Many candidates used similar points to part (c) relating to flat packing rather than considering that the product may be manufactured using different materials or processes.

(b) Very varied responses with many candidates describing an assembly process from a product they had made. Common responses were dowelled joints or finger joints.

(c) Well answered by many. Common answers were that self assembly products would be easier to transport and cheaper for the manufacturer and consumer.

(d) Scripts that showed a clear drawing of a valid non permanent fixing such as screw threads, velcro, knock down fittings, nuts and bolts were in the minority. Most candidates did gain some marks but the quality of communication was poor.

Question 8

(a) Well answered with most candidates showing an understanding of basic packaging criteria to protect, inform, display, transport and contain.

(b) Well answered by many. The glass bottle was a popular choice with advantages of reuse and recycling and disadvantages of breakage if dropped.

(c) An understanding of the term biodegradable was shown by many candidates.

(d) Very few candidates knew all three symbols. Aluminium recycling was usually correctly answered.

(e) Most candidates could come up with some reasons for recycling such as environmentally friendly and preserves resources.

(f) Most candidates drew a recycling symbol without a number which gained one mark.

Question 9

(a) Well answered. Many candidates understood the term computer aided design.

(b) Many candidates came up with valid advantages such as accuracy and that changes can be made easily.

(c) Well answered. Many candidates understood the term computer aided manufacturing.

(d) Again valid reasons were often given such as reduced labour costs and accuracy.

Higher Tier

General Comments

A wide variety of skills related knowledge was displayed in the responses produced by the candidates. The paper did prove to be challenging to most candidates whilst extending high achievers with scores of a hundred plus. This was not at the expense of other candidates as most were able to access the paper and achieve good responses. Very few papers were unanswered or with blank questions.

It is evident that areas featured in recent year are well bedded in, the advice and content covered in teacher meeting is finding its way into candidates' responses. This demonstrates a move to a more complete product design approach rather than a single material experience. The relationship of CAD CAM to production methods is an example of this. Candidates also had a very good understanding of contemporary products displaying independent interpretation to questions.

Question 1

Students generally answered this question satisfactorily with some recognising that materials can have both positive and negative properties. A small minority of students confused properties with ingredients and lost marks accordingly. Student's knowledge of Composite materials was mixed with some having a good knowledge of materials but with others being too general.

Question 2

This question was answered well with the majority of candidates scoring high marks. CAD, CAM was the favourite answer here along with 'The Internet'. It was obvious that schools were using the common design packages (pro Desktop, 2D Design) but a lot of candidates failed to pick this up. There were a lot of generic answers.

Question 3

Generally straightforward to mark as many candidates did well in this section. The question provided for good discrimination between candidates. Some of the sketches were neat, clear and well annotated, receiving top marks whilst those who found annotation difficult were still able to score fairly high marks. The commercial production was an area of the specification which was either well covered or missed out entirely and candidates found it difficult to gain top marks.

Question 4

Candidates answered this question well displaying a good level of understanding of technology with which they are familiar. Some students lost marks by not listing recent improvements in television technology but talking about developments since they were invented.

Question 5

Most candidates picked up on the need to mass produce and were able to use suitable processes and accurate descriptions. This question enabled candidates to talk about their own experiences, which depended on the teaching and equipment available in the centre.
Part (c) was generally not well answered as many candidates positioned the windows and door but few could annotate with a detailed understanding.
In part (e) candidates confused risk assessment and quality assurance in many cases.

Question 6

This question was generally well answered although few candidates received full marks for part (b).

Quality control in coursework often resulted in candidates talking about the quality of the coursework in general terms.

Wear Testing was not answered well and candidates were able to write the same almost to achieve full marks in both 3D-Modelling and Computer Generated Modelling.

In part (c) there was confusion with the type of product that would be suitable for batch production as opposed to continuous production.

Question 7

This question was very well answered but there was some confusion over the symbols with some candidates reading between the lines as regards the identity of the symbols and coming up with the wrong explanation. Some students correctly identified the symbols but did not expand on their answer as to what they actually meant.

Question 8

This question was well answered with an understanding of the implication of using the Internet. It is clear from the candidate's responses that centres have covered CAD and CAM extensively. The knowledge displayed was well related to both prototyping and high volumes of production.

Coursework

General Comments

The continued increase in centres entering candidates for this course means that moderators have reported a wide range of standards and approaches.

The full range of materials has been used this year and many centres have adopted Product Design across the entire department. Outstanding work has been reported in all material areas from Textiles through to Electronics, Ceramics through to Food. Where moderators have reported under achievement this has often been related to work with paper/card products.

The majority of centres chose to develop functioning prototypes where all aspects of the product can be tested and evaluated. There are a growing number of centres who are developing non-functioning prototypes such as electronic devices. Where this approach is done well it often results in outstanding work. However, moderators are reporting that it is often resulting in poor quality outcomes which do not access the higher marks. Despite consistently advising against architectural modelling centres continue to offer this route to candidates. It is clear that the Coursework Adviser service offered to all centres by AQA is seriously under-used. New centres in particular should seek advice before allowing candidates to start their coursework project.

The 2005 Notes and Guidance Update had provided a great deal of advice on the suitability of coursework projects. The expectation for Product Design coursework is that the model or prototype produced should be:

- designed to meet a commercial need
- designed for commercial manufacture, in volume and not as a one-off

Designing for the candidate's own personal use without consideration for a wider commercial market is likely to restrict learning and access to the higher grades. Products are likely to involve some form of packaging, labelling or instructions. Although this is not a compulsory element as far as the assessment is concerned these areas are likely to feature in written papers. Combinations of materials are encouraged in the product or the manufacturing processes. Single material products are acceptable as far as the assessment criteria are concerned but ignore the distinct nature of this specification. It is important that candidates realise that they are designing a product which needs to be modelled or prototyped. They should not be designing a model or prototype. This distinction is vitally important as moderators often report that access to the assessment criteria is often restricted when candidates design a model. With regard to architectural modelling there are a number of specific issues which cause concern. The first one would be the appropriateness for a 40 hour project by a 16 year old. Candidates rarely take account of all of the building and planning regulations associated with architecture.

