

# CONTENTS

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<b>DESIGN AND TECHNOLOGY</b> .....	<b>2</b>
<b>GCE Advanced Level and GCE Advanced Subsidiary Level</b> .....	<b>2</b>
Paper 9705/01 Written .....	2
Paper 9705/02 Coursework Project 1 .....	6
Paper 9705/03 Written .....	7
Paper 9705/04 Coursework Project 2 .....	11

# FOREWORD

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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 mixed and ranged from poor to very good. It was evident that in some cases candidates had only limited understanding of the subject matter they had chosen to answer. This was particularly true with production processes and manufacturing techniques where there was sometimes a distinct lack of appropriate technical knowledge and understanding.

Instructions on the front of the Paper draw attention to the statement “discuss” within a question. While in some cases discussion was well presented with clear supporting arguments made, in some answers 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 much higher number missed out parts of questions.

The questions on the Examination Paper require candidates to respond in a variety of different ways, for example, using one word answers, detailed explanations, tables, charts and annotated sketches. It is important that whichever method is used, candidates try to make their answers as clear as possible and relate the length and depth of their responses to the number of marks available. A common error in written responses was for candidates to repeat the same point using slightly different words.

### Comments on specific questions

#### **Section A**

#### **Question 1**

- (a) This question was poorly answered by many candidates. Details were often given about injection moulding, a production process totally inappropriate for making a batch of just twenty stands. Other candidates viewed vacuum forming as being appropriate but gave little or no detail about how the shape would be cut or formed. Many answers failed to present the information in the form of a flow chart which made use of the correct symbols. Correct answers which detailed the production of a template, the marking out, cutting out, finishing and then forming the shape using a strip heater were rare.
- (b) Many candidates gained at least one of the three marks available. Appropriate points in the process where accuracy and quality would be checked were at the marking out stage, when the edges had been polished, when the bends had been made and when the product had been completed.

#### **Question 2**

- (a) This was very well answered by the majority of candidates. Many were able to identify appropriate aspects such as rechargeable batteries require an expensive initial outlay but are cheaper to run in the long term, there is a time delay when charging and they tend to lose performance with age.
- (b) Again this was well answered. Explanations were frequently related to problems associated with leaking batteries, corrosion and toxicity.

**Question 3**

- (a) Answers ranged from the very good where candidates were able to explain clearly the principles employed in CAD to those that did little more than use the wording given in the question to say that designs were drawn using a computer. Better answers explained how the keyboard, mouse and appropriate software could be used to generate drawings.
- (b) Responses were at a similar level to part (a). Only a limited number made full reference to how a computer was used to control. Some just suggested that the computer manufactured the product.
- (c) There were some good responses which related to speed, accuracy and the ability to change easily and modify designs. Appropriate reference was sometimes made about the advantages of using the internet to communicate designs to parts of the company in other countries.

**Question 4**

This question was often very poorly answered with single words such as aesthetics, cost and ergonomics being used. Answers of this type were far too general and could apply to almost any product. More appropriate specification points would be that the container needed to be lightweight, there needed to be clear instructions about where to put the stamps and that there needed to be an easy way of putting the stamps in and getting them out of the container.

**Question 5**

- (a) This was well answered with painting and plastic dip coating being the most common correct answers.
- (b) Generally this was reasonably well answered with painting being the best explained process. To gain full marks details were required about cleaning and three specific points about the application of the chosen finish. Answers such as "you put the paint on with a brush" gained only one mark.
- (c) This was poorly answered by many candidates. A good many answers related more to testing the materials rather than the final product. While a good number correctly described how putting bottles in the rack and carrying it could be used to test its function, far fewer described how heavy weights could be used to test the rack's construction. Questionnaires would be a good way to test how well the rack meet user needs but they were rarely mentioned. A good number of candidates suggested three almost identical tests.

**Section B****Question 6**

This was by far the most popular question in **Section B**.

- (a) This was correctly answered by the vast majority of candidates. Pine was one of the most common correct answers.
- (b) Again most candidates gave a correct answer of which MDF was the most common.
- (c) While most candidates described the three stages of manufacture, many did it at a rather superficial level. For example – "The shape would be cut out using a jig saw" - without any attempt to explain how. Candidates frequently failed to describe how the work would be secured while working on it. Many suggested that the edges could be shaped and smoothed by just using glasspaper. To gain full marks excellent sketching and notes had to be used to describe fully all of the required stages along with details about how the tools and machines required would be used in an appropriate and safe way.
- (d) A good number of candidates failed to produce answers that were totally suitable for self assembly. A mortice and tenon joint was the most common answer. Many candidates spent time explaining how a joint of this type would be made rather than just showing a method of attaching the rails to the table ends. An annotated exploded view would have been an appropriate method of communicating the required information. Fully correct answers had to show all details of a joining method that would clearly work for self assembly.

