

# DESIGN AND TECHNOLOGY

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**Paper 6043/01**

**Paper 1**

## Key Messages

- Candidates are reminded not to use long pieces of continuous text to answer a 'note and sketches' type question. Problems should be broken down into detailed stages and should be aided by sketches.
- It is important that answers are presented clearly and orderly, with all related parts together; sometimes answers started out on lined paper then reverted to large sheets of drawing paper.

## General Comments

The standard of drawing and sketching is now at a very high level in some Centres. This graphic approach proved a valuable aid when answering the process section of the paper.

Most candidates showed good understanding of materials, but less with tools. For example using a metalworkers file to cut wood, heating aluminium with a strip heater. In the process section, the sequence of marking out on materials was answered with insufficient detail with many candidates just stating 'use a template'. Even a template needs to be marked out to get a shape.

Injection moulding and sand casting continue to be well understood and described, whereas the lathe is still not widely understood. Building up artefacts from pieces poses problems for many candidates.

Some candidates are still committing rubric errors by answering every question.

## Comments on specific questions

### **Part A**

#### **Question 1**

Most candidates were able to state two effects of hot weather on the chair. Answers ranged from shrinkage to splitting, etc.

#### **Question 2**

The sketching of a countersunk rivet proved of little difficulty; the machine screw was less well understood.

#### **Question 3**

This was very well answered by nearly all, with powder, granules and sheet as the main answers. Some candidates misunderstood the question and gave types of plastic.

#### **Question 4**

This was another well answered question, with most candidates stating that children put things in their mouths so would be poisoned by the toy.

#### **Question 5**

Only a small number of candidates understood the meaning of 'full scale mock up' and that it was a full size model used for testing.

### Question 6

There was a mixed response to this question, with candidates understanding that acrylic needs to be heated to soften, but not sure what needed to happen to meranti or brass.

### Question 7

This was a well answered question, with most candidates giving the correct answers – copper and steel.

### Question 8

There was good sketching of the two fittings, with the butt hinge proving to be the better known of the two.

### Question 9

This was a well understood safety question, with answers such as face mask, gloves, barrier cream, etc.

### Question 10

Only a small number of candidates were able to identify the lathe face plate and its use.

## Part B

### *Section 1 - Tools and Materials.*

### Question 11

Most candidates were well able to identify the three marking-out tools and their uses.

- (a) Tool A was usually correctly identified as a centre/dot punch and used for marking witness or centre points on metal.

Tool B was usually correctly identified as a marking knife and used for cutting across wood grain.

Tool C was usually correctly identified as a try/ engineering square used to test or mark at 90 degrees.

- (b) (i) Most candidates stated the decoration was for grip but failed to state its name or why grip was needed.
- (ii) Very few candidates understood the reason for the blade shape, with the flat side against the square and the bevelled side cutting in the waste material.
- (iii) Some candidates understood how to check the accuracy of a square, for example marking a line with the aid of the square, then turning the blade over and marking another line. If they are the same, the square is accurate.

- (c) The working of acrylic seemed to be understood by most, who stated that the scriber is used for cut lines, and not used for bending lines.

### Question 12

All candidates copied the chart as required and added the process and reason for use.

- (a) Soft solder- This was well answered with joining metals as the main process and low temperatures as the reason for use. Better candidates related the process to small electrical items.

Acid – This was less well answered, with only better candidates linking it with cleaning metals, etc.

Tensol Cement – This was known by nearly all, and its use in joining acrylics by means of solvent action.

Wire Wool – This was less well known by candidates.

Sand – Most candidates were able to relate this to casting of hot metals and its ability to form complex shapes when mixed with oil or water.

- (b) This part was well answered by all who attempted the question, showing good understanding of the problem insects can cause to timber.

### Question 13

This was a very popular question that was well answered.

- (a) Two properties were identified by the majority of candidates, including lightweight, flexible, colourful, easy to clean, hygienic as answers.

- (b) This section on unsuitable materials showed that candidates had a good knowledge of the three given materials.

Expanded polystyrene was known to be a soft weak material, not flexible and would crumble easily.

Mild steel was known to be heavy and would rust if it got damp. It was also stated that the material could be a danger with sharp edges.

Chipboard was known to have little strength, weak at the thickness stated, difficult to colour, etc.

- (c) The main material chosen for the bookmark by candidates was acrylic, with aluminium also a popular suggestion. Both would have been highly suitable.

- (d)(i) Some of the graphics for this section were excellent, with fine detail of the g-cramp, waste material, both supporting the work and protecting the surface.

- (ii) Again there were some excellent illustrations; however, some held the material on the flat of the bench instead of holding it vertical in a vice, which would have made it easier to cut out and finish the shape.

- (e) There was some excellent flower design work for the given surface.

### Section 2 - Processes

#### Question 14

This was another popular question, with candidates again using their graphic skills to good effect.