Where we see good examples of domestic products modelled it is easy to understand how these will be commercially manufactured and they can usually be fully evaluated in every aspect other than function. This is far more difficult to do when faced with large scale buildings.

When the coursework marking criteria was applied to the design folder there were several areas which caused concerns. The requirement to test and evaluate is made more difficult by taking this route. So is the requirement for knowledge about the techniques, manufacturing and working characteristics of materials when developing a design solution. Moderators rarely report seeing this evidence when architectural work is undertaken but did find it in other forms of product modelling. Finally, as far as the design criteria are concerned, industrial understanding was rarely addressed in such work. Whilst the general advice to centres is to concentrate on one major aspect of the prototype, such as how the

packaging would be manufactured, moderators would expect architectural projects to address issues such as how the window frames would be manufactured in quantity. Again, this was rarely addressed.

There were three areas of the making criteria which were often difficult to evidence at the higher levels with such work. The first concerns the range of materials, tools, and equipment including CAD/CAM. Most architectural models seen were simply butt jointed and assembled from small sections of materials using nothing more demanding than glue. In comparison with what was seen from other candidates, architectural models rarely meet this requirement at the highest levels. Accuracy and finish has also been an issue. Scale was by far the biggest problem for candidates who often used what was available rather than what was required for the correct scale model. Finishing was often no more demanding than painting with poster paint or pasting on brick effect paper. Rarely have moderators reported seeing the quality met by commercial model makers whereas this is far more common in other forms of model making entered for assessment. The final requirement raising concern is the one relating to the application of QA & QC consistently and successfully. Candidates who tackle projects such as board games can easily meet this requirement through using manufacturing aids such as casting moulds or CAD/CAM. Unless the building requires lots of identical parts this is much more difficult to evidence at the higher levels.

Moderators are concerned that this type of work often results in lots of effort on the part of the candidate but a poor match to the assessment criteria at the higher levels. As such, the potential for adjustments to centre marks is increased and they may feel that candidates have not been adequately rewarded for the amount of work done. Further guidance on this matter can be seen later in the report.

Some centres used a single project brief, some offered a small choice of projects and some a provided a totally open brief. Centres, which did give themes to candidates in the main, have got this approach well structured to the benefit of lower ability candidates. However, moderators have consistently reported that this approach has often prevented candidates accessing the higher grades and centres should be aware of this. By contrast some other centres had been too open-ended with candidates taking on tasks, which could never be completed in the 40 hours.

As with previous years, many centres had marked the design folders in accordance with the AQA standard. However, the assessment of the practical outcome was often over rewarded by more than a grade. It is important to stress that the expectation for this coursework is that around 13 hours are spent on the design folder and 27 on the manufacturing. Candidates who had an imbalance towards the design folder often did not access the higher grades.

There continues to be a misunderstanding in some centres that because Product Design requires a breadth of knowledge that this somehow means that the standard is lower. It is important to stress that this is not the case and a similar project should score a similar grade if entered for one of the focus material courses. Commercial viability is a key expectation for this course and candidates should develop a prototype to a point where the commercial viability can be tested. Candidates who tackle smaller scale products often achieve higher grades than those taking on complex projects because they can address all of the assessment criteria and produce a prototype which, with further development, could be manufactured and sold commercially.

The coursework assessment is undertaken in a holistic manner and the assessment criteria should be used as an indicator rather than a set of tick boxes. This is especially important with the making mark as there are only five sections. Centres might rely on experienced teachers to benchmark work they believe to be, for example, in the C grade band prior to looking at the specific assessment criteria and to use the criteria to refine the assessment to High Middle or Low. Each of the sections in the assessment criteria are not regarded as carrying equal importance, therefore centres who had devised spreadsheets or a form of aggregation were often less accurate with their judgments. Key criteria in the design folder would be ideas, development and analytical thinking rather than simply hoop-jumping. In the making criteria the

demand of the making, accuracy, finish and the commercial effectiveness are seen as the most influential areas when establishing a grade.

Designing Skills

The quality of work submitted was very high from a significant number of centres and many candidates had submitted a combination of formal presentation sheets and freehand sketches. Centres had generally made a very real effort to encourage candidates to produce a concise design folder of around 20 sheets. It is concerning to note that moderators reported a significant increase in the number of folders which contained in excess of 30 sheets this year. There is still a tendency for many centres to encourage candidates to include large amounts of copied material and this is regarded as a serious waste of candidate's time and has no value.

Some centres are not insisting on candidates sorting out and securely binding design folders prior to marking and this makes the process of assessing the relevant work harder for moderators. Moderators reported having to sort out Y10 projects from the coursework project as well as seeing teaching material, handouts, homework and even text books within folders. Some centres are encouraging the use of sketchbooks and/or notebooks as well as formal design sheets. This reflects good commercial practices and moderators reported that this often aided the assessment, particularly when teacher annotation was present. The use of plastic flip folders is becoming widespread and this often helps the moderator to assess the material more easily.

Many candidates made effective use of ICT to present a lot of their design investigations in a concise manner. Digital photography was extensively used by candidates as both a research tool and for recording the various stages of their work. Where photographs of work in progress were provided the moderators found it to be of enormous benefit in deciding whether to accept the centre's marking. Some design folders were presented entirely using ICT. It is therefore surprising to report that so few centres submitted electronic portfolios. Where electronic portfolios were seen they were generally easy to handle (PowerPoint submissions only) but did not exploit the potential to include video footage and/or sound which could have provided additional evidence in a manner more efficient than written reports. Centres wishing to consider such a strategy in the future should contact the subject officer as early as possible.