- (e) Most candidates gained at least one of the two marks available for this part of the question. Appropriate stages of preparation included planing the joints smooth, sanding the surface and sealing the top.

### Question 7

- (a) Very poorly answered. Specification points were often too general and could have related to almost any product. Appropriate specification points were, for example, the rack must hold eight CDs, it must be easy to take out and replace the CDs, the size of each slot must be a little wider than a CD, the rack must be made from 3mm thick acrylic.
- (b) A good number of candidates failed to present their answer in the form of a table or chart. Most of the candidates identified at least one of the four required stages of marking out, cutting out, finishing and bending. Often the order was not correct, for example cutting out the slots after the bends had been made. Many just listed tools and processes with no explanation of how things would be done. Inappropriate production methods such as injection moulding and vacuum forming were in evidence. To gain full marks all the stages had to be considered in detail and presented in the correct order.
- (c) While many candidates produced a design that would join together two or more holders most solutions involved glueing or screwing on extra pieces rather than the required one piece design. Solutions of this type gained only limited credit. To gain full marks candidates had to use excellent sketching techniques to give details about a construction method that would clearly work.

### Question 8

This was the least popular question in **Section B**.

- (a) Most candidates named a suitable hardwood such as teak.
- (b) Many inappropriate types of adhesive were suggested. Epoxy resin was the most common correct answer.
- (c) While most answers used some form of jog or former many answers failed to take into account the required 50mm radius. A good many answers gave only superficial answers about how the 8mm diameter rod would be bent.
- (d) Again many superficial answers were seen. Simplistic statements such as "The metal would be cut out" were much in evidence. Answers generally lacked the level of detail about the processes, tools, equipment and machines required to make the measuring scale.
- (e) Some candidates confused the pieces to be joined together and therefore gained only limited credit for their responses. A number of excellent solutions were seen which gave full details about a suitable method of attachment which would allow for easy removal.

### Section C

#### Question 9

This was the most popular question in **Section C**.

- (a)(i) A good proportion of candidates were able to explain that laminated wood consisted of several layers of wood glued together.
- (ii) Most were able to explain what and how it was used to shape materials such as laminated wood and plastic.
- (iii) Candidates were frequently able to explain that 'turned' referred to wood being made round on a lathe.

- (b) While many candidates identified the advantages of using the metal and plastic, most presented the information in little more than list form. Discussion which introduced evidence to support conclusions or arguments was rare. While it was common to see statements such as "metal and plastic chair is more comfortable" or "The chair is more durable" it was rare to see statements followed by "because .....". It is the explanation and discussion that candidates need to carry out in order to gain high marks in this section of the Paper.
- (c) Most candidates were able to identify at least some appropriate ergonomic data. A good many failed to explain the data and just repeated the same information they had shown as a diagram in a written form.

#### Question 10

- (a) Most candidates were able to identify specific situations in which at least two of the battery powered lights could be used. However, some suggested uses were far too general and a number of repeat answers were seen.
- (b) This was well answered by most candidates.
- (c) This part of the question was very poorly answered. Most candidates failed to relate how the factors had influenced the design of their chosen light and just wrote about the factors. In these cases part (i) was no more than a repeat of the answer to (a). Some responses were more in the form of a specification rather than a discussion of an existing design. Answers in general were weak and presented confused information. It is important that candidates read and understand a question before attempting to answer it.
- (d) Some excellent answers were seen but again some candidates gave superficial answers such as "Screws would be used" without going on to explain how. Just stating a method gained only very limited credit it was the 'how' part of the answer that had most marks allocated to it.

#### Question 11

This was the least popular question in **Section C**.

