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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
Paper 1 - Written

General comments

The performance of candidates was mixed and varied from poor to some very good quality answers. Sadly it was evident that in some cases candidates had little understanding of the subject matter they had chosen to answer. This was particularly true with production processes and manufacturing techniques where there was frequently a distinct lack of technical knowledge.

It was felt that questions were diverse and offered plenty of scope for all candidates and that questions were testing knowledge and understanding at an appropriate level.

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 arguments made in some answers, there was evidence to suggest that the candidates had not taken sufficient notice of this instruction.

In a limited number of cases candidates had answered too few or too many questions.

Comments on specific questions

Section A

Question 1

The majority of candidates were able to name at least one type of temporary fixing method. The most common correct answers given were screws, nuts and bolts and knock down fittings. Many candidates gave one or more permanent fixing methods as part of their answer.

Question 2

- (a) Most candidates were aware that copper is a good conductor of electricity. Many were able to give a second reason by stating that copper is a ductile and malleable material which can be easily drawn into wire.
- (b) A good proportion of candidates were able to identify either PVC or rubber as being appropriate materials to use for the cable insulation.

Question 3

While many candidates were able to identify some appropriate properties or characteristics that the required material should have, a good number just listed them rather than giving the required descriptions.

Ergonomic and general safety issues were not appropriate responses.

Question 4

Some excellent answers were seen but a number of candidates did not attempt this question. Some candidates failed to give an application for each type of gear, while others did not use notes to explain how the gears moved. A common error was to draw various arrangements of spur gears.

Question 5

A high proportion of candidates were able to give a brief outline of how hydroelectricity was produced. However, very few were able to respond correctly to parts (a) and (c). Most answers offered little more than vague references to the tide or waves driving turbines. Frequently no real explanation of how this would be done was given.

Question 6

Many answers failed to focus on specific factors. In part (a), for example, reference should have been made to start and finish times and how the overall time allocated could be broken down. Generally there was a failure to discuss such factors. A good number of responses were rather superficial and did little more than to state that time, facilities and materials should be used efficiently. They failed to discuss how and why this is important when planning the production of work in a school workshop.

Section B

Question 7

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

- (a) Almost all candidates were able to identify a suitable plastic and timber. Acrylic and pine were the two most common correct answers given.
- (b) A good number of candidates missed the point that the storage unit was to be made in a school workshop and suggested that it could be injection moulded. Others stated that it could be vacuum formed without, perhaps, realising that this would generally result in the unit having a top and bottom in addition to the three required sides. Answers of this type only gave candidates limited access to the marks available. Inappropriate tools were often suggested for cutting out the plastic. These included circular saws and hot wire cutters. To gain high marks answers needed to explain how the shape and slots would be marked out, cut out, filed and polished. Appropriate tools, equipment and processes should have been identified and their use described.
- (c) This part of the question was answered very well. Almost all candidates suggested that either the plastic could fit in a slot made in the wooden base, or the bottom of the plastic would be bent over to form a lip which could be screwed to the base. Communication techniques were generally good.
- (d) Some candidates appeared to have misread this part of the question and did little more than repeat part of the answer they had given to part (b). Appropriate answers were those that indicated minor changes to the two shapes which would overcome potential hazards and problems associated with sharp, angular corners.

Question 8

- (a) Many candidates were able to give appropriate advantages and disadvantages. A common advantage given for mild steel was to state that it was cheaper than aluminium while for aluminium many said that it did not require a surface finish. Disadvantages frequently related to mild steel perhaps being too heavy for the table and that aluminium was difficult to join together.
- (b) Almost all candidates were able to give at least one reason. Common correct responses made reference to the stability of the table, that it would be easier to join and easier to attach the castors (wheels) and the locking screw.
- (c) The majority of candidates stated that the tubes could be joined by welding but many failed to give any real detail about how the process would be carried out. In order to gain high marks answers needed to explain how the metal would be cut, cleaned and prepared for welding, how the work would be held in place and an explanation of the welding process including safety precautions. Finally, an explanation was required of how any excess welding material would be removed and the joints cleaned up. Other fabrication techniques were acceptable but a similar description to that outlined above needed to be given.