It is important to note how few centres had adopted a design methodology which reflected current industrial design practices. The development stage of the process is generally where the bulk of the work takes place. Commercially, the use of CAD, modelling and sampling are used to a great extent and there is also a considerable amount of testing and evaluation taking place. Many candidates are being encouraged to hoop-jump the assessment criteria in a linear manner. It is important to recognise that the development stage should represent the most influential part of the assessment process

Design brief

Candidates were generally more focused this year. Centres were far less often encouraging candidates to explore several potential design briefs then select the most appropriate one to continue with although this approach was reported more this year. Most candidates were able to provide a clear statement of intent which was often supported with mood boards, user profiles etc. It is important to remind centres that commercial designers use mood boards or image boards often as a background to talking to the client. It should not represent a random selection of catalogue pictures. The best were often supported by a short statement explaining the relevance of the material. Where this approach was taken, full credit was given within the analysis section of the assessment criteria. Initial design criteria was sometimes found at this stage of the folder and often provided a focus for relevant research and the generation of initial ideas.

Moderators reported that too many centres are still not working on a commercially viable product aimed at a target market. Successful product design relies on being able to manufacture products that people will purchase in sufficient quantities to keep the cost as low as possible. This concept does not appear to be widely understood.

Research

Moderators reported an increase in the amount of irrelevant research undertaken this year with many reporting over half of the folder dedicated to such activity. Copied material was seen in abundance and this source was often not acknowledged in the design folder or the Candidate Record Form.

Really good first hand research obviously drove the best projects with candidates using commercial products as a focus for their own designing. Some candidates had made excellent use of interviewing relevant experts such as parents, teachers etc.

Written questionnaires & graphs were found in a large percentage of folders and it is important to report that this research rarely provided useful data to influence the candidates. Few candidates really conducted this activity in a manner which would provide valid data and it is strongly recommended that this activity is discouraged in favour of more product analysis. Graphs were often used to fill pages but the analysis and relevance could often have been summarized more effectively in a single sentence.

Really good, detailed product analysis and disassembly research was being encouraged by a wider number of centres. A good range was seen in some folders but the understanding of the relevance of it to the task was variable from centre to centre. A lot of materials research and research on industrial methods of manufacture was either not necessary at the initial stages or irrelevant. Where is was specific to the product being developed and included alongside development sketches this material was often better used and clearly more relevant.

Letters to companies rarely provided useful material. Centres need to understand the actual cost of providing such catalogues and advice for the large numbers of candidates undertaking coursework projects. It is suggested that centres build up a product library of catalogues and brochures for candidates to access in preference to wasting time writing formal letters.

The inclusion of anthropometric data at the front of the folder was often of little use to candidates during the design stages. Including such data as part of the development was often far more useful and seen to be relevant.

Some of the better design folders had summarised research findings in preference to including large amounts of copied material. This had been made relevant to the design focus. Far too many candidates still had large collections of irrelevant research such as photocopied data on materials and jointing methods from textbooks, CD ROMs and the Internet.

As with last year, some centres were encouraging candidates to include photographs and plans of the exact location of their final product. This is a major concern, as clearly, these centres have not understood the nature of this Product Design specification. Candidates should be designing for a commercial need and for commercial manufacture rather than a one-off product for their own bedroom.

Analysis of task and research material

The inclusion of a simple list of tasks to be undertaken was an aid to many candidates. The better candidates often explaining why, how and when the task would be completed in an action plan. Some centres had devised pro-formas to aid candidates with this potentially difficult area.

Research material was often described rather than analysed. The simple question "How is this relevant to my work and what can I learn from this?" applied to all research material would have aided many candidates.

When done at the beginning of the project and kept in mind throughout, analysing the task and breaking it down into manageable stages has a significant influence on the project. A noteworthy number of centres seen are guiding students to do this although it is by no means universally done.

Specification

This section was greatly improved by many centres again this year. The better candidates looked at essential, desirable and possible attributes for the product and focused on consumer and manufacturer needs as well as social, moral and environmental issues.

The position that a specification is found in a design folder is a contentious one. Whilst the assessment criteria suggest that ideas must fit the specification, in practice, this can stifle creativity. Some centres had encouraged candidates to devise initial design criteria and developed a full specification at a later stage of the process, such as prior to development. This allowed candidates to clarify their thinking and demonstrate their creativity and was seen by moderators as a more effective design strategy. Many candidates still presented a design proposal at this stage, rather than design criteria, listing the materials construction etc. before designing had commenced. This was clearly restricting the generation of ideas.

It is pleasing to report that many centres had directed candidates to cover general areas such as:

- Target market
- Function
- Size
- Weight
- Durability
- Aesthetics
- Materials
- Safety
- Cost
- Green issues
- Manufacture
- Packaging

These were suggested in last year's report and were seen in many folders. However, this list is not exhaustive and is also not relevant to every product. Centres should use this as a guide only and should not expect criteria to match every area listed.

Some of the more able candidates produced more than one specification, including a manufacturing specification within the design proposal or as part of the evaluation. Again, full credit was given for this approach even though it is not a specific requirement but does reflect best practice.

Specifications, however written and presented do need to reflect the analysis previously undertaken. Moderators reported that many candidates at all levels were not making this connection obvious. Where candidates had summarised their research this link was often far easier to evidence.

Generation of ideas

Moderators were looking for quality rather than quantity. They reported seeing some really free flowing, creative thinking from a number of centres – nearly always done in the form of quick, freehand sketches. Ideas need to be feasible and varied to gain the higher marks. This was, again, the strongest part of many folders with both creativity and originality evident. However, numerous centres appeared to have directed candidates to produce four to six superficial ideas and had over-rewarded this achievement. Candidates were also being over-rewarded for ideas which had been copied from existing products. Whilst it is expected that many candidates will draw ideas that closely resemble existing products it is vital that this is clearly indicated in the design folder or in the candidate declaration when it has been the case. In several instances centres were over-rewarding work that was blatantly copied from other sources. Some candidates had stuck pictures of the source product onto the ideas sheet then continued with their own ideation. This was seen as an excellent strategy.