- (a)(i) Few candidates correctly explained that tinsplate was a sheet of mild steel plated with tin.
- (ii) Generally candidates showed some understanding of the term pressed. They were able to explain that pressure was applied to press the tinsplate around formers or into moulds.
- (iii) Poorly answered with only a few candidates explaining that fabricated meant that a product was made from a number of separate pieces joined together.
- (b) Soldering was the most common correct answer that was seen.
- (c) In general this part of the question was poorly answered. Many candidates failed to relate their answers to the type of toy shown. Surprisingly, few candidates identified the health hazards associated with the use of lead based paint. Answers often failed to explain the hazards identified. Again, as with other questions in this section candidates needed to present a detailed explanation in order to gain high marks.
- (d) A good number of candidates were able to identify the properties of polypropylene. Some were then able to go on to discuss why these properties made polypropylene suitable for use in the manufacture of children's toys. Most discussions were correctly related to issues of safety.

<p><b>Paper 9705/02</b> <b>Coursework Project 1</b></p>
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### **General comments**

The work was well presented for moderation and, generally speaking, design folders were easy to follow. It is important that clear and detailed photographs of the models produced by candidates are included in the folders. If this is not done then moderation of this section of the assessment scheme cannot be carried out.

There was a wide range of project types and candidates should be congratulated on the imagination shown. 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 coffee shop, tuck shop, garden and gymnasium designs, lifting devices, bird feeder, bicycle immobiliser, fishing lures, soccer scoreboard, sports bag, butter maker, loudspeaker enclosures, table for hospital patients and the normal range of domestic furniture and other devices.

Although the design process can be evidenced in a variety of ways it would help the Moderator and indeed assist candidates if folders were structured to reflect the order of the assessment criteria contained in the Syllabus. Where this had been done it was clear to see how marks had been awarded and, generally speaking, candidates covered all aspects of the assessment scheme.

The weighting of marks for the individual sections of the assessment scheme should give some indication of the approximate amount of time to be spent on each part of the project.

Centres are reminded to include the Summary Coursework Assessment Form 9705/2/4/CW/S together with the Moderator copy of the computer printed mark sheet MS1 with work sent for moderation.

Where marks have been internally moderated, it would be helpful to the Moderator if changes to each of the criteria could be shown on the Summary Coursework Assessment Form 9705/2/4/CW/S in addition to total mark changes.

### **Comments on individual assessment criteria**

#### **Part 1**

##### *Identification of a need or opportunity leading to a design brief*

Candidates described the situation clearly but were not always quite so specific about the intended users. It is important that detail is included here to assist in the analysis and research of the design brief which follows.

#### **Part 2**

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

Although candidates were generally able to identify a wide range of existing products they did not always relate these to the intended user. This section of the folder must follow on from the design brief and should not include irrelevant information such as the history of products or information on materials and constructions before ideas have been generated and appraised. Materials, components and construction details should be considered at the Product Development stage in 9705/04 Project 2.

There was a tendency for candidates to simply give a description of existing products, often with vast amounts of technical detail, but analysis was missing. It is important that this information is evaluated and commented upon in connection with the intended user and the design brief.

Candidates scoring high marks in this section considered aspects of the requirements of the intended user and included detailed information to be taken forward for consideration in the generation of ideas.

This section of the folder must culminate in a detailed specification that has evolved from the analysis and research. This is presented best as a list of specific points.

### Part 3

#### *Generation and appraisal of design ideas*

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

However, there was sometimes a tendency to show variations of just a few concepts rather than a wide range of different ideas. Ideas were sometimes shown in a rather formal way with little evidence that candidates were really 'thinking with a pencil'. It is important that candidates include all their drawings however rough they may be.

When appraising their design ideas candidates 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.

### Part 4

#### *Modelling of ideas*

The intention of this section is that candidates develop ideas as far as the modelling stage and do not become too involved in the detailed development of the final product in terms of materials and constructions.

They should therefore show evidence that they have a knowledge of modelling materials and can choose those most appropriate to their own design.

Where products include particular mechanisms or structures it would benefit candidates if they included evidence of modelling of these. Construction kits can be put to good use for this purpose 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.

Where candidates intend to produce an architectural model as the final product then the modelling for Project 1 could, for example, focus on one or more detailed aspects of design ideas which would then help decision making at the development stage. How could particular shapes be formed in the final model? What modelling materials would be most successful? How could certain effects or finishes be modelled?

In this way there would be a closer link between modelling and development and the whole project would become more meaningful. The Moderator is always looking for genuine design work where a candidate has evidenced that they have given real thought and consideration to a need rather than having simply 'jumped through hoops'.