- (d) Some excellent answers were seen to this part of the question. These showed how the device could be both angled and locked into place to enable patients to read their books more easily. However, most answers gained only limited credit because they showed only one of these features, either the angling or the locking device.

Question 9

This was the least popular question in **Section B**. A few candidates appear to have misread the question and designed products to hold litter rather than pick it up.

- (a) Most candidates were able to list at least some points that needed to be considered when designing the product. A number of answers, however, were too superficial to gain access to all of the marks available. For example it was common to see answers such as 'it needs to be safe' without saying what or why it needed to be safe. Points given must be specifically related to the product being designed.
- (b) While the majority of candidates produced two designs a good number were not totally appropriate or failed to give any real degree of detail about materials and construction. In some cases the two designs were very similar. Common answers were (i) a metal point on the end of a pole and (ii) a brush and pan. Neither of these designs would be suitable for picking up litter from a variety of surfaces. Communication techniques were generally good.
- (c) Some candidates did not present their answer in the form of a table or chart. It is important that in an answer of this type the candidate shows a positive link between the four required elements. For each stage of manufacture that is identified it needs to be clear what tools are needed, the machinery required and any health and safety issues concerned with that stage. Brief outlines of how the tools and machines are used and how the health and safety issues would be addressed need to be given. Some candidates did little more than to produce a list of first the stages of manufacture then a list of tools followed by lists of machinery and safety issues. Simplistic terms such as 'Join the pieces together' were much in evidence.

Section C

Question 10

- (a) Most candidates were able to list at least some design considerations but many were too general or superficial. Terms such as 'safe' and 'strong' were common. Such terms could apply to almost any product and candidates need to ensure that they relate their answers to the specific product given in the question. For example, the product needs to be safe in terms of what?
- (b) Some candidates made reference to more than the two parts required. In a question of this type attention needs to be paid to the statement on the front of the Paper which relates to the instruction 'discuss'. Many candidates raised some relevant issues about the materials used in the construction of the outdoor play equipment. But most, however, failed to discuss these issues in sufficient depth to gain full access to the marks available.

Question 11

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

- (a) Most candidates were able to list at least some design considerations but many were too general or superficial. Terms such as 'safe' and 'strong' were common. Such terms must be qualified and related to the specific product given in the question.
- (b) The majority of candidates were able to identify at least some advantages and/or limitations of using wood in the manufacture of toys. Single word answers such as 'strong' or 'heavy' were evidenced in some answers. It is important that candidates offer a brief justification in their responses to questions of this type.

- (c)(i) In a few cases candidates drew the toy given in the question but the majority suggested an alternative, if sometimes inappropriate, example. Very few were able to identify a specific material from which the toy could be manufactured.
- (ii) The manufacturing processes most commonly suggested were vacuum forming and injection moulding. Many candidates just drew the equipment to be used without fully describing the manufacturing process involved. Questions of this type generally require several annotated diagrams in order to communicate fully the stages involved in the required process.

Question 12

This was the least popular question in **Section C** and was generally very poorly answered.

- (a) A number of candidates suggested inappropriate materials such as plastic and metal for the laminated timber chair. Most suggested mild steel for the second chair but a few stated 'metal tube', a repeat of what they were given in the question.
- (b) Many candidates listed advantages and limitations rather than providing the required discussion. Answers were often superficial or too general. Very few responses related specifically to the two chairs. Common answers often consisted of 'strong' or 'has a good appearance'.
- (c) Very few candidates were able to show any real knowledge or understanding about the process of laminating and the formers required in the production of one of the side frames.
- (d) A high proportion of candidates failed to attempt this part of the question. When responses were given they were generally of a very poor standard, frequently failing to address the requirements of the question.