More able candidates had demonstrated a variety of approaches from freehand drawing, sketch modelling, word webs, test experiments etc. There were also some excellent design strategies used such as shape borrowing from other products, observations from nature, manipulation of geometry etc. to generate original design proposals.

One important issue for candidates is whether a third party can assess the feasibility of the ideas. Whilst the more able candidates had often thoroughly annotated the ideas, too often superficial single-view sketches were submitted with no indication of the materials and constructions that would be used. Neat drawings were more commonly seen rather than creative and efficient designing and many centres need to

examine this. Whilst the complexity of the product will greatly affect the expectation for this part of the assessment, candidates who only suggested three or four very detailed ideas often gained the highest grades. Critical design thinking was highly rewarded.

Higher-level candidates summarised and evaluated their ideas giving clear information on why one or more might be further developed. Often more than one idea had been substantially developed and both the generation and development was one continual section within the folder. Once again, this is closer to commercial practice than the artificial divisions more often seen.

It is significant to report that moderators often could not see where centres had credited ideas and often felt that this section was over-rewarded. Many commented that they believed the centres had been more influenced by the presentation of the ideas rather than by the design thinking behind each idea. Whereas centres do have the opportunity to discuss drawings which may appear superficial with the candidates moderators do not. They rely on candidate annotation, or in the absence of that teacher annotation to support such judgements.

Development of a solution

This is regarded as the most important part of the design folder and a broad range of work was seen. Once again, far too few candidates are undertaking any real development of their ideas and simply redrawing one of their initial ideas as a design proposal. It is expected that alternatives are considered and design details explored in some depth. Some of the best examples were found in textile products where samples of stitch details, fastenings and decorative details were often explored through samples as well as trial mock-ups or toiles in cheaper fabrics. Card and block models were well used by some centres but this was in a minority of cases. The significance of modelling and testing at this stage cannot be over emphasised and reflects best practices in Higher Education and commercial design. Pro DESKTOP was used for virtual modelling by an increasing number of centres. In some cases this was a very superficial exploration of form whereas in the best examples sophisticated concepts were explored in detail. In a minority of cases it was used with additional modelling and sketching to refine design details and explore a range of alternatives.

Moderators reported that many candidates simply moved from ideas into a making plan. Many candidates did not provide anywhere near enough detail for third party manufacture to be attempted.

Testing is seen as an important part of the development section and, where relevant, should be encouraged and evidenced. This is by far the most appropriate time for candidates to undertake additional research into materials and constructions. A short investigation of relevant stock sizes and standard components was a useful addition for some candidates and full credit was given within the development section.

If sufficient development had taken place within the ideas section then credit was given. Sometimes additional evidence was also found in the evaluation report. As with the ideas section, moderators often felt that candidates had been over-rewarded for development.

Planning of making

Flow charts were often used and this relates to industrial practices. More able candidates were able to indicate the quality assurance/quality control checks that would take place at various points and the action that would be taken. Pro formas were put to good use by some centres. The use of patterns, templates and manufacturing aids were often missing completely from folders even though they formed an important part of the planning for many candidates. It is worth reminding centres that the expectation at the higher grades is for a third party to be able to manufacture the same prototype from the information supplied by the candidate and this was often not possible. The inclusion of formal working drawings was very rare even when it would have been essential to the planning stage. Cutting lists for materials was a surprising omission from many design folders where the assembly of a variety of components was a significant issue and few indicated the additional components that might need to be purchased, such as jewellery findings, zips, hinges etc.

Many candidates appear to have been simply supplied with materials or the construction predetermined through the project set by the centre, and this gave little opportunity to gain marks.

The use of diaries, supported by photographs, to record the stages of the making was seen in a larger number of centres this year and moderators commented how useful this had been in supporting marks for the development and the making as well as the planning section. Full credit was given to planning as long as there was sufficient evidence to support the judgment that planning had taken place. Where moulds, formers, jigs, manufacturing aids, CAD/CAM, patterns etc. had been used, some credit for planning was given even if there was no relevant written plan in the design folder.

Some of the more able candidates presented design proposals in sufficient detail that a separate planning document was not required. Again, credit was given when it was obvious that some planning had taken place.

A small minority of centres had encouraged the use of diagrams to explain basic making processes such as using a try square or applying spray paint. It cannot be stressed enough that this is not what is required. Centres are encouraged to look at how industrial planning takes place and the use of simple pro formas and notes will often result in a more efficient use of candidates' time.

The use of a photo library of school equipment was used well by some centres to illustrate the processes used although moderators reported concerns when this was not specific to the candidates' own work. The use of clip art to illustrate planning was rarely used to good effect and moderators questioned the value of such approaches.

Some good examples were seen where industrial planning sat alongside planning on how to make the prototype and comparative flowcharts were the most common method of communicating this.

Evaluation, testing and modification

This was once again a weak area for many candidates. Evaluation evidence should be found throughout the design folder in ongoing annotation. Some candidates drew attention to this by highlighting their evaluation comments wherever it appeared in the folder. This was often helpful to moderators.

Many candidates offered only a superficial final report of just a few sentences. Centres often appeared to be encouraging a detailed evaluation of the process when it is the evaluation of the product, which is the most important. Moderators do value the information contained in an evaluation of the process as candidates do include information that is not clear elsewhere, however, if the on-going annotation is clear throughout the folder then this approach is unnecessary. Generally, not enough time had been allowed for this part of the design component.

By contrast, it was clear that some centres had provided a great deal of guidance and support for this work. Pro formas were occasionally used to good effect with checklists linked to the specification criteria found in the better examples. The use of real consumer trials was found in some folders with independent feedback provided by potential users. This is to be encouraged. Superficial comments from friends often produced worthless data but some surveys provided valid results, which were then commented on by the candidate. Moderators expressed some concerns over the limited number of candidates who detailed the modifications that would be needed to the prototype in order to commercially manufacture the product. This is a key expectation for this specification and centres need to plan for this.