Paper 9705/03

Written

### General comments

The overall standard of performance on this Paper has been broadly maintained. Candidates are generally well prepared and follow the rubric correctly. There were many examples of outstanding responses, particularly in **Section B**. Although most candidates devoted appropriate time to the different sections, a significant number did not answer two **Section A** questions and did not fully complete **Section B**. In a number of cases, candidates devoted considerably more effort on one question in **Section A** and produced a brief response for their second question.

It is recommended that candidates spend 20 - 25 minutes on each question in **Section A** and at least 100 minutes on **Section B**.

In **Section A**, parts (a) and (c) were the most popular options. Relatively few candidates attempted **Question 2** and **Question 3**. In **Section B**, in **Part A**, **Question 1** was the most popular, with equal numbers attempting **Question 2** and **Question 3**. In **Part B** **Question 4** was the most popular followed by **Question 6** then **Question 5**. In **Section B**, **Questions 7** and **8** were the most popular.

**Question 10** was by far the most popular in **Section B** followed by **Question 12**. Relatively few candidates attempted **Question 11**.

### Comments on specific questions

#### **Section A**

##### *Part A - Product design*

#### **Question 1**

This was the most popular question on the Paper, and was generally well answered. Most candidates offered acrylic or aluminium as suitable materials for the prototype and gave appropriate reasons for selection. Some candidates gave single word responses such as 'strong' without any further reference to suitability for purpose and did not receive credit.

Part (b) was well answered with most candidates giving a full and detailed account of the manufacture of the tape dispenser from marking out to finish.

The best responses to part (c) included detailed descriptions of either injection moulding, giving specific details of the split mould required or stamping and press forming arrangements.

#### **Question 2**

This was a popular question, with a wide range of responses. A significant number produced very brief answers lacking in detail and supporting evidence. The best responses covered a range of issues including client involvement, material choice, time, cost and equipment required.

Many candidates explained issues well but some simply produced a list of points and consequently did not achieve marks for quality of explanation.

#### **Question 3**

There were a number of outstanding responses to this question. Candidates demonstrated a very good understanding of the processes involved and made excellent use of detailed annotated sketches to support their answers.

Most candidates were aware of the process of rotational moulding to manufacture hollow plastic products and gave appropriate reasons for suitability.

A broad interpretation of turning was accepted with candidates describing methods of turning in wood and/or metal.

The majority of candidates had a clear understanding of welding although a few responses tended to be very brief and lacking detail.

##### *Part B - Practical technology*

#### **Question 4**

A relatively small number of candidates attempted this question. Most were able to define toughness and ductility and state a tough and hard material.

Many described in detail an appropriate comparative test for hardness focusing on the size of indentation caused by either a punch or a ball bearing pressed into the surface of a range of sample materials.



**Question 5**

Very few candidates attempted this question. Most candidates described the function of a resistor and explained how value could be identified. Some candidates missed the variable resistor and transistor required to complete the circuit diagram in part (b).

Most candidates explained the working and gave examples for both the strain gauge and the LDR.

**Question 6**

There were few attempts at this question. Most correctly calculated the required number of rotations (13.9), for the flywheel for one revolution of the front wheels.

Virtually all candidates used good quality sketches to describe two methods of converting rotary motion to linear motion.

Candidates gave an outline of pneumatic and hydraulic systems but very few gave details of the particular advantages of each system.

*Part C - Graphic products***Question 7**

This was a popular question with a wide range of responses. The best answers included details of issues concerning the nature of the product, the needs of the market, target range and appropriate pricing and the placement and promotion of the product.

Many responses however were very brief and focused only on advertising.

**Question 8**

This was a popular question with a number of excellent responses. Most candidates were able to create a good quality isometric view of the hairdryer.

Candidates are becoming aware of the amount of time that they should allocate to questions and are using a correct balance of freehand and instrument techniques to achieve a good quality drawing.

Many were able to use rendering to distinguish between a polished and a matt textured surface although a number did not apply any rendering at all.

**Question 9**

Very few candidates fully completed all elements of this question. Candidates were able to construct the two views given and project a plan view. The majority did not produce accurate intersections.

Very few were able to complete a development/net of the cylinder.

**Section B**

This section was answered well by most candidates. Some answers were outstanding and Centres are to be congratulated on preparing and guiding candidates to produce high quality responses in the time allowed. Most candidates prepared their answers on A3 paper as instructed.

