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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
Written

General comments

The performance of candidates was 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 production processes and manufacturing techniques where there was a distinct lack of appropriate technical knowledge and understanding.

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 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.

In ***Section B*** many 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 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.

Comments on specific questions

Section A

Question 1

Almost all candidates used sketches and notes to give at least some details about how the hole in the drawer front would be marked out and cut out. However, many candidates just stated the tools and equipment that would be used and failed to describe how they would be used to carry out the required processes. For example it was common to see answers such as 'A rule and pencil would be used to mark out the hole' with no indication about how the process of marking out would be done.

Question 2

This question was generally well answered with most candidates gaining at least some of the marks available in each of the three parts of the question. There was, however, some confusion about renewable and non renewable sources of energy. In part **(c)**, a limited number of candidates gave 'light' as one of their responses, a form of energy already stated in the question.

Question 3

In the main this question was poorly answered. Many answers failed to focus on the key aspects asked for in the question. A common error was to spend too long explaining how the holes would be marked out followed by only a very brief explanation of how the holes would be drilled and the screws inserted. Some candidates confused a clearance hole with a countersunk hole. Only a limited number of answers showed any real understanding about how the size of holes could be determined. Many candidates failed to include an appropriate sketch showing a cross-section through the two holes.

Question 4

The vast majority of candidates showed a very good understanding of the process of vacuum forming very good annotated sketches were seen. The most common error was to fail to explain that the p needed to be heated on the vacuum forming machine. In part **(b)** while a number of candidates incorre gave key features of the actual vacuum forming machine rather than the former many were able to identify that the former needed to have features such as sloping sides and rounded corners.

Question 5

Many candidates were able to explain was meant by the term 'ductility'. While in part **(b)** most candidates suggested some form of test that could be carried out many of the tests were not suitable for testing ductility. Some tests were too basic such as 'Hitting the metal with a hammer'. Many responses failed to take into account the need to 'Compare the ductility of different metals' and did not explain how the same test could be carried out consistently several times. Some responses identified the use of complex testing equipment. While marks were awarded in these cases the use of this type of equipment could not be described as a 'simple test'.

Section B

Question 6

While most candidates identified a wood in part **(a)** many failed to relate their reasons for its choice to the wood's suitability for its intended purpose i.e. lamination.

Some very good answers were seen in part **(b)(i)** of this question. These answers used a series of high quality annotated sketches to explain the formers required to laminate and bend one of the sides of the chair. However, answers of this type were in the minority. Many responses gave only superficial details and displayed only a limited understanding of the formers required.

Levels of response in part **(ii)** were similar to those in part **(i)** with answers giving either very full or only superficial details about the process of lamination. In a limited number of cases totally inappropriate methods, such as the use of a strip heater, were suggested as ways of bending the wood.

Part **(c)** of this question was generally well answered with a good number of candidates suggesting how appropriate methods such as mortise and tenon and dowel joints could be used to join the cross rail to the sides of the chair. Inappropriate methods that were seen included the use of screws and metal plates.

Question 7

While most candidates identified a metal in part **(a)** many failed to relate their reasons for its choice to the metal's suitability for casting and being used outside.

Part **(b)(i)** of this question was poorly answered by the majority of candidates. Many seemed to have confused the making of the pattern with the actual casting of the house number. Some very complex and often totally inappropriate ways of making the pattern were seen. Most candidates failed to describe that the pattern would probably best be made from four separate pieces which were then joined together. In almost all cases candidates failed to mention that the sides of the pattern would need to slope so that it could be removed from the casting sand.

Some very good answers were seen to part **(ii)** of this question which displayed a good understanding of the process of casting the house number. High scoring answers were those that used a series of annotated sketches to describe stage by stage how the process would be carried out. Weaker answers frequently showed one sketch of metal being poured into a mould. The full range of answers were seen to part **(c)** of this question. Again high scoring answers were those that used a series of annotated sketches to show the various aspects involved in attaching the house number to the wall. The weaker responses generally stated little more than 'It would be screwed to the wall'.

Question 8

While most candidates identified a plastic many failed to relate their reasons to aspects such as ability to resist moisture and that it would be easy to clean.

In part **(b)** most candidates gained at least some of the five marks available for listing in order the stages in making the bathroom fitting. The main stages were marking out, cutting out, making the holes, filing and polishing the edges and finally bending.