In a minority of centres, detailed midpoint evaluations had taken place prior to finalising every detail of the product. For example, children's furniture had been tested prior to painting to ensure that sizes were correct. This approach is to be encouraged where appropriate.

A small number of centres structured the evaluations to include the products that were collected and analysed in the research section and made comparisons with their candidate's own design solutions. In the best examples, candidates were noting costs, marketability, improved features etc.

Use of communication, graphical and ICT skills

There is still a tendency for some centres to encourage use of over-elaborate titles and borders and to over-reward this section. However, this continues to be a reduction on previous years. There were numerous candidates who demonstrated a range of very high quality communication skills. Whilst the 40-hour requirement for the coursework does impose some challenges for centres, there is an expectation that candidates will demonstrate good communication skills at various points in their folders. Centres have generally discouraged time-wasting activities such as colouring the background of design sheets and using coloured mounts in favour of generally clear communication.

The most notable inclusion this year has been the use of Pro DESKTOP which was used very well by many centres. In general, whether they were informal folders or immaculately produced using ICT & A3 colour printers, the actual content of the communication has been better this year.

Higher-level skills should be found in some sections of the folder but it is not expected that every sheet is presented as a pristine end product. The folder should clearly and concisely demonstrate effective and efficient design skills.
Some very good "rough work" was seen in the ideas and development sections and it was pleasing to note how many centres had responded to the advice of not re-presenting such work. Many candidates were able to sketch fluently and efficiently, using notes to clarify their thinking.

A wide variety of presentational drawings and working drawings were seen. Fashion drawings combined with patterns, engineering drawings, marker rendered 3D views and ProDESKTOP virtual modelling was seen in the folders of many of the better candidates. DTP was evident both for the presentation of the design folder pages as well as for the creation of related graphical components such as packaging, labelling and leaflets. It is pleasing to report that modelling was more apparent again this year.

Many candidates used CAD effectively, prior to the use of CAM. Many centres still reported inadequate access to ICT facilities although it was obvious that many other centres had made a significant investment. It was clear that where effective use of ICT was used that this did have a positive effect on the motivation of candidates. Photographic evidence was often abundant in the better design folders and moderators commented how useful this had been, especially in determining whether a visit was required.

In the few electronic portfolios seen and some of the entirely ICT printed paper portfolios the scanned sketches lost something in the transfer to digital format and achieving the correct balance will be an issue for the future.

One problem that was reported by several moderators concerned the work of candidates using food as a material area and supplying evidence of the practical work using photographs from other sources. This is clearly not appropriate as there may be some misunderstanding about what has actually been manufactured by the candidate.

Social issues, industrial practices and systems and controls

Moderators, once again, reported that the majority of centres had not addressed this aspect of the coursework despite this being a significant expectation of this specification. Many candidates had approached this as a bolt-on at the end of the folder. Copied material on general issues related to the various scales of production was the most common evidence seen. It was also common to see material on injection moulding and similar processes even when these were irrelevant to the product.
Many centres still appeared to be providing handouts for candidates to put into their own words as every candidate had near identical evidence. Few candidates demonstrated any real understanding of how their prototype might be commercially manufactured and the cost implications of tooling. Ill considered comments such as “My product will be batch produced using injection moulding in several hundred” simply highlighted the lack of understanding about tooling costs and the scale of commercial manufacturing.

Even fewer candidates had taken into account the impact their design might have on society, for example, through over-packaging. These are major areas for centres to address both to meet the coursework criteria as well as adequately preparing candidates for the written paper. It is not expected that this evidence be found in a single isolated sheet titled “Social issues, industrial practices and systems and controls”

Where centres had thoroughly addressed this aspect, candidates provided a good understanding throughout their work. References were made to commercial production in the specification and throughout the designing. Ongoing evaluation comments included both the social and industrial issues.

The issue of whether candidates are modelling a design or designing a model is an important distinction. Many centres, once again, appeared to have encouraged candidates to design a model or prototype and ignore the final product. The complexity of some projects made this aspect of the work extremely difficult and especially so when candidates had tackled large-scale architectural problems.

It is not expected that candidates will fully understand all aspects of commercial production at this level. Some centres had directed candidates to consider one aspect, such as the packaging, and to deal with this

in some detail. This is regarded as good practice and should also help with preparation for the written paper.

Where candidates had made manufacturing aids such as jigs and formers some credit was also given to industrial understanding. The use of CAD alone was not seen to evidence this well and centres should refer to the specific assessment criteria not just the bracketed reference in the Candidate Record Form.

Making skills

A very wide range of work was seen from very professional and well finished artefacts which would not be out of place at A level standard, to very simplistic models. Whilst the majority of centres had produced work using resistant materials and paper/card, all materials listed in the specification were seen, with textile products greatly increased. Fewer centres offered food products or ceramics. A small number included control components.

The overall standard of making was disappointing in a significant number of centres and many moderators felt that standards seen were lower than previous years. A considerable number of centres had fully embraced the multi-material approach and this was a pleasing development. However, many new centres or centres who had not received a moderator visit the previous year were often severely limiting the candidates (sometimes because of resource implications) to a very narrow band of materials and manufacturing processes. There were many examples of materials and construction methods being so prescribed by the centres that it was difficult to separate candidates at the moderation stage.

It is important to point out the expectation for around 27 hours manufacturing (or one third of the 40 hours available) and the comparability with other specifications within the D&T suite. Some centres had misunderstood the requirements for this specification believing that it was less rigorous than the others. This caused particular difficulties where centres had encouraged, for example, computer printing as the main manufacturing method or entirely CAM outcomes which might have been routered in Styrofoam or laser cut in acrylic in a matter of minutes. The use of CAM is greatly encouraged but centres do need to be aware of the need to demonstrate a range of making skills. Outcomes such as a range of business stationery do not meet the requirements for this course.

