CONTENTS

FOREWORD

This booklet contains reports written by Examiners on the work of candidates in certain papers. **Its contents are primarily for the information of the subject teachers concerned**.

DESIGN AND TECHNOLOGY

GCE Advanced Level and GCE Advanced Subsidiary Level

Paper 9705/01

Written

General comments

The performance of candidates was very mixed and ranged from poor to the very good. It was evident that in some cases candidates had only limited knowledge and understanding of the subject matter that they had chosen to answer. This was particularly true with some production processes and manufacturing techniques.

The questions on the examination paper require candidates to respond in a variety of different ways, for example, using one word answers, detailed explanations and annotated drawings. It is important that whichever method is used candidates try to make their answers as clear as possible and relate their responses to the number of marks available. Candidates would be well advised to look carefully at the number of marks available and structure their answers in such a way that the content reflects that mark.

Some candidates are spending too much time on questions which carry a low mark while others are producing superficial responses to questions which have higher marks. Answers must be focused in a way that responds fully to the question being asked.

In ***Section B*** a good number of candidates are using too much continuous text in their answers to the questions. In a few cases candidates did not produce any sketches at all.

Instructions on the front of the examination paper draw attention to the statement 'discuss' within a question. While in some cases discussion was well presented in ***Section C*** with clear supporting arguments made, in a good number of cases there was evidence to suggest that candidates had not taken sufficient notice of this instruction.

A few candidates failed to answer the required number of questions. A higher number missed out parts of questions.

Comments on specific questions

Question 1

In part **(a)** a good number of candidates failed to identify the anthropometric data which would be important for the safe and comfortable use of the picnic table. Many suggested very general sizes such as 'the height of a person' or 'the length of their legs'. Appropriate data needed to relate to aspects such as distance from foot to knee, distance from knee to hip or the height of a wheelchair from the ground to the top of the arm rest.

In part **(b)** most candidates correctly stated at least one of the required three features of the picnic table that would have been designed based on the data identified in **(a)**. Appropriate features included the height of the seat, the depth of the seat and the height of the table.

Question 2

Part **(a)** of the question was well answered by the majority of candidates. The inappropriate ways in which tools, materials and equipment had been positioned were generally correctly identified and the potential dangers well explained.

In part **(b)** many candidates failed to state safety rules which related specifically to using workshop machines. They incorrectly gave rules related to the dangers shown in Fig. 2. Appropriate rules were those that related to correct behaviour and dress code such as wearing eye protection, tucking in ties, making sure machines are switched off when not in use.

Question 3

In part **(a)** a fair number of candidates correctly identified lamination as the production method shown in Fig. 3.

Many candidates gained at least some of the three marks available in part **(b)**. They were able to offer at least some degree of explanation about how several layers of thin wood could be deformed easier than one thick piece of the same material to provide a mechanically strong curved shape.

In part **(c)** most candidates were able to show at least some understanding of a former and offer some explanation about how it could be used in the production of one of the legs for the stool.

Question 4

In a limited number of cases candidates answering part **(a)** of this question produced an alternative design for a CD storage rack rather than suggesting a change that could be made to the given design. Many candidates correctly identified that the slots in the tube needed to be deeper and went on to explain that this change would result in the CDs being held more securely. A number of very good drawings were produced. Some candidates used several drawings to explain their suggested change. While they were not penalised for doing this the question stated 'Use a drawing to ……..'. While in their answers to part **(b)(i)** most candidates showed that they understood that the rack was unstable many just mentioned the small size of the base rather than going on to explain that the poor stability was caused by the fact that all the weight would be on one side of the rack when it was fully loaded.

Part **(b)(i)** was well answered by most candidates. These candidates were able to correctly explain how increasing the size and/or weight of the base would make the storage rack more stable.

Question 5

In part **(a)** many candidates correctly named the type of motion made by the rotor blade of the helicopter as rotary motion.