High scoring answers to part **(c)** were those that used a series of annotated sketches to describe stage by stage how each of the three processes in this part of the question would be carried out. Weaker answers frequently showed just one sketch with very little description of the process. In part **(i)** a reasonable understanding was generally shown about how a large 'hole saw' could be used or a small hole drilled and a coping saw inserted to cut the shape of the hole. Answers frequently failed to give details about how the edge of the hole would be cleaned up and polished. Most answers to part **(ii)** gave details about how the plastic would be heated and then bent using formers. In a limited number of cases little understanding was shown with statements such as 'The plastic could be bent by hitting it with a hammer' being made.

In part **(iii)** good descriptions of how the two holes would be made using a drilling machine or hand drill were much in evidence.

Section C

Question 9

In part **(a)** most candidates were able to explain that veneer could be glued to the MDF to make it look like solid pine.

The most common appropriate joints given in part **(b)** were mortise and tenon and dowel joints. Methods such as nails or screws were not considered appropriate in this situation.

In part **(c)** the most appropriate method of fixing was for the panel to go in a groove or a rebate. Some credit was given for stating that it could be nailed or screwed to the frame.

While most gained some marks in part **(d)** for giving advantages and disadvantages of the three types of door the level of discussion was generally limited.

In part **(e)** most candidates were able to name at least one material from which hinges are made.

In part **(f)** as with part **(d)** most candidates gave some advantages and disadvantages but failed to discuss why they were advantages or disadvantages. For example it was common to see responses such as 'The butt hinge looks good' without any discussion as to why.

Question 10

A good number of candidates were able to correctly identify to mechanism shown in part **(a)**.

In part **(b)** an appropriate power source was named by most candidates. In part **(c)** most candidates gave at least some of the properties of a thermoplastic and many were able to go on to name a suitable material for making the casing of the power drill.

In their responses to part **(d)** most candidates were able to identify advantages and disadvantages with each of the three types of drill but answers frequently lacked the level of discussion required to gain high marks. Candidates must examine the issues raised by the question and go on to interpret and explain the issues. They must introduce evidence wherever possible to support the conclusions of their arguments.

Question 11

In part **(a)** many candidates were able to name a suitable plastic and/or process for making the wheels.

Part **(b)** of this question was generally well answered. As well as giving advantages and disadvantages many candidates presented at least some level of discussion. For example many discussed how the hollow wheels would be lighter and therefore make it easier for young children to move.

In part **(c)** many candidates incorrectly tried to suggest improvements to the design of the toy which would overcome the safety hazards they had identified. This is not what the question asked for. Again the required level of discussion was lacking in many responses.

While ergonomic factors were often identified in part **(d)** there was often little discussion about how and why would have needed to have considered it. It was common to see statements such as 'The designer would need to know the length of a child's leg' without anything to say why.

Paper 9705/02

Coursework Project 1

General comments

Candidates should be congratulated on the imagination shown in the production of a wide range of projects. 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: car security device, water feature, coin counter, crocodile trap, wind tunnel, solar water heater, seedling cutter, bird feeder, table for a hospital bed, tuck shop design, fashion items, promotional material for various initiatives and organisations in addition to the normal range of domestic furniture and other devices.

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. It is very important that clear and detailed photographs of the models produced by candidates for 9705/02 Project 1 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 marks had been awarded and, generally speaking, the work was of a higher standard as candidates had a structure to follow and, as a result, covered all aspects of the assessment scheme.

There were a few cases where candidates had spent an inappropriate amount of time on certain aspects of their design folders often to the detriment of other sections. 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.

Centres are reminded of the need 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 the sample of work sent for moderation.

Comments on individual assessment criteria

Identification of a need or opportunity leading to a design brief

Most candidates gave consideration to the situation in their design brief but a detailed description of the user was not always included. Only when both are included can a clear picture of the design need be identified and full marks awarded.

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

Most candidates were able to identify a wide range of existing products but they did not always rela to the intended situation and user specified in their design brief. This section should not include irre information such as the history of products or information on components, materials and constructions be ideas have been generated and appraised. This part of the design process should be included as part o Product Development stage 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. Detail gathered and observations made should then be carried forward and referred to in the generation of ideas.

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 detailed observation and comment.

Successful candidates identified and collected data by 'working through' the purpose of the intended product and visualising its use in the design situation.