Where centres had encouraged a range of related outcomes, such as merchandise for a charity promotion it is important that the evidence is not simply a collection of KS3 projects but does reflect some rigour appropriate to GCSE level.

One pleasing development this year was the number of candidates who produced full scale product models which closely resembled the commercial product. This approach closely follows commercial practices for product designers.

Correction of working errors

There was often little evidence in the folder or through test pieces seen at the time of the visit to support this criteria and the moderation process often relied on teacher annotation. More able candidates had undertaken some testing as an integral part of the development before commencing the final product and had clear evidence of modifications. This is probably the most effective way of addressing this aspect of the criteria. If the candidate fails to record this work in the folder it is essential that it is retained and shown when the moderator visits. Where candidates had made no obvious errors in the manufacture of their prototype or model but had described changes needed for commercial production full credit was given even though it is not strictly making criteria but knowledge of making.

It was a common strategy for candidates to prototype their product in less expensive modelling materials such as MDF or Styrofoam. It is important that candidates can explain the modifications needed when a more appropriate material would be used. Modifications due to poor crafts skills rather than as a result of testing and development did not receive high credit for this section of the assessment.

Use of appropriate equipment and processes (including the use of CAM)

Once again, moderators often needed assistance from teacher annotation to make a judgment in this area, as many candidates did not provide details of the equipment or processes used. It is an expectation that centres will give considerable guidance to individual candidates on the appropriate use of equipment and processes taking into account skill levels and the required standards.

Moderators commented that it was often difficult to know how much assistance was received from the technician, especially where CAM is being exploited. Candidates do need to record all aspects of this work and centres need to be clear that making grades can only be awarded to the candidates' own making. Whilst many candidates require considerable assistance centres do need to be vigilant about monitoring this work and recording assistance on the Candidate Record Form.

Moderators, again, reported that candidates were often using unsuitable construction techniques although there has been a general improvement year on year. A disappointing number of candidates used construction techniques that were unsuitable both for prototyping and commercial production. Knock-down fittings and the use of biscuit-jointing continues to grow in popularity where furniture projects had been undertaken. Timber materials were still being cut out by a teacher/technician and the candidate simply finishing and assembling the parts. Some of the larger scale projects do restrict access to the higher grades mainly because of the amount of work done by staff. Centres who adopt this strategy do need to review the type of work undertaken.

More able candidates produced some very high level work which would compete well at Advanced Level. Where CAM was available this undoubtedly had a positive impact on the work seen in the majority of centres. In a small minority of centres the use of CAM was inappropriate and did not enhance the work.

Some centres have begun to exploit rapid prototyping systems to produce candidate outcomes. Laser-cutting had also increased dramatically this year. Whilst these do represent good commercial practices moderators often commented that the CAM had not been exploited to make the best use of the time available for manufacturing. It was difficult to compare a product manufactured at the touch of a button with one manufactured through the application of traditional craft skills. This specification does encourage and embrace the use of this type of technology but centres do need to be aware of both the benefits and the pitfalls. As a general guide, centres should ask themselves whether the work represents 27 hours worth of rigorous work for a 16 year old and demonstrates a range of skills. If the answer to ether question is no then they need to examine what the benefits might be in terms of freeing up time to undertake other work, such as packaging, exploiting the nature of quick and accurate manufacturing by

producing a variety of outcomes or by comparing with other manufacturing methods. The latter is where developmental modelling can play a major part in supporting the grade.

Moderators are aware of the development time needed to draw some of the products or components prior to outputting to CAM and try to be as flexible as possible in allocating some of this work to the making criteria as an alternative to, for example, marking out materials. However, the assessment criteria must be applied consistently across a whole range of approaches. Centres that have any doubt regarding this type of work should contact their Coursework Adviser.

Centres continued to use computer printouts of one form or another and claimed this as appropriate CAM. Whilst this is undoubtedly the case with many graphical products, moderators were looking for this used with die cutting tools or other aids to access the higher marks. Some centres used this as part of a transfer printing system, for example on T shirts and similar commercially made products. This printing method and the use of sublimation printing can produce near commercial standards, however, unless there is a substantial range of manufacturing undertaken candidates are unlikely to achieve C grade or above.

Some centres are still totally reliant entirely on hand production techniques and the feature of traditional skills is still valued. In the better centres, the use of jigs and similar manufacturing aids gave candidates a good understanding of batch production systems even if they did not have access to CAM.

Moderators did report that with the growing interest in the use of electronics within products that they do need to be able to access any circuitry for which the centre is claiming manufacturing marks.

Production and effectiveness of outcome

Once again, higher-level candidates produced very effective products with commercial viability and this was particularly the case with many of the textile products. Some high-level craft skills were evident in all material areas.

The criteria for this section of the assessment continue to be commonly misinterpreted by centres. It is crucial that the level of demand is taken into account when making judgments. A key fob might well be complete and of very high quality but is unlikely to be worth an A grade because of the level of demand. T shirt printing, simple graphical products such as CD covers or stationery, vinyl cutting applied to commercial products all fit into this category.

Electronic or mechanical products are expected to function to access the higher grades. It is essential, for example, to have a suitable power source to test electronic products. It should also be clear how the product functions and moderators commented that this was not always the case with this type of product. Lamps without the necessary fittings are another example of where higher level awards are restricted. It is worth mentioning at this point that any device which uses mains electricity should have been checked by a competent person and the necessary PAT label attached. The use of pre-wired 12 volt lamp units which come with a mains adaptor plug are highly recommended for candidates wishing to design lighting.

This is one of the more influential sections of the making assessment and one where moderators often disagreed with the centre's mark. Using holistic marking moderators tend to start with this evidence to establish the making grade before refining the grade using the remaining criteria.

