

DESIGN AND TECHNOLOGY

Paper 9705/12
Written 12

Key Messages

Sections A and **B** were generally accessible where students had prepared well. Process knowledge was good and candidates showed a clear understanding of basic knowledge in all three questions in **Section A**. Occasionally health and safety points that students added were irrelevant to the process and were simply generic.

To really excel it is imperative that the specification receives full coverage through the scheme of work that can be used to deliver the material.

Section B Part (d) analysis questions were occasionally well attempted but candidates did not always identify the key phrases/requirements within the question or include relevant examples to evidence their understanding or extend their answers to justify full understanding of a relevant point.

General Comments

Candidates usually found the three questions in **Section C** accessible with some good answers seen. It is important that centres reiterate that the terms 'develop' and 'range' mean that the candidates should be offering several different ideas, which they then evaluate to allow further development into a final proposal for each part of the question. Components, mechanisms, and construction techniques were particularly helpful. Having a coherent layout of page with designated areas for a range of designs, evaluation, and development helps candidates to focus their attention and time.

Evaluation of candidate's initial ideas was often limited in detail and sometimes did not include any of the aspects that were very clearly requested in the question.

Comments on Specific Questions

Section A

Question 1

- (a) This was generally well answered and most candidates could state at least one reason why plywood had been chosen with the stability of the perpendicular veneers being a popular response.
- (b) (i) Good answers clearly detailed both marking out the position of the pivot and then drilling of the material to accept nuts and bolts or dowel. Many candidates used technical terms for the tools and equipment that were being used. Safety precautions were not always included.
 - (ii) Candidates gave a wide variety of answers to this question. Detailed answers included the use of a centre lathe or sand casting to produce the different sized brass weights.
- (c) Candidates often gave good detail in their answers with many responses offering vacuum forming. Unfortunately, some candidates gave answers that were not feasible and omitted the need for twelve trays to be manufactured.

Question 2

- (a) Most candidates were able to correctly explain at least one reason why recycled card had been chosen, with that it is environmentally friendly being a popular response.
- (b) This was generally a well-answered question, with candidates understanding the structure of a one-piece development net. Some answers omitted the double wall aspect.
- (c) (i) Candidates demonstrated a thorough understanding of marking out and cutting out the development net, including the use of tools and equipment. Safety precautions were often very sensibly described.
(ii) All candidates were able to demonstrate how to add a clear plastic cover. In some instances, the method of connecting the cover to the packaging was not feasible.

Question 3

- (a) This was a very popular question with candidates clearly understanding why MDF had been chosen as the material for the adjustable table.
- (b) (i)(ii) Candidates gave clear explanations of either using a template, marking out and cutting out with traditional methods or the use of CAD/CAM. Safety precautions were often included.
- (c) Candidates gave a very wide range of different responses to locking the table at different heights. The majority were sensible ideas and candidates usually scored well.

Section B

Question 4

- (a) Candidates clearly understood the function of **X**.
- (b) Many candidates answered this correctly. They identified several different problems with the design of the plant stand with stability, materials and a lack of drainage being popular responses.
- (c) Most candidates were able to respond to the two problems identified in **(b)** and used notes and sketches to show how the problems could be overcome. Those candidates who correctly identified problems and subsequently followed the instructions gave some excellent fully detailed answers that scored full marks.
- (d) Candidates gave a broad range of answers relating to the purchase of all resources before production begins. Explanations were often thorough but examples were not always given.

Question 5

- (a) Most candidates understood the function of the rubber strip.
- (b) Many candidates answered this correctly, identifying several different problems with the design of the shape sorter.
- (c) Most candidates were able to respond to the two problems identified in **(b)** and used notes and sketches to show how the problems could be overcome. Common answers focused on the weakness of foamboard as a material for a child's toy, access to the shapes once they are in the sorter, and the hardwood ends not being attached to the foamboard. Those candidates who correctly identified problems and subsequently followed the instructions gave some excellent fully detailed answers that scored full marks.
- (d) Candidates clearly understood how manufacturing a prototype before production begins could have both positive and negative impacts. Candidates who discussed issues such as checking for errors, materials choice and customer feedback answered well. Examples were not always given.