While in part **(b)** some excellent drawings showing how bevel gears or a worm gear could be used to make rotor blade turn when the helicopter was pushed along many candidates failed to show any understanding of an appropriate mechanical system that could be used.

In most cases where an appropriate system had been shown in part **(b)** the candidate was able to state its correct name in part **(c)** of the question.

Section B

Question 6

In part **(a)** a fair number of candidates correctly explained that acrylic was not suitable because it is a brittle material that breaks and scratches easily. In part **(b)** appropriate materials such as PVC were named by a good number of candidates who frequently went on to explain that the material was more flexible than acrylic and therefore less likely to break.

In their answers to part **(c)** a number of candidates suggested very complex ways in which the wooded former could be made. These generally showed a hollow former fabricated from several pieces of wood and looking exactly like the final scoop rather than one made from a single piece of solid wood. While some good descriptions of how the former would be marked out, cut out and shaped were in evidence statements such as 'Cut it out using a saw' were frequently seen with nothing to say how it would be done.

Inappropriate tools, equipment and processes were suggested. For example 'The shape could be made on a lathe'.

In part **(d)** most candidates showed a good understanding of the vacuum forming process. Many used a series of drawings to explain:

- how the plastic would be clamped in place and heated
- how the former would be raised to meet the plastic
- how the air would be evacuated and the plastic pulled onto the former.

Some candidates tried to use too much continuous text rather than annotating their sketches. While they were not specifically penalised for using this method of communication it can often take longer than producing 'The sketches and notes' asked for in the question.

Question 7

In part **(a)** most candidates named an appropriate metal for making the frame of the stool and were able to explain at least one appropriate reason for their choice. For example mild steel tube because it would be lighter in weight than solid steel and be easy to join.

Part **(b)** was poorly answered by the vast majority of candidates. Many answers showed the length of the rails and legs rather than their cross section. Very few appropriately sized cross sections were seen. It was very rare to see the correct convention (cross hatching) used to show a cross section.

Part **(c)** of the question was frequently answered at a very superficial level. While a number of candidates correctly identified welding as being a way of joining the rails to the legs few gave any real details about how this would be done. One poorly annotated sketch was all that many candidates produced as their answer.

In part **(d)** a suitable material for making the top of the stool by most candidates who were then able to give at least one appropriate reason for their choice. For example MDF because it is more stable than solid timber and is available in large sizes.

A good number of superficial and inappropriate answers were seen to part **(e)** of the questions. Some candidates even suggested that nails could be used to join a wooden top to a metal frame. Answers to questions of this sort require a series of sketches and notes to explain stage by stage how the joining method would be carried out. Large amounts of continuous text should be avoided.

Question 8

In part **(a)** a suitable wood for making the storage unit was named by most candidates who were able to go on to give at least on appropriate reason for their choice. For example pine which is a readily available material which takes various finishes well.

Some good answers were seen to part **(b)** of the question. The most commonly seen appropriate joining methods that were seen were nailing, screwing and dowel joints. Sketching was frequently of a good standard. In some cases only one sketch was presented where the question asked for sketches and notes.

While in part **(c)** most candidates were able to give the correct size of at least some of the eight pieces required to make the unit most failed to put the information into the form of a table with headings such as PART, NUMBER OFF, MATERIAL, LENGTH, WIDTH, THICKNESS.

In part **(d)** of the question almost all candidates specified a suitable finish for the unit. The most common answer was varnish.

Most answers to part **(e)** gave at least some details about the required process but a number of very limited, superficial answers were seen. Details were required about aspects such as the equipment required to apply the finish, how the equipment would be used, how many coats would be need and how to prepare for the next coat, how the equipment is cleaned and the working environment e.g. dust free and well ventilated.

Section C

Question 9

In part **(a)** most candidates were able to identify the design features on the jaws of the 'crab cramp' that would enable at least some of the four given materials to be held firmly but without damaging them.

In part **(b)(i)** only a limited number of candidates were able to identify and describe the required design feature. Some realised that the feature had to have an internal screw thread but few went on to give any real detail about how the feature would be attached to the arm at X.