- (a) All candidates were well able to name a suitable material with an appropriate reason.
- (b)(i) As stated earlier, there was little real detail given by candidates of how to mark out a shape. Many just stated 'use a template' or thought they could do it with a pencil and a ruler.
- (ii) There were much better attempts at drilling the holes, with better candidates joining the support and cross piece together in some way for accuracy.
- (iii) All did well with the problem of the joint at **A**. A variety of joints appeared, such as housing joint, mortice and tenon, dowel, dovetail, screwed, etc.

#### Question 15

This was a popular question; candidates tackled the making in a number of ways.

- (a) All were well able to give two suitable properties for the ring game body.
- (b)(i) Most gave acrylic/aluminium as the suitable material for the body due to making it in one piece. Those that chose pine or beech tended to make the body in two pieces.

- (ii) There were some odd selections for the rod, such as mild steel and stainless steel because of their strength.
- (c) (i) In the main, this was well described by most candidates who used acrylic and the strip heater method. Some used a two piece method and nailed them together.
- (ii) There were some good solutions to this part, with most candidates suggesting to drill a hole in the body and one in the rod and gluing and screwing together. The best solutions reduced the end of the rod to form a shoulder.

#### Question 16

- (a) This was well answered by all who attempted it, with a wide range of safety features such as no loose parts, nothing to trap fingers, no sharp edges, non-toxic, etc.
- (b) (i) The popular method of forming the body was using acrylic and strip heating with the aid of formers. Others used aluminium and annealed the material before bending. Some tried to cast the shape in sand.
- (ii) Injection moulding proved to be the most popular method of producing the head with again some excellent sectional drawings of the process. Details such as the plastic granules, hopper, heater, screw, ram, mould, all appeared in the sketches. A small number did well and turned the shape on the lathe.
- (c) Most gave a crank and handle as the means of turning the spindle but all failed to explain how they were fixed to spindle.

#### Question 17

- (a) A range of materials given as suitable such as brass, silver, acrylic with reason as colour, easy to form, decorative, etc.
- (b) (i) Some candidates unnecessarily spent time explaining how to mark out the material when the question asked how to cut out the window. Most drilled a hole first to allow the blade of the frame saw to enter. Again some good graphics were used and details of holding work.
- (ii) Forming the holder shape was quite well done with most using a former for the final bend. Some built up the shape with wood veneers. However, a number tried to make the shape from a solid block of material.
- (iii) The better candidates built up the base from pieces while others cast the shape. A large number of candidates, less successfully, considered making the base from a solid piece of wood.

#### Question 18

- (a) The methods of construction tended to be sand casting or injection moulding with reasons such as complex shape, speed of production, less waste, etc.
- (b) Both the construction methods chosen were well presented with excellent detailed sketches of the processes. Each stage in the process was generally well explained.
- (c) Only the best candidates managed the problem of marking out the three holes. Some tried to mark the base from the top when you had to turn the support over and mark the flat bottom surface.

# DESIGN AND TECHNOLOGY

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**Paper 6043/02**  
**Design Project**

## Key Messages

- Candidates should be guided at the start of the design project to ensure that they eventually identify a problem which is within the candidate's capability and can be produced using the facilities available.
- Good time management is important for candidates to give an appropriate amount of attention to each section.

## General Comments

The theme **Food and Drink** provoked a wide range of design problems; very few candidates did not produce an artefact that did not have a direct or related connection to the theme. The theme provided a range of contexts in which food and drink was relevant and also a range of contexts in which food and drink might be consumed. Whilst this provided a useful starting point for more able candidates, some candidate's response to the theme area was restricted to problems they could identify within their own domestic situation. A few excellent design briefs were inspired by a relative or friend who had a real problem to solve. Many problems related to storing food, carrying food or keeping food hot or cold depending on the circumstances. The following list reveals a rich variety of problems which were identified from the research phase of the project:

Cool box, serving tray, portable food container for barbeques, menu and drink of the day display unit, food dispenser, bread container, tray for sick or invalid people, cutlery container, spices and condiments container, rice dispenser, bicycle drinks carrier, personal food container for school, foldaway chair for use at barbeque, cutlery box, container for storing food. Many candidates identified various methods of serving food in informal situations both inside the home and outdoors.

In some cases candidate's research lost the focus required to provide a single 'design problem area' from which a design brief could be formed. In many of these cases the candidates did not identify a sharply defined problem and specification; the subsequent development and refinement stages lacked focus and the final artefact did not always fulfil the expected function well.

## Comments on Individual Assessment Criteria

### *The Folio*

#### **General Analysis of Topic**

Overall management of the design folder is important if candidates are to reach the point where they can begin to make and complete the artefact within the time available. Some Centres clearly help candidates identify the amount of time available on a weekly basis and at the beginning of the project set out a time related plan. Where this approach is used, candidates rarely spend too much time on the initial theme investigation, with the result that the investigation is focused on identifying a problem. Candidates need support and advice to identify a design brief which is within the scope of the theme, within their making capabilities and the facilities available.