Question 6

- (a) Candidates were able to demonstrate an understanding of feature **X**.
- (b) Most candidates answered correctly, identifying several different problems with the design of the electric toothbrush. The size of the switch, a lack of ergonomics, and the brush not being replaceable were clearly communicated by candidates.
- (c) Candidates found this section straightforward if (b) had been answered well, often with good diagrams included.
- (d) Candidates often had a good understanding of why designers of products seek to make them energy efficient and communicated the benefits to the manufacturer and consumer. Some candidates did not extend their answers or give many examples.

Section C

Question 7

- (a) There were many well-structured answers showing ideas for attaching the pole to a vertical surface. Often ideas were very similar and occasionally vertical adjustment was a little limited. The final solution was often realistic with good detail. Evaluation ranged from generic commentary through to some good comments on positive and negative points.
- (b) Candidates offered some excellent ideas on extending the pole and locking in each position.
- (c) Candidates offered some good answers but some found it challenging to come up with a range of ideas for an adjustable system to space out the hangers and prevent them from falling off the end of the pole.
- (d) This question was generally answered well with a variety of rendering styles and quality. However, some candidates did not apply any render at all. There were some outstanding responses with superb three-dimensional drawings.

Question 8

- (a) Candidates often produced a range of ideas for a pop-up card. Three ideas were mostly produced with some candidates showing development. Evaluation ranged from generic commentary through to some excellent annotation of positive and negative points. Occasionally the pop-up aspect was not included.
- (b) Candidates did not always offer a range of different ideas for the tray, often with many similar outcomes. However, there were still some outstanding examples of different ideas for such an item with some very creative options given.
- (c) Candidates found this challenging and often found it difficult to offer a range of different packaging ideas. The address label as a seal and closure was sometimes omitted.
- (d) This question was generally well answered with a variety of rendering styles and quality. However, some candidates did not apply any render at all. There were some outstanding responses with superb three-dimensional drawings.

Question 9

- (a) Candidates were generally successful with this question. Three ideas were regularly produced with some candidates showing development. Evaluation ranged from generic commentary through to some excellent annotation of positive and negative points.
- (b) Candidates were able to detail one or more solutions for a temporary method of fixing the barrier in place. Some candidates found it challenging to offer a range of different ideas for making the barrier easy to move. They occasionally found the technical concepts a challenge to communicate.

- (c) Candidates were able to suggest a range of different devices to attach to the barrier to provide an audible or visual alarm. Occasionally candidates offered suggestions that did not fulfil the question, omitting the need for someone to trigger the alarm when they approached.
- (d) This question was generally answered well with a variety of rendering styles and quality. However, some candidates did not apply any render at all. There were some outstanding responses with superb three-dimensional drawings.

DESIGN AND TECHNOLOGY

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

Key messages

- Candidates are advised to focus on the design need and brief throughout the analysis and research stages of the project.
- Careful consideration needs to be given to the design of questionnaires, both in terms of the types of question used and who is asked to complete the questionnaire.
- Research should be fully analysed, and conclusions drawn that will impact upon the design specification. The inclusion of large amounts of information copied from websites is of little value unless analysed and conclusions drawn.
- The design specification should be presented as a list of points, with references made to the research undertaken.
- A wide range of appropriate ideas should be proposed and appraised in terms of fitness for purpose.
- The modelling of ideas should be fully recorded using high-quality photographic evidence and explanatory notes.
- Candidates are advised to number the pages of their project, use section headings, and securely fasten all pages together.

General comments

The school-based assessment for this syllabus can be offered either as two discrete components, Project 1 and Project 2, or as one larger piece of work combining the two projects in a holistic way. This report identifies each of the components separately but also acknowledges the overall design process where the two are combined.