Again in part **(b)(ii)** there was only a limited understanding about how the required design feature would work. Most related the ability of the arms to open and close just to the pivot points with little or no description of how the end of the threaded bar would need to be attached to the arm so that when it was rotated it would make the arms open and close.

While in part **(c)** candidates were able to identify aspects of the crab cramp that made it better than a G cramp generally little discussion took place. Very few candidates introduced any evidence to support their conclusions or arguments as to why it was better.

Question 10

In part **(a)** most candidates were able to identify that the cup would get hot and therefore be difficult to hold.

Part **(b)** of the question was generally poorly answered with most candidates talking about the design of the cups rather than properties of the materials from which they were made. For example the card used to make the first cup would need to be of the type that would not be affected by hot liquid. It would need to retain its shape and not go soggy. The metal used for the second cup would have to be of a type which would not rust or tarnish in any way that would result in a potential health hazard.

In part **(c)** most sketches tended to be copies of the given drawings rather than focusing on specific design features which made the cup suitable for its intended purpose. These features included the textured surface around the card cup which makes it easier to grip or the large flat bottom on the metal cup which makes it more stable when put down on uneven surfaces such as the ground.

In part **(c)** most candidates identified litter as being the biggest problem with the disposable cup. Many incorrectly said that the card cup could not be recycled. Once again problems were identified but evidence to support conclusions and arguments was limited.

Question 11

In part **(a)** most candidates correctly identified that A was made from wood, B from plastic and C mainly from metal.

In part **(b)(i)** a good number of candidates identified that all of the designs had small parts which could cause potential health hazards if babies put them in their mouths.

While in part **(b)(ii)** all candidates suggested age ranges they were not always appropriate. Reasons given were often superficial such as 'Design A does not have much detail', 'Design B has a bit more detail' and 'Design C has the most detail'.

In part **(c)(i)** most candidates got at least one of the required three production methods correct.

In part **(c)(ii)** most candidates had some understanding about the features that result from a product being fabricated (made from several separate parts with obvious joins) blow moulding (large pieces with rounded edges and corners) and die casting (high level of detail with sharp definition). The way in which the features were explained using sketches and notes was, however, often weak.

Papers 9705/02 and 9705/04
Coursework Projects 1 and 2

General comments

A wide range of projects was presented for moderation and many candidates should be congratulated on the care taken in the production of their work. Clearly, many became engrossed in their work and developed a sound understanding of the chosen area of study. Some work was of an extremely high standard and in line with expectations for Design and Technology at this level of examination. Notable products included: camping light; stationery storage system; tee shirt logo designs; bush camp chalet; art material storage system; teacher's chair; theatre design; automatic adjustable horse jump; cat environment; lighting system and the normal range of household equipment and furniture.

The work was generally presented well and design folders were easy to follow. This is helpful to the Moderator as the basis on which the assessment has been made can be seen easily. Centres are reminded of the importance of including clear and detailed photographs of the models produced by candidates for Project 1 9705/02 are included in the folders. If this is not done then moderation of this section of the assessment scheme cannot be carried out.

Although the design process can be evidenced in a variety of ways it would assist candidates if folders were structured to reflect the order of the assessment criteria. Where this had been done it was clear to see how a candidate's thought process had developed and, generally speaking, the work was of a higher standard as candidates had covered all aspects of the assessment scheme.

The weighting of marks for each section should give some indication of the amount of time to be devoted to that part of the design process for assessment purposes.

The Moderator would like to thank Centres for the care taken in the administration of centre based marking and the submission of work and all documentation for moderation.

Comments on Individual Assessment Criteria

9705/02 Project 1

Identification of a need or opportunity leading to a design brief

The design situation was expressed clearly by most candidates but a detailed description of the user was not always included. Only when both are included as parts of a clear and precise design brief can a clear picture of the design need be identified and full marks be awarded.

