

# DESIGN AND TECHNOLOGY

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Paper 6043/01  
Paper 1

## Key messages

Candidates should plan their time effectively on this paper. Candidates should spend no longer than 45 minutes on **Part A** and equal time on the four remaining questions from **Part B**, two questions from Section 1 Tools and Materials and two questions from Section 2 Processes.

Many candidates make no attempt at all at some questions in Part A. Candidates are advised to make an attempt at all questions in Part A, as there may be some point in their response that could gain a mark.

When using notes and sketches to describe a process or to show how a component could be manufactured, candidates should focus on the key stages. Some candidates spend too long focusing mainly on the marking out of materials. Candidates need to include sufficient detail of other parts of the process such as cutting, shaping, assembling and finishing, in order to access the full mark range.

## General comments

Most candidates followed the rubric and answered the correct combination of questions and used the time available well. There were a significant number of outstanding scripts from candidates: their responses were fully detailed and showed a clear and in-depth knowledge and understanding of design and technology.

It is important that candidates understand the instructions for this examination. Some candidates did not use the time allocation well and produced limited and incomplete responses for **Part A**. In **Part B**, many did not attempt the required four questions.

Most candidates made excellent use of annotated sketches to support their answers. Written responses were generally full and of appropriate detail. Some candidates often gave single word responses to questions that required a description or explanation and consequently access to the full mark range was limited.

**Questions 12 and 13** were the most popular questions in **Part B Section 1** – Tools and Materials.

**Questions 16 and 17** were the most popular choices in **Part B Section 2** – Processes.

It is helpful if this report is read in conjunction with the specification, the examination paper and mark scheme.

## Comments on specific questions

### Part A

#### Question 1

This question was generally well answered with drill and hole saw the most common correct answers for part (a), jigsaw and coping saw for part (b), dividers for part (c), centre punch for part (d), template for part (e), and marker for part (f).

## Question 2

Many candidates did not give the correct name of the equipment, bench hook, but were awarded credit for stating the purpose, holding work to saw accurately.

## Question 3

This question was generally well answered although not all responses included sufficient detail to clearly show a sash cramp to achieve 2 marks.

## Question 4

Some candidates knew the properties of beech, for example, that it does not splinter easily, is tough and takes a good finish and were awarded full marks.

## Question 5

Candidates needed to develop their knowledge for this question as few candidates correctly explained that tempering is a heat treatment used to increase toughness by reducing hardness.

## Question 6

Many candidates correctly stated that GRP stands for Glass Reinforced Plastic and gave correct products to achieve full marks. The most common correct products were boats and swimming pools.

## Question 7

This question was generally answered well. Most candidates correctly named Vernier callipers and micrometer.

## Question 8

Many candidates achieved full marks by correctly identifying appropriate specific materials for the products.

Expanded polystyrene for the cup, teak for the garden bench and stainless steel for the saucepan were the most popular correct responses although a wide range of other appropriate specific materials were accepted including pine with an appropriate finish for the bench.

## Question 9

Most candidates correctly stated two safety precautions when operating a drilling machine. Wearing appropriate PPE and securing work firmly were the most common correct responses.

## Question 10

Brass, bronze and steel were the most common correct responses for alloys and many candidates accessed a mark. Very few candidates correctly named two metals used in the alloy.

## Part B

### *Section 1 –Tools and Materials*

## Question 11

- (a) Many candidates correctly named Jack plane or Smoothing plane for tool A and described its use. Very few candidates correctly named the Spokeshave for tool B and described its use. Many correctly identified the rasp and described its use. Surform was accepted for tool C.
- (b)(i) Very few candidates could describe how the blade on the plane was adjusted.
- (ii) Some candidates correctly described how the cap iron could be loosened and the blade adjusted with the top thumb wheels.

- (iii) Candidates needed to develop their knowledge for this question as few achieved full marks on this part. Some candidates correctly described the clean single cut of the plane and the multiple rough cut of the rasp.
- (c) (i) Many candidates correctly sketched a countersink bit and explained its use. A significant number of candidates incorrectly sketched a countersink head screw.
- (ii) Many candidates correctly sketched a tap wrench and explained that it was used to turn a tap to create a thread. A significant number of candidates incorrectly drew a wrench.

### Question 12

This was a popular question with some excellent responses. Most candidates gave correct applications and properties for MDF, Acrylic, Plywood and Copper. Some candidates needed to develop their knowledge for this question in order to access marks relating to Phenol Formaldehyde and Duralumin.

### Question 13

A very popular question, generally answered well. Most candidates achieved very high marks for part (a) stating the two main material groups for wood, metal and plastic and naming specific materials in each group.

Although a significant number of candidates achieved full marks for part (b), some candidates did not