Centres introduce the coursework in different ways. Some centres set a common theme or topic, from which each candidate identifies a design need, while others allow candidates the freedom to independently identify a design need. It is important that the evidence produced matches the requirements of the assessment criteria.

Comments on specific assessment criteria

Question 1

Identification of a need or opportunity leading to a design brief

This section of the project was generally completed to a very good standard, with many candidates scoring maximum marks.

Most candidates made it very clear how their chosen design problem linked to both the situation and the users. Both the situation and the users were usually described in detail, with photographic evidence often used to support the description. This was then usually followed by a clear design brief, leaving the reader in no doubt as to the intended design route being followed.

Question 2

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

This section of the project was generally completed to a good standard, with almost all candidates considering an appropriate range of research material and formulating a design specification.

The analysis of the research is a very important stage in the design process as it provides information from which an accurate and meaningful specification can be formulated. Many candidates produced a research plan to help them identify the areas they needed to research. In their research most candidates considered a wide range of existing products and analysed these using headings such as function, materials, cost and aesthetics.

Specifications were generally well formulated and included many specific requirements of the product to be designed. Generic points, that could apply to almost any product, should not be included in the specification unless fully justified.

Successful candidates clearly demonstrated how the analysis of their research led to the formulation of a detailed specification.

Question 3

Generation and appraisal of design ideas

This section of the project was generally completed to a very good standard.

A good range and high standard of communication techniques were used in the presentation of design ideas. Freehand sketching, with annotations, was the most seen communication technique used to show design ideas. This communication technique allowed candidates to demonstrate how their thought process had developed.

Some candidates chose to use Computer Aided Design (CAD) to show design ideas, which in a few cases appeared to restrict the flow of the design thinking. Candidates are advised to use freehand sketching for their initial ideas and then, if appropriate, progress to CAD or more accurate drawings.

Many candidates showed a high degree of flair in the creation of ideas. However, some candidates presented a range of drawings not linked to the specification or did not comment on their possible suitability for the problem being considered. The importance of presenting a wide range of different ideas, however impractical they may appear at the time, cannot be understated. All ideas should then be considered against the specification, with some form of written appraisal alongside each.

Question 4

Modelling of ideas

This section of the project provided evidence of a wide range of modelling techniques, with candidates having access to the appropriate materials, tools and equipment.

Modelling should be seen as one stage in the process of the testing and evaluation of design ideas so that a final design can be presented and subsequently developed, perhaps in Project 2. Many candidates produced several high-quality models that formed part of this process, whereas others simply produced a mock-up of the chosen design idea. The use of computer modelling, alongside physical models made from cardboard or resistant materials, was seen in many projects.

The quality of evidence used to record the modelling process and the outcomes was variable. In many cases photographic evidence and notes clearly demonstrated the design thinking, with conclusions highlighting what each model had contributed to the development of the design. In some cases, the photographic evidence was simply a photograph of the final model.

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Paper 9705/32
Written 32

Key messages

- When candidates are asked to explain why a process is particularly suitable for the production of a given item, such as in **Question 3(b)**, single word responses are not acceptable.
- When a question asks candidates to discuss, appropriate examples or evidence to support responses should be included.
- When answering **Section B** questions, candidates should use annotation to evaluate initial design ideas and make clear their reasons for selecting ideas or features to take forward for further development. Tick charts alone do not indicate design decision making.

General comments

Candidates used the time available effectively and made full attempts at both questions in **Section A** and at the selected question in **Section B**. There were very few rubric errors.

Candidates generally made good use of appropriate sketching and annotation to support their answers to questions in **Section A**.

Questions including the instruction to discuss were generally answered well but a number of candidates produced very brief responses with limited detail and did not access the higher mark ranges. A significant number of candidates did not include evidence to support the conclusions of arguments.

Comments on specific questions

Section A

Part A

Question 1

Candidates made good use of annotated sketches in their response to **(b)** and **(c)**.