Analysis of and research into the design brief which results in a specification

A wide range of existing products was identified by most candidates but these were not always related and linked to the intended situation and user, specified in the design brief. This section should not include irrelevant information such as the history of products. Similarly, information on components, materials and constructions should not be considered before ideas have been generated and appraised. This information should be considered as part of Product Development in Project 2 (9705/04).

Many candidates fell into the trap of simply giving illustrations or descriptions of existing products, often with vast amounts of copied technical detail. For the award of high marks, detail of existing products must be analysed and evaluated in the context of the situation and user stated in the design brief. It is only when this detail is then carried forward and referred to in the generation of ideas that the candidate can give a clear indication that genuine design thinking is taking place.

The Moderator does not expect to see large amounts of 'cut and paste' at this level of examination and where this technique is used no marks can be awarded unless it is accompanied by the candidate's own, in depth, detailed observation and comment.

Candidates who identified and collected data by working through the purpose of the intended product, step by step, and visualising its use in the design situation then went on to carry out meaningful and innovative design work.

Analysis and research into the design brief must culminate in a detailed specification that has evolved from this work. The specification is often most effective when consisting of a list of specific points that can be easily identified and referenced during the generation and appraisal of ideas.

Generation and appraisal of design ideas

Most candidates produced a reasonable range of design ideas. In many cases the quality of drawing was very high and, as such, information was successfully conveyed. There were examples of high quality work indicating that candidates were able to think in an imaginative and innovative way leading to genuine creativity.

This section of the folder gives candidates the opportunity to explore and record a wide range of ideas however practical or appropriate they may appear at this stage. Unfortunately some candidates approached this in a somewhat formal and stifled way simply concentrating on one or two concepts with these often coming, at the lowest level of performance, from existing ideas.

Candidates should be encouraged to include all evidence of design thinking whatever quality the drawings may be at this stage. As candidates consider their design ideas they need to show through clear annotation of drawings that they have the specification in mind throughout this stage of the design process. The assessment criterion in the syllabus gives a clear indication of what is expected here.

Modelling of Ideas

Candidates do not always make good use of the modelling stage but simply produce a mock up of the chosen design idea, often very close to the final made artefact where this is carried through into Project 2. This stage can be used in an imaginative way to consider one or several aspects of the form, construction or operation of a product design or system.

The model need not necessarily be of a complete product but may concentrate on one or two particular design aspects still to be finalised. Where products include particular mechanisms or structures it would benefit candidates if they included evidence of modelling of these. Successful candidates considered the most appropriate way of modelling these aspects of their design ideas including consideration of suitable materials and construction methods to be used.

Construction kits can be put to good use when modelling some design features as they can be reused once photographic evidence has been taken. As mentioned earlier it is a requirement of the assessment scheme that photographic evidence of modelling is included in all design folders.

9705/04 Project 2

Product development

Many candidates do not make full use of this part of the design process and often simply repeat ideas from earlier stages. They should take the chosen, and modelled, idea from Project 1 and consider all aspects of form, materials, finish, construction and production methods in detail. All information should be linked directly to the chosen idea and, where this is technological in nature, should include details of components to be used.

At this level of examination there should also be clear evidence of meaningful testing and experimentation linked to the ideas being developed. Simply listing materials and constructions with their strengths and weaknesses in textbook fashion is not sufficient and cannot be awarded high marks.

Having developed their ideas through consideration of alternatives, candidates must give the reasons for decisions made. Unfortunately, in many projects, there was uncertainty as to how the product had developed from the final idea to the artefact produced.

The final part of the development should give all details of the intended design solution.

Product planning

Successful candidates planned the production of their artefact before any work commenced. This included an indication of the overall sequence of operations linked to some form of time plan. There is no need for candidates to give detail or show illustrations of basic tasks but it is expected that the order of events will link to sound practical techniques.

Working drawings should provide all the detail required for the artefact to be made by an experienced person. A list of materials and components to be used should also be included.