<p>Paper 9705/02 Coursework Project 1</p>

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 and golf course designs, vehicle maintenance, farm handling and water purification equipment, microlight aircraft, motorcyclist's knee brace, packing equipment, car and bicycle security devices, snake capturing aid 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.

Where 'cut and paste' technique is used no marks can be awarded unless it is accompanied by the candidate's own observation and comment.

This section of the folder must culminate in a detailed specification which has evolved from the analysis and research.

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 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.

General comments

There has been a significant rise in the number of candidates taking this examination.

Centres are to be congratulated on their preparation of candidates who generally performed well and answered the correct combination of questions. There were very few rubric errors.

In most cases candidates devoted appropriate time allocations to the different sections, but there were a few problems with **Section B** where it appears that a number of candidates ran out of time and did not fully complete all aspects of the marking criteria.

Whilst most candidates had a good understanding of materials and processes, some did not refer to specific materials and stated generic terms e.g. wood or metal.

Some candidates attempted questions where they could only answer parts of the question. It is important that candidates read all of the questions carefully before selecting which ones to answer.

In **Section A**, *Part A* was the most popular option with an even spread of attempts at all three questions.

The most popular questions in *Part C* were **Questions 8** and **9** and relatively few candidates attempted *Part B*.

Questions 10 and **12** were by far the most popular questions in **Section B**.

It would be helpful if this report is read in conjunction with a Question Paper.

Comments on specific questions

Section A

Part A – Product Design

Question 1

This was a very popular question, generally answered well. Most candidates demonstrated a good understanding of materials and related manufacturing processes. Some candidates devoted too much time on this question. Although the answers were mostly exceptional from those candidates, their **(b)** attempts tended to be incomplete.

- (a)** Aluminium and mild steel were the most common responses although a wide range of appropriate specific materials were accepted. Some candidates stated generic terms e.g. 'metal' and consequently did not gain a mark.
- (b)** There were some outstanding responses where candidates made excellent use of annotated sketches to describe in detail the stages of making a prototype handle.
- (c)** A number of candidates included details of the use of templates, jigs and formers to produce 5000 handles. The majority were aware of the large quantity required and selected different materials and processes, e.g. polypropylene for injection moulding.

Question 2

This was a popular question, generally well answered.

- (a) The most popular examples identified were: distance to pedals; position of steering wheel; position of rear view mirror and height of seat. Many candidates traced features from Fig. 2 to illustrate their answer. To achieve full marks candidates had to identify an example and explain the specific anthropometric measurements required for that example.
- (b) Whilst most candidates explained ergonomic features such as physiological factors concerning the force required to turn the wheel or depress the pedal and psychological factors such as the shape and colour, a significant number referred to anthropometric examples.

Question 3

This was a very popular question. Most candidates produced good responses but a large number spent far too long on part (c). Many produced detailed and lengthy construction plans when only 6 marks were awarded.

- (a) Although most candidates were able to list five design requirements, a large number used only single word responses e.g. size. Candidates must qualify such responses, e.g. use anthropometric data, to ensure the seat can hold up to four adults.
- (b) An annotated sketch was required to show a suitable design giving details of construction. Many candidates spent far too long on producing a plan for making.
- (c) Most stated a specific material and gave appropriate reasons for their choice. Some candidates used generic terms, e.g. wood, and were not awarded a mark.
- (d) This was very well answered with candidates making reference to factors such as shape, proportion and the environment in which it is placed.

Part B - Practical Technology

Question 4

This was generally well answered with excellent use of annotated sketches.

- (a) Candidates made attempts at all three processes with extrusion and blow moulding the most popular. Many responses were outstanding with candidates showing a detailed understanding of the processes concerned.
- (b) A significant number of candidates did not attempt this part.