Time management is still a problem for some candidates; in a significant number of cases the proposed solution and evaluation were either rushed or omitted completely.

### *Analysis*

As in previous exam sessions, some candidates repeated the given problem and did not look at the issues involved.

The best responses indicated at least five detailed points of analysis relating to the given problem.

Some candidates used scattercharts but in a number of cases, used single words e.g. 'safety', without any further qualification.

Some candidates dedicated a whole side of A3 to analysis which is too much.

### *Specification*

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

Each question provides initial specification points or data. Candidates are expected to produce a list of five other points. Some candidates gave single word specification points e.g. 'safe' which needed to be qualified in order for marks to be awarded.

### *Exploration*

This area continues to improve. Most candidates produced a range of well presented ideas with clear annotation and gave sound reasons for the selection of features to be developed. It is recommended that at least one side of A3 be dedicated to exploration of ideas.

Selection in some cases consisted of a specification chart with ticks or crosses against the ideas proposed. Some evaluative comment is required in order to achieve full marks.

### *Development*

Improvement continues in this area. Candidates generally provide a clear development of their ideas into a single design proposal. Well annotated sketches are used to justify design developments and candidates gave clear details of specific materials and construction methods.

### *Proposed solution*

Most candidates produced either orthographic or dimensioned pictorial views of their proposed solution. Some candidates do not leave enough time to produce an appropriate drawing showing the complete solution.

A significant number of candidates do not give dimensional details and offer no indication of scale.

### *Evaluation*

Relatively few candidates produced a full evaluation. The best responses included evaluative comments related to the initial specification. Some candidates provided a tick list which contained very little useful evaluative comment into how well the final proposal met the specification or included suggestions of modifications or improvements.

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

## **Question 10**

This was by far the most popular question. Most candidates used their time well and demonstrated excellent design technique in proposing a range of ideas. Most took into account the need for a lightweight, simple to carry seat. A number of candidates came up with over-complicated large systems that did not meet the original requirement of a promotional exercise. The development of ideas, in most cases was most impressive.

Final proposals were generally well drawn although a significant number did not include appropriate dimensioning.

**Question 11**

Very few candidates attempted this question. Those who did produced mostly mechanical solutions in the form of grips to switch on lights and to draw curtains. The detail provided tended to be lacking in many cases.

**Question 12**

This was a popular question. Many responses were outstanding. Candidates produced a range of solutions for both the point of sale display and the logo. Presentation of work in some cases was most impressive. Constructional details included printing and assembly were evident in some cases but a significant number did not give any indication as to how the point of sale display was to be assembled.

Some candidates did not leave enough time to develop their ideas fully or produce a final design proposal and evaluation.

<p><b>Paper 9705/04</b> <b>Coursework Project 2</b></p>
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**General comments**

See **General comments** for 9705/02.

**Comments on individual assessment criteria****Part 5***Product development*

This is the opportunity for candidates to take the chosen idea, which has been modelled in the previous section, and to consider all aspects of form, material selection, 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.

This section should take account of all modelling undertaken and should show evidence of clear thinking together with reasons for decisions made.

This was the weakest section of many projects leading to uncertainty as to how the product had developed from the final idea to the artefact produced.

**Part 6***Product planning*

Candidates are expected to plan the production of the artefact before any work commences. There should be an indication of the overall sequence of operations linked to some form of time plan together with a list of materials to be used.

Drawings should provide all detail required for the artefact to be made by an experienced person.

This section **must not** be produced after the completion of the artefact in which case it becomes a record or diary of what has already happened. Marks cannot be awarded for this approach. It must be a true plan indicating that thought has been given to the order in which operations will take place.

## **Part 7**

### *Product realisation*

The assessment of this section is based on the way in which candidates have independently undertaken making of the artefact together with the quality of the final product. Candidates are expected to take on tasks appropriate to this level of examination and to produce work of a high standard and quality of finish.

The assessment of quality of production should be based not just on the outward appearance of the artefact but also, for example, on the way in which components and mechanisms have been included.

It is important that photographic evidence includes overall views of the product together with close up detail showing the quality of work produced.

## **Part 8**

### *Testing and evaluation*

There was evidence of critical testing in many cases and this led to the identification of opportunities for modification and improvement. Testing is always more meaningful where a potential user of the product can be involved and this is supported by photographic evidence.

Many folders contained evidence indicating that designs had been carefully thought through with subsequent acceptance and approval of the intended user.