Level of accuracy and finish

Generally, this has continued a year on year improvement as fewer candidates undertook inappropriate projects given the time limitations and resource implications found in many centres. However, moderators continued to report that a surprising number of products were left unfinished by choice. This was particularly the case with Styrofoam models left unpainted and/or lacking the graphical details which form such an important part of the product styling.

Where candidates had access to CAM it was often easier to access the higher marks although this was not always the case. Spray painted models of the highest quality were seen when candidates had been modelling injection-moulded products. The use of vinyl cut lettering often provided additional detail to closely resemble the commercial product.

Timber products continue to be the least well finished and it is often the nature of the material combined with the time needed to seal and finish a porous fibrous material which had not been allowed for in the planning. In the best examples the products were of a saleable quality.

Textiles products were often finished to a commercial standard and displayed high levels of accuracy. The use of care labels and swing labels often replicated the product as it would be sold.

Moderators reported seeing some excellent examples of prototypes that were often packaged or labelled and appeared to be very similar to commercial examples. In these instances, candidates had generally undertaken more appropriate projects.

Board games were one example where moderators commented on the wide range of standards seen from crude to commercial. In the best examples they exploited the ability to manufacture in quantity and create a product complete with instructions and packaging. Where CAM was readily available some candidates had produced two variants of the product, one assembled and one packaged in self assembly form. This was particularly appropriate with some of the less demanding constructional products.

Use of Quality Assurance (QA) and Quality Control (QC)

Many candidates continue to provide no evidence of this either through the design folder or the manufactured product and moderators needed to rely on teacher annotation. Candidates who had utilised CAD/CAM, produced moulds, formers, templates or jigs were much more likely to gain credit for this criteria. Some centres had encouraged a theoretical approach to this with candidates writing an extensive section on QA/QC in very general terms, which gained little credit. Again, it is important to emphasise that this is part of the making assessment and is not regarded as a section within the design folder.

Some centres had simply asked candidates to list the quality assurance and quality control measures they would take throughout their work. This was often no more complicated than tacking parts together prior to machine stitching, checking angles in a construction using a try square etc. Moderators were looking for an application of QA/QC in the candidate's making rather than a design folder exercise and sought evidence in many areas, e.g. planning, evaluations etc.

Once again, it was pleasing to see how many centres had encouraged some degree of volume production. In some cases this was simply the production of identical components for a lamp or storage rack. Some centres had encouraged multiple production, with board games being a good example of a project that requires this. At least one centre had designed and manufactured slip moulds so that a set of ceramic products could be manufactured. As well as replicating industrial production it was easy to address the QA/QC criteria. CAD/CAM, pewter casting, injection moulding, die-stamping, vacuum forming, printing and embossing were some of the processes which allowed QA/QC procedures to be fully utilised.

Quality of written communication

It appeared that many centres had responded to advice regarding the importance of this assessment which can provide a mark to the value of almost a full grade on top of the matrix mark.

Where centres had encouraged extended writing, for instance, as part of the analysis or as a formal evaluation report, moderators reported the ease at which candidates could gain a valuable number of additional marks. Word processed reports were found in many of the best examples.

Basic technological vocabulary was still a major omission for many candidates and this is surprising considering the emphasis on literacy across the curriculum in recent years. It was obvious where this had been taught and monitored by the centre. The misspelling of subject specific words often prevented access to the higher marks.

The advice given at teachers' meetings was that the over use of pro formas sometimes prevented candidates gaining the higher marks as they were encouraged to use simple bullet points or notes rather than complete sentences. It is pleasing to report how few examples there were of this strategy this year.
A structured approach to extended writing had been adopted by many centres this year. Moderators also reported that the majority of centres had applied the assessment criteria for QWC fairly and consistently although a considerable minority did not appear to have linked it to the assessment criteria at all and picked a number based on quantity rather than quality.

Architectural modelling

Although there are often problems with this work, a slightly different approach will result in a better match to the criteria. The first suggestion is to ensure that the buildings are indeed products that can be made in quantity and are perhaps better matched to the age of the students concerned. Holiday chalets, caravans, bus shelters, play structures would all fit into this category.

Another approach suitable for larger scale buildings would be to consider the product as a kit for railway modellers, a set of collectable buildings moulded in Plaster of Paris for painting at home, sales models for new housing developments manufactured in pack flat form or a wall relief for a shopping centre based on local buildings. Products in this category might include packaging and instructions.

A third approach for utilising the architectural modelling skills in a product design way would be to produce modular/transportable designs. Examples such as set designs which can be dismantled and packed in a lorry to transport to the next theatre, kiosks for selling band merchandise at a concert, exhibition stands, and survival shelters for disaster areas would be typical of this group.

Whilst the list above is not definitive it does indicate the expectation of a Product Design course. It is also worth mentioning the need for preparing candidates for the written paper. Whilst the awarding body does not attempt to suggest a single method of specification delivery, many centres do try to match up coursework projects to the requirements of the paper. Packaging, labelling or instructions are likely to be addressed in the written paper due to the compulsory material being paper and card. Many centres insist on the products being packaged as a means of tying this together. Many centres also encourage multi-material products as this can give the candidates an advantage in the written paper. Whilst it must be stressed that this approach is not mandatory it has been the advice given consistently at all of the teacher meetings.

Moderator visits

Moderators continued to report that they were made welcome by centres that were, in the main, eager for any feedback they could give. Moderators have been asked not to provide verbal feedback to centre staff as this can occasionally be misconstrued and lead to difficulties later on. It is not the function of the moderator to provide staff training and centres that feel that they need support over and above that offered by their coursework adviser should note the new full day fee-paying workshops which are now available from AQA.

Centres had usually gone to some length to provide a suitable location and the work was laid out well for moderators. There were far less cases reported that inappropriate rooms had been used this year. The length of the moderator visit can vary enormously with two/three hours being common. Centres do need to be aware that the room may be out of action for a large proportion of the day. In a very small minority of cases a second visit by a senior moderator may be necessary to ensure the AQA standard is maintained.