Question 5

Few candidates attempted this question. Some answers were fully detailed and achieved very high marks. Other responses achieved full marks for some parts of the question, most often part (b) and (c), and no marks for the other two parts. It is important that candidates read all of the questions carefully before selecting which ones to answer.

- (a) Most candidates used appropriate examples to explain the difference between a frame and monocoque structure.
- (b) The vast majority of candidates determined the direction and magnitude of the equilibrant forces. A tolerance of + or - .3 was allowed.
- (c) Most candidates who attempted this part achieved very high marks. Some did not follow the instruction to 'use labelled sketches'.
- (d) The most popular examples were: using ribs to reinforce the tray; using a diagonal brace to give support at the back of the bookcase and using a gusset plate to strengthen the joint on the steel structure.

Question 6

Very few candidates attempted this question. Most answers were fully detailed and achieved v marks.

- (a) The vast majority calculated the correct resistance.
- (b) Most candidates explained the workings of a diode, some did not attempt to explain the workings of a strain gauge. In some cases, candidates did not give examples.
- (c) Almost all candidates achieved full marks on this part.

Part C – Graphic Products

Question 7

The least popular question in *Part C*. To achieve full marks candidates had to produce an *exploded, isometric* sketch, approximately *twice full size* and use a *thick and thin line* technique. Candidates should spend between 20 – 25 minutes on questions in **Section A**. Some responses were very rushed and lacking accuracy.

Question 8

Many candidates made good attempts at part (a) and ignored part (b).

- (a) Most candidates constructed the views required to generate the developments. A large number did not construct the true length on the pyramid to generate a true development. Some candidates did not include the surface used to display notices.
- (b) The best responses included details of using templates, CAD/CAM systems using creasers/cutters and assembly methods.

Question 9

It appears that some candidates may have been running out of time at the end of the Paper as this question was generally rushed by most candidates. A few had produced outstanding responses showing excellent graphic skills.

- (a) Although most candidates produced a list of four design considerations, a large number used only single word responses e.g. language. Candidates must qualify such responses e.g. use minimal words, or ensure correct terms are used (worldwide campaign).
- (b) Some candidates produced a simple and effective symbol drawn with care and accuracy. Too many candidates presented quick untidy sketches. Several candidates ignored the instruction for a monochrome symbol and used a range of colours in their design.
- (c) To achieve full marks on this part candidates needed to produce a sketch of an appropriate unit constructed from stiff card with clear details of the main dimension and of the folding or disassembly method used.

Section B

This section was answered well by the vast majority of candidates. Some candidates spent far too long on this section and did not do themselves justice on the questions in **Section A** and a few candidates spent far too long on **Section A** and ran out of time on **Section B**. Many candidates did not complete a proposed solution and evaluation.

Centres may wish to refer to comments made in the June 2002 report.

All candidates prepared their answers on A3 paper as instructed.

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 and did not look at the wider issues involved.

The best responses indicated at least 5 detailed points of analysis relating to the given problem.

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

Most candidates were able to produce a list of at least 5 detailed 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.

Question 10

A very popular question with a wide range of responses. Many candidates used their time well and demonstrated excellent design technique. The development of ideas tended to be weak with very few candidates making reference to materials or constructional details.

Many did not include details of attachment to the bicycle.

Question 11

Very few candidates attempted this question. Ideas tended to be very limited and proposed solutions lacked detail.

Question 12

This was a very popular question. Many responses were outstanding although in some cases it was evident that other questions suffered because of the amount of time spent on **Section B**. Some candidates made excellent attempts at the first part of this question but did not produce a design proposal or evaluation, again because of weak time management. Candidates produced a range of solutions for the packages and logo but in many cases did not develop them fully. Constructional details included printing and assembly were lacking.

<p>Paper 9705/04 Coursework Project 2</p>

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 from the previous sections 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 happen.

Part 7

Product realisation

The assessment of this section is based on the way in which candidates have independently undertaken the 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.