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

By this stage candidates should have some idea of the design of their intended product outcome. The modelling stage allows candidates the opportunity to explore ideas further either with regard to the appearance of the design or in terms of particular constructional or operating aspects of the design.

Successful candidates considered the most appropriate way of modelling their design ideas in terms of suitable materials and construction methods to be used. 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.

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.

Paper 9705/03
Written Paper

General comments

Centres are to be congratulated this year on their preparation of candidates and the excellent administration of scripts.

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. Several candidates only answered one question in ***Section A***.

There was a marked increase in the number of candidates who made reference to specific materials rather than generic terms in their responses.

The front cover of the exam paper gives candidates clear guidance as to what is required by the instruction 'discuss'. Most candidates raise a number of issues and explain them well. A large number do not introduce appropriate evidence to support their responses.

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 B* and *Part C*.

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

Comments on specific questions

Section A

Part A – Product design

Question 1

This was a very popular question, which was generally answered well. Most candidates selected appropriate examples of the use of the materials listed. A significant number gave examples that were not specific enough e.g. 'kitchen utensil' which makes it very difficult to explain why the properties of the material make it appropriate for that particular use.

Too many candidates listed the properties of the materials in part **(b)** and did not explain how the properties related to the given example.

Question 2

A popular question, with a wide range of responses.

A number of candidates did not comply with the instructions of the question to select one of the given examples.

Whilst some candidates produced very full and detailed answers, a large number raised and explained a number of relevant issues but did nit introduce any examples or evidence to support their answer.

Most referred to aesthetic details related to shape, selection of materials and finish. The common responses regarding unit costs included details of the complexity of design, and issues related to material selection and labour and assembly.

Many candidates linked the selection of processes as a key factor in determining the overall unit cost of the example selected.

Question 3

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

Many candidates gave specific examples of appropriate materials and demonstrated a clear understand of the process concerned but very few went on to describe the improvements in working characteristics and used to good effect.

Alloying Most candidates used duralumin as an example of an aluminium alloy and gave specific percentages of the constituent materials. Steel and brass were also popular choices.

Reinforcement The best responses used either concrete with steel reinforcement or glass fibre and polyester resin to produce Glass Reinforced Plastic as examples. The methods were well described but the improvement in working characteristics was not included by most candidates.

Lamination The most common response related to the lamination of specific wood veneers to create flat or curved boards. Many used diagrams effectively to describe the process of using formers to help to hold the desired shape whilst the glue set.

Some candidates gave details of the lamination of plastic or card e.g. in the production of membership cards.

Part B – Practical technology

Question 4

Most candidates who attempted this question fully completed parts **(a)** and **(b)** correctly. Very few accurately described a test to ascertain impact resistance and torsional strength.

(a) Virtually all candidates correctly defined ductility as the ability of a material to be draw into wire and elasticity as the ability of a material to return to its original shape after a load is removed.

(b) The most common example of a ductile material was copper to be used to make electrical wire. The most common example of an elastic material was rubber used to make elastic bands.

(c)(i) Very few candidates included details of the sample to be tested and the need to provide measurement of the force applied. Many candidates described hardness testing systems rather than resistance to impact.

(ii) Most candidates recognised the twisting nature of the test required. Very few considered how to hold and turn the sample and gave details of a comparative measurement system.

Question 5

There was a wide range of responses to this question. The most popular examples were:

Bicycle – chain and sprocket drive mechanism

Coping saw – screw mechanism to tension blade

Camera tripod – rack and pinion system to raise and lower the height of the camera

Umbrella – spring system/linkage system to open the canopy

Ironing board – linkage system

Car jack – crew and linkage system

Hand drill – bevel gears

Whilst there were some outstanding responses from candidates, some did not clearly describe the mechanism involved. In a number of cases sketches tended to be limited, lacking real detail and not sufficiently labelled.

Question 6

Very few candidates attempted this question. Parts **(a)** and **(b)** were often fully detailed and achie high marks.

(a) The vast majority named a thermistor as a sensor for temperature and a Light Dependant Resisto (LDR) as a sensor for light intensity.

(b) The most common examples given were:

thermistor – room temperature controller

LDR – for street lamps or burglar alarms

(c) Very few candidates produced an appropriate full circuit.

(d) Many candidates were able to describe the purpose of at least two components in the circuit.