- (a)** Some candidates stated an unsuitable material for the support for the bookshelf. For example, MDF would be not be suitable to hold the weight of books on a shelf. Mild steel and an appropriate hardwood such as beech were the most popular correct answers. Most candidates gave valid reasons for the choice of materials. However, some gave single word responses for a reason which could not be awarded full credit.
- (b)** Shaping and bending mild steel and drilling and brazing a rod in position was the most popular manufacturing method outlined. Some candidates spent a considerable amount of time describing the marking out stages and produced limited descriptions of the manufacture of the product,
- (c)** Most candidates correctly gave details of injection moulding to manufacture a batch of 50 000 identical supports. Few candidates gave full details of the design of mould to be used.

Question 2

Some answers were well structured and fully detailed. Most candidates described the range of modelling methods in detail but few discussed the importance of the range of modelling used in the design and

development of products. Some responses were very brief, with few issues raised and lacked sufficient detail to access the higher mark ranges.

Question 3

- (a) Most candidates used sketches and notes to produce detailed descriptions of the processes listed. Most had a very clear understanding of the chosen process. Responses to the etching of the copper achievement badge were particularly full and correctly detailed. Some candidates described in detail the process of making a stopped housing joint, a significant number of candidates gave details of incorrect joints. The process of line bending the phone holder was generally described well.
- (b) Some candidates gave valid explanations as to why the process was suitable for the specific item and achieved high marks. A significant number of candidates produced very brief responses, mostly single word answers, and did not access the higher mark range.

Part B

Question 4

Responses were mostly full and candidates compared the benefits and drawbacks of using the three material types for the garden tables given in detail. All of (a), (b) and (c) were considered.

Question 5

There were no attempts at this question.

Question 6

There were no attempts at this question.

Part C

Question 7

Candidates accurately drew the given plan and elevation to the correct scale for (a). Few candidates fully constructed the hole onto face A.

Answers to (b) were mostly brief and lacking appropriate detail. Candidates described a few formal drawing techniques but few discussed their importance to designers and engineers.

Question 8

- (a) Most candidates had an understanding of all of the drawing types given and used sketches and notes to describe them. Few candidates went on to explain how and why they would be used in a design situation.
- (b) Some candidates clearly explained the benefits of using freehand sketching when designing a product. Speed and ease of modification were the most common benefits given.

Question 9

There were no attempts at this question.

Section B

The overall performance of candidates on **Section B** was generally good with several very high quality examples of designing. Almost all candidates fully completed the requirements of the question attempted.

Some candidates produced a good analysis of their chosen situation, highlighting the key issues to consider. This helped to generate a detailed and justified specification. Some candidates produced generic spider diagrams with very limited reference to the given situation and received little credit.

Most candidates produced a reasonable range of well annotated design ideas which were generally well presented and detailed. Evaluation was clearly evident for some candidates and helped to identify ideas and features to take forward for development. Some candidates used a tick chart with no supporting comment which did not receive credit.

Higher marks are achieved when candidates give evaluative comments on their ideas and can make a reasoned judgment on the best solution or features to take forward for further development.

The development of ideas section was completed well by most candidates. A significant number of candidates presented detail of manufacture and assembly only. Candidates needed to consider the reasoning and composition of ideas that led to their single final design proposal.

Most proposed solutions were feasible. Most candidates included functional comment, key dimensions and detail such as material and finish used.

Few candidates produced full evaluations of their final proposed solution. Candidates were expected to include detail of the strengths and weaknesses of their solution. They needed to outline positive features and give details of possible improvements or modifications.

Question 10

There were some very good, full and detailed responses to this question. Candidates focused on the key points of circular table, ease of access for the diners and holding and replenishing six different dips or sauces.

Acceptable specifications included:

- that the product should have a handle that would enable a waiter to remove the product easily for refills;
- that materials used must be able to be cleaned and washed regularly to maintain hygiene;
- that the product could allow rotation for ease of access for diners;
- that dips or sauces could be held in containers that could be easily removed and fitted into the product to enable ease of refilling.