Managing the exploration of the theme is challenging and is better completed in projects that take one or two pages to set out the scope of the project theme and then immediately go on to identify a series of possible design situations which can be further developed. In some projects the theme exploration was too long and did not sensibly lead to a design situation which could be developed by the candidate. Some candidates developed a section where they considered 'open' and then 'closed' design problems which allowed them to quickly move from the general problem areas to specific problems within a focus area.

## **Formulation of Design Brief and Specification**

Most candidates identified a design brief which focused on a specific problem to be developed. Many showed a clear understanding of the role of the specification. Some candidates left the problem area generalised and unclear.

Setting out relevant specification points remains a challenge for some candidates. Specification points largely remain very general, and not specific to the problem being developed - for example, 'must be safe', 'must be stable'. Specification points need to be specific and unique to the actual design brief. Many candidates have been provided with prompt lists for the specification section; this approach, whilst useful, can be limiting, because it often results in a list of general points which have not been made relevant to the specific problem being developed.

## **Exploration of Ideas**

It is reasonable to expect candidates to develop several ideas in this section and there should be an absolute minimum of three different ideas for high marks to be scored; a significant number of candidates recorded more. A candidate may develop 5, 6, or more ideas, but this is advised only if they added value to the project. Candidates should be guided to move on to the development section if they think that the rest of the project could suffer as a consequence of spending too much time on this section.

In general this section was competently completed; the sketches and notes display a good understanding of the problem area. Better responses included evaluative comments and thoughts which not only added value to the ideas section but can also contribute marks to the Evaluation section.

## **Detailed Development of Proposed Solution**

Candidates presented a good range of techniques to develop their chosen idea; many realised that the detail, which will enable the artefact to be manufactured, should be resolved in this section. Stronger responses included testing of models and the exploration of types of materials, joints and finishes which would suit the overall solution. Candidates who spent an excessive amount of time producing general notes on joints, materials, fittings and finishes gained no further credit.

Some candidates made such a comprehensive response to the ideas section that they had run out of information and further refinements to add to the project folder for the development section. This makes marking more complex and therefore it would be helpful if candidates ensured they developed the chosen idea in this section of the folder.

## **Suitability of Chosen Materials and Construction**

Folders which made no reference anywhere in the project folder to materials and construction techniques scored low marks in this section. Better folders used specific pages to set out their decisions about the reasoned choice of materials and the reasons for choosing joints or approaches to the construction of the artefact.

## **Production Planning**

Photographs increasingly feature in this section; the addition of pictures taken at key stages in the production process augments the important planning process that ensures a candidate understands how to move from raw or prepared materials to the final product. Details about modifications should be recorded in the evaluation section for best effect. Better folios had a staged and annotated approach which clearly demonstrated they understood the sequence of production and in some cases they showed a detailed knowledge of the processes involved.

## **Communication**

In the majority of cases the design project folios are clearly the result of many hours of dedicated and carefully executed work. Graphic techniques are often enhanced by the use of computer based software and in many folders there is a balance between the use of computers and the continuing need to be able to present sketches and annotations which are created by the candidate. Some Centres have begun to use computer packages which obscure the graphical skill possessed by the candidate. Regardless of the medium used, this section rewards candidates who show an ability to communicate their thoughts and decisions in a clear way. Highest marks were awarded in this section to folders which displayed an

approach which brought together visually informative, colourful and, where appropriate, annotated sketches, charts and diagrams.

### ***The Artefact***

#### **Suitability of Proposed Solution**

Some Centres had judged their candidates to have comprehensively fulfilled the expectations of the specification and as a consequence awarded maximum marks in this section. In many cases where this had happened the artefact did not fulfil one or more of the specification points or the artefact could have been further refined or had features which could be further improved. Marks awarded in this section should not be confused with the workmanship or how dedicated or successful the candidate had been in making the artefact.

#### **Workmanship**

Many of the artefacts were complete and finished to a high standard and as a consequence high marks were awarded in this section.

It is important that every folder contains a good quality photograph/s of the finished artefact; this allows the moderation process to judge the detail of the finished artefact and so confirm the marks awarded by the Centre for the quality of the work.

#### **Evaluation**

A comprehensive evaluation should contain the following key elements.

- (1) Reference back to the design problem and the specification points made earlier in the project folder. (Specifications which were originally vague meant that candidate's assessment of the performance of the finished artefact remained general and really failed to assess some key aspects of the performance of the artefact.)
- (2) Testing of the artefact and a report on its performance
- (3) Reference to modifications and improvements which would be useful.

Some candidates tested the artefacts by asking friends and relatives what they thought of the artefact; whilst useful, this approach should be restricted in volume and should not replace the actual testing of the artefact.