Part C – Graphic products

Question 7

This was the least popular question in *Part C*. Most candidates used a correct construction technique to plot the locus. Some candidates lost marks by not plotting the point A at the end of the sliding point or by not using sufficient care and attention to detail.

Some candidates did not plot enough points to produce an accurate locus.

Question 8

Most candidates demonstrated a general appreciation of the need for 2D and 3D models. Many answers were comprehensive and fully detailed. A number of candidates however, only referred to the use of 3D models. Some candidates lost marks as they only answered part **(a)** or part **(b)**.

(a) Many candidates made reference to detailed, dimensioned 2D models, computer aided modelling and the use of 3D models to give a clear visual representation of ideas and as a way of testing particular features of a design. The use of models to highlight health and safety implications was frequently mentioned.

(b) The best responses included details of 2D modelling to position components e.g. batteries and the use of 3D models to test anthropometric and functional details.

Question 9

The most popular question in *Part C*. A number of candidates produced outstanding responses to part **(a)** but a significant number did not attempt part **(b)**.

(a) All candidates were able to produce an approximately full sized pictorial presentation of the clock. Line quality and rendering were usually of a very high quality.

(b) Some candidates did not attempt this part. Many were able to create an appropriate development, including gluing tabs and an appropriately positioned window. A number of candidates were not accurate enough and did not consider the correct orientation of the positioning of the mirror. Some gluing tabs would have obstructed the clear view through the window.

Section B

This section was answered well by the vast majority of candidates. Some candidates devoted too m on this section and did not do themselves justice on the questions in ***Section A***. A significant num candidates did not complete a proposed solution and evaluation.

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 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.

Some used scattercharts to present an analysis but in a number of cases, used single words or generic statements e.g. 'aesthetically pleasing', without any further qualification.

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.

Most candidates made reference to specific materials rather than use generic terms.

The standard of the development of ideas section continues to improve. Candidates used notes and sketches to develop selected features, clearly showing the reasoning behind decisions. A number of candidates spent 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.

Many proposed solutions included overall dimensions but did not include specific details such as the thickness of materials.

Evaluations tended to be charts giving ratings of performance for specification points. 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

The most popular question in ***Section B***. Many candidates used their time well and demonstrated excellent design thinking skills and very high quality presentation. Most candidates produced realistic solutions.

Question 11

Very few candidates attempted this question. Ideas tended to focus on an outside shell design for the timer and ignore circuit details, battery housings and methods of producing visual and audible signals.

Question 12

A popular question. Some responses were outstanding, showing a detailed understanding of the use of developments to produce 3D models, the ranges of card available and appropriate printing methods. A significant number however, produced outline sketches of vehicles and made very little reference to the requirement to produce a development. Constructional details included printing and assembly methods were lacking.

Paper 9705/04

Coursework Project 2

General comments

See Paper 9705/02

Comments on individual assessment criteria

Product development

This is the opportunity for candidates to take the chosen idea from Project 1 and to 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.

Candidates who benefited most from this development stage took account of the outcomes of modelling and became involved in meaningful trialling and testing of materials and constructions. They also considered how particular shapes and forms could be achieved.

Having developed their ideas through consideration of alternatives, candidates must give the reasons for decisions made if they are to be awarded high marks in this section. Unfortunately, this was the weakest section in many projects leading to 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.

Unfortunately some candidates produced this section after the product had been completed or simply included photographic evidence of the work in progress. In this way it simply formed a record or diary of what had already happened and showed no evidence of forward thinking. Marks cannot be awarded for this approach.

Product realisation

The quality of the final product and the way in which candidates have independently undertaken its production account for half of the total marks awarded to Project 2. Candidates are expected to take on tasks appropriate to this level of examination and to produce work of a high practical quality and standard of finish.

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 own initiative in the making stages and had worked on their own to 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 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

In many ways this is the section of the design process where many candidates do not seem to achi full potential. Very often the evaluation was simply a few unconnected observations, made b candidates themselves, about problems associated with the making of the artefact or in the production of design folder. Evaluations of this nature can be awarded few marks.

Meaningful evaluations included evidence of practical testing which led 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.

Successful candidates referred to the original specification points and commented on the level to which these had been satisfied. A list of the specification points with ticks or crosses, without comment, is not sufficient at this level of examination.

Good folders contained evidence indicating that designs had been carefully developed and thought through with subsequent acceptance and approval by the intended user(s).