Whilst the letter to centres required the sample to be laid out in total mark rank order some moderators commented that it was easier if the rank order for just the making component was used. This would certainly have been helpful when work was from different teaching groups, as internal standardisation continues to be an issue in some centres and is addressed in more detail later in the report.

Some centres had included all of the development work, models, test pieces etc. and this was found to be very helpful for moderators who could re-check, for example, the development mark. Where centres had disposed of such material the assessment often relied entirely on the candidate to record such details in their folder. As previously mentioned, this is very often a crucial part of both the designing and making process and work at this stage can often be credited in more than one area of the assessment.

It continues to be disconcerting to note how many centres need to substitute work that has gone missing or had been badly damaged. Whilst storage is a major problem for many centres, it is vital that work submitted for assessment is available to the moderator. It is also important to note that the moderator may need access to additional work during the visit and appropriate staff support would be needed if that is the case.

In the better-organised centres the work of every candidate was clearly labelled and stored for easy retrieval. This was often easier if the physical size of projects had been restricted.

Internal standardisation

Internal standardisation continues to be a major issue and there is a requirement that where a number of teachers have been involved in the assessment that rigorous assessment has taken place. This is a time-consuming exercise, especially in large centres, but the moderation process involves sampling a maximum of 20 projects and the moderator will chose the sample based upon a spread of marks. The impact of a single teacher marking at a different standard can have a dramatic effect upon any adjustments to the centre marks.

It is a requirement that where more than one teacher is involved in the assessment of work that internal standardisation is carried out. This needs to be consistent and centres must ensure that all material areas and all teachers are involved. Sampling work in isolation is not regarded as an effective method of undertaking standardisation. This specification has attracted some very large centres where it would be impractical to assemble all of the work in rank order within a single room. If that is the case, it is recommended that a range of work is marked and agreed by all teachers involved and that this becomes the standard to check against.

Administration

Moderators expressed concerns about the number of centres who did not forward all of the coursework folders if the entry is under 20 by the May 5th deadline. Likewise, there were often severe delays in receiving the sample once selected. It is often very difficult for moderators to arrange to leave their own classes to visit centres and any delays in this process can create real difficulties.

Moderators reported that matrix errors were commonly found within the samples and again, this can affect a lot of candidates if unchecked. It is strongly recommended that the checking and recording of the matrix mark is a two person operation to avoid mistakes. Where adjustments have been made as a result of internal standardisation it is essential that these alterations are clearly recorded on the candidate record form to avoid any later confusion.

A significant number of centres show differences between the marks recorded on the Candidate Record Form and the centre mark sheet.

It is an essential requirement that all candidates sign the Candidate Record Form and this is countersigned by the supervising teacher. By so doing the candidate is recording all assistance and all sources of information which is not clearly shown in the design folder. The teacher signs to agree that this is the case and to detail any specific help provided.

An individual mark is required against all of the criteria and an overall grade for the designing and making recorded with the QWC mark. A small number of centres failed to complete the form adequately. Teacher annotation is only required where evidence is not clear. For example, food products require extensive annotation because of the nature of the material. Such annotation is greatly appreciated by the moderator who is trying to agree the centre marks based on the evidence submitted.

Whilst the report outlines a great deal of minor problems encountered by moderators centres do need to be congratulated on the way they have embraced this new specification and established it as a viable alternative to focus material courses.

Mark Range and Award of Grades

Full Course

Foundation tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	125	140	71.9	19.9
Coursework	95	210	109.8	38.9
Foundation tier overall 3544/F	--	350	181.5	50.1

		Max. mark	C	D	E	F	G
Paper boundary mark	raw	125	78	66	55	44	33
	scaled	140	87	74	62	49	37
Coursework boundary mark	raw	95	60	47	35	23	11
	scaled	210	133	104	77	51	24
Foundation tier scaled boundary mark		350	213	175	137	100	63

Higher tier

Component	Maximum Mark (Raw)	Maximum Mark (Scaled)	Mean Mark (Scaled)	Standard Deviation (Scaled)
Paper	125	140	84.9	16.6
Coursework	95	210	164.0	31.6
Higher tier overall 3544/H	--	350	249.0	41.2

		Max. mark	A*	A	B	C	D	allowed E
Paper boundary mark	raw	125	93	85	77	70	55	-
	scaled	140	104	95	86	78	62	-
Coursework boundary mark	raw	95	95	83	71	60	47	-
	scaled	210	210	183	157	133	104	-
Higher tier scaled boundary mark		350	309	273	242	211	165	142

Provisional statistics for the award

Foundation tier (8726 candidates)

	C	D	E	F	G
Cumulative %	28.2	57.0	77.6	89.8	96.3

Higher tier (10670 candidates)

	A*	A	B	C	D	allowed E
Cumulative %	6.1	30.2	58.6	83.1	96.9	98.5

Overall (19396 candidates)

	A*	A	B	C	D	E	F	G
Cumulative %	3.3	16.6	32.2	58.4	79.0	89.1	94.6	97.5

Definitions

Boundary Mark: the minimum (scaled) mark required by a candidate to qualify for a given grade. Although component grade boundaries are provided, these are advisory. Candidates' final grades depend only on their total marks for the subject.

Mean Mark: is the sum of all candidates' marks divided by the number of candidates. In order to compare mean marks for different components, the mean mark (scaled) should be expressed as a percentage of the maximum mark (scaled).

Standard Deviation: a measure of the spread of candidates' marks. In most components, approximately two-thirds of all candidates lie in a range of plus or minus one standard deviation from the mean, and approximately 95% of all candidates lie in a range of plus or minus two standard deviations from the mean. In order to compare the standard deviations for different components, the standard deviation (scaled) should be expressed as a percentage of the maximum mark (scaled).