It was obvious that some candidates had produced this section after the product had been completed or simply included photographic evidence of the work in progress. This simply formed a record or diary of what had already happened and showed no evidence of forward thinking. Centres are advised to discourage this approach, as it is really a waste of valuable time and cannot be awarded marks.

Product realisation

There was evidence that many candidates had become very involved in the realisation of their developed designs and these products were of a very high quality indeed. It was clear that the artefacts matched the requirements of the specification and could be put to good use.

These candidates had been able to use their initiative in the making stages and had overcome problems as they arose. Other less successful candidates had clearly required more help and guidance from their teachers.

Centres are reminded of the need to include good quality photographic evidence showing overall views of the product together with close up detail showing the quality of work produced. Without this evidence the Moderator is unable to substantiate the marks awarded.

Testing and evaluation

There was a greater variation of outcomes between candidates in this section than in any of the others. This is probably due to what appears to be a misunderstanding of what testing and evaluation is about. It is not an evaluation of the design folder and the problems associated with the making of the artefact but of the success of the product itself. Does it fulfil the design need and requirements as set out in the specification? Nor is it simply a matter of asking friends to complete a questionnaire or to complete a tick box against each of the specification points.

Successful candidates referred to the original specification and commented on the level to which each point had been satisfied. This can only be achieved by practical testing of the product leading to the identification of opportunities for modifications and improvement. Critical testing of the required nature can really only be successful where the potential user of the product has been involved. It is expected that this will be supported by a meaningful record of testing activity and/or photographic evidence, where this is possible.

Paper 9705/03

Written

General comments

There were very few rubric errors and most candidates used the full allocation of time appropriately. There are still a number of candidates who do not fully complete all elements of the assessment criteria for ***Section B*** and the proposed solution and evaluation are often rushed or missing.

The use of well annotated, clear sketches to support answers continues to improve and Centres are commended on their efforts in preparing candidates for the exam. The specific knowledge of materials continues to improve, answers to **Questions 2**, **4** and **6** were particularly impressive.

Some candidates locate the analysis, specification and evaluation in amongst answers to ***Section A***. ***Section B*** flows much better for candidates and is far easier for Examiners to follow the design thinking if the whole answer is presented on A3 paper.

The most popular questions were in ***Section A***, *Part A* was the most popular option with **Questions 1** and **2** the most popular.

Attempts were fairly evenly spread across the questions in *Part A* and *Part B*.

Fewer candidates attempted *Part C* where **Questions 7** and **8** were the most popular.

Questions 11 and **12** were the most popular questions in ***Section B***.

It would be helpful if this report is read in conjunction with the question paper and mark scheme.

Comments on specific questions

Section A

Part A – Product design

Question 1

This was a popular question, which was generally answered well. Most candidates had a clear understanding of the process of extrusion and provided excellent supporting sketches. Descriptions of casting processes and turning on a lathe varied. The best answers included clear diagrams and labelled all important features of the process including, where appropriate, specific tools used.

Most candidates gave very clear explanations as to why the processes chosen where particularly suitable for the production of the item.

Question 2

This was a popular question, with a wide range of response.

Most candidates stated acrylic as a material and justified its choice. Some candidates interpreted 'prototype' as a model and described how to make the item in card. A prototype should be seen as a one-off working product.

Most descriptions of manufacture were very thorough and included full details of all stages and tools used. Supporting sketches were mostly clear and well annotated.

There was a significant improvement in the explanation of what changes would be required to manufacture 500 products. Candidates demonstrated a clear understanding of the use of moulds, jigs for batch production.

Question 3

This was the least popular question in *Part A*. Many answers were very brief and lacking specific detail.

The best responses examined and explained a number of issues concerning the development of new products, applying appropriate focus on consumers, manufacturers and advances in technology and introducing relevant examples.

Part B – Practical technology

Question 4

Most candidates correctly defined brittleness as low resistance to impact, and corrosion resistant as resistance to oxidation/degradation. Glass was the most popular example of a brittle material and aluminium was the most popular choice for a corrosion resistant material.