Question 11

Most responses included a good range of ideas for the containers and other features including signage, instructions to enable proper use and educational messages. Few candidates considered the need for the container to generate a noise or light effect when waste is placed in the appropriate section.

Acceptable specifications included:

- that the container must be easy to access for 5 – 11-year-olds to avoid spillage and harm;
- that the container should be easy to transport and to empty when full;
- that the container should have clear symbols and labels appropriate for 5 – 11-year-olds to identify the different types of waste section;
- that the container should be stable and able to withstand slight knocks without falling over.

Question 12

- There were no attempts at this question.

DESIGN AND TECHNOLOGY

Paper 9705/04
Project 2

Key messages

- Product development is a substantial and important stage in the development of the selected design idea and should be presented as evidence of practical design thinking rather than a collection of information on materials, constructions, finishes and other items.
- Product planning should show, using drawings and diagrams, all the information and the sequence of operations required to make the product.
- High-quality photographic evidence should be used to show both the making processes and the completed product.
- Conclusions should be drawn from the testing and evaluation and used to make proposals for further development of the product.
- Candidates are advised to number the pages of their project, use section headings, and securely fasten all pages together.

General comments

The school-based assessment for this syllabus can be offered either as two discrete components, Project 1 and Project 2, or as one larger piece of work combining the two projects in a holistic way. This report identifies each of the components separately but also acknowledges the overall design process where the two are combined.

The realised products were solutions to a wide variety of design problems, and it was obvious that many candidates had developed a keen interest in the area being studied. In addition to the usual range of household items and architectural models, there were several interesting outcomes relating to the sustainable use of materials or changes to routines during Covid-19.

Comments on specific assessment criteria

Question 1

Product development

This section of the project was generally completed to a good standard, with most candidates developing their chosen idea by making reasoned decisions about form, materials, and construction methods.

Successful candidates took the final design idea(s) from Project 1 and then considered all aspects of form, materials, components, constructions, finish and production methods in detail. All information was linked to the chosen idea and where alternatives had been considered and choices made, reasons for these were given.

This section of the assessment criteria also requires candidates to carry out some form of testing. This can be used to determine such things as materials or construction methods, but it should be obvious how this links to the design idea being developed. Candidates need to include written or photographic evidence that demonstrates that this has been carried out.

The final part of the development should include details of the final solution, mainly in the form of drawings, from which a skilled person could make the product. Orthographic drawings and exploded views were commonly used to show details of the final solution.

Question 2

Product planning

This section of the project was generally completed to a very good standard, with many candidates scoring maximum marks.

Most candidates set out the sequence for the main stages of production and often produced a flow chart, Gantt chart or table showing the main stages and time required for each stage. There is no requirement for candidates to show how basic techniques will be carried out, but many candidates included details of the more complex methods of manufacture.

Candidates are not required to include photographic evidence of all the stages of manufacture, but some photographs can be helpful when highlighting certain aspects of the manufacturing process.

Question 3

Product realisation

Many candidates produced high-quality products that could clearly be put to their intended use. Candidates had taken great care and showed enthusiasm in the making of their design outcomes in terms of construction methods and finishing techniques. Many well-developed practical skills were applied.

The use of Computer Aided Manufacturing (CAM), often using a laser cutter or 3D printer, was commonly seen but traditional construction methods were also evident in many folders.

Centres are reminded of the need to include clear and detailed photographic evidence of made products in line with the guidance set out in the syllabus document. These must be submitted as part of the project folio for moderation purposes.

Question 4

Testing and evaluation

This section of the project was generally completed to a very good standard, with candidates clearly demonstrating the testing of their product followed by proposals for further development.

Many candidates carried out meaningful testing and evaluation. This can only be achieved if the product is shown to be put to the use intended and the results compared to the original design brief and specification. It is always helpful when candidates include photographs of the product being used and tested in the intended environment.

The completion of questionnaires and the recording of views of others are only of use where the results can be collated and compared to the intended use of the product and some form of qualified judgement made and recorded.

Successful candidates clearly showed, using sketches and notes, proposals for further development of the product.