The toughness of materials is tested using an impact testing system. Very few candidates described an impact test. The measurement of force applied and recording the effect on samples was evident on a small number of responses. The use of identical size and shape of samples was ignored by many candidates.

Question 5

This was not a popular choice. Some candidates had a very good understanding of brazing and welding processes and produced very detailed responses achieving very high marks.

Question 6

This was a popular question which was answered generally very well.

Most candidates correctly stated anti-clockwise as the direction of rotation of gear A and calculated the Velocity Ratio.

Most were able to clearly describe the use of cams and cranks and gave appropriate examples.

Most candidates had a very clear understanding of the properties of materials and gave very detailed explanations of the advantages and disadvantages of making gears from the materials listed.

Part C – Graphic products

Question 7

Most candidates produced an accurate isometric view of the camera. Enhancement techniques to produce a realistic drawing were lacking.

Question 8

There were very few attempts at this question. Some were able to complete the elevation seen from arrow A, very few went on to produce developments.

Question 9

There were very few attempts at this question. The responses varied widely. The best responses had a very clear understanding of one off and small batch production methods and produced exceptionally detailed and well structured answers to part **(b)** taking into account the sensitive display of 2D and 3D work and the use of a well thought out layout to maximise impact and enable easy circulation of visitors.

Section B

This section was answered well by most candidates. A significant number of candidates did not complete a proposed solution and evaluation.

Most candidates prepared their answers on A3 paper as instructed but a number produced the analysis, specification and evaluation in amongst their answers to ***Section A***.

It is obvious that candidates were given clear guidance on how to approach the design question. Some responses were of an exceptionally high quality, indicating that candidates had been well prepared, allocating appropriate time to each section and using all of the time available.

Many candidates repeated the given problem in the analysis and specification and did not look at the wider issues involved.

The best responses indicated at least five detailed points of analysis relating to the given problem, other than the main issues given in the question.

A number of candidates produce a brief, which is not necessary.

Most candidates were able to produce a list of at least five justified specification points.

Each question provides initial specification points or data. Candidates are expected to produce a list of five other points. No marks are awarded for repeating given data. Generic terms such as 'safe to use' did not gain a mark, 'the mechanism must not allow fingers to get trapped when folding' would gain credit. For many candidates, the annotation of the exploration of ideas related solely to construction details. Notes should make specific reference to specification points.

Many candidates did not make use of the information given in the stem of the question e.g. sizes of DVD Video cases, battery sizes, anthropometric data etc.

The standard of the development of ideas section continues to improve. Candidates use notes and sketches to develop selected features, clearly showing the reasoning behind decisions. A number of candidates spend far too long producing a lengthy step-by-step procedure for manufacture. Candidates are expected to make clear the constructional details of ideas leading to a single design proposal and show their reasoning.

Very few candidates completed a final solution.

Some candidates evaluate their own performance and not the final proposal. Candidates must make specific reference to their final proposal and state whether the proposal is fit for purpose, referring to specification points where necessary, and suggest improvements or modifications.

A more detailed breakdown of the assessment criteria for ***Section B*** is given in the mark scheme.

Question 10

Many candidates produced a range of possible ideas, which met the criteria given. Candidates produced clear evidence of constructional possibilities and were specific in their use of appropriate materials. Developments tended to be descriptions of manufacture of one of the ideas proposed. Reasons for selection were often missing.

Very few candidates produced a final proposal and evaluation.

Question 11

A few candidates attempted this question. Candidates looked at simple mechanical/electrical systems and/or systems that attached to the head or arm. Very few took into account the size of the battery. Ideas tended to focus on an outside shell design for the torch although most provided simple circuit diagrams. Very few made attempts to provide two levels of light intensity.

Question 12

There were a number of outstanding attempts at this question showing a detailed understanding of the ranges of card available and appropriate joining and printing methods. Most made reference to the sizes given for DVD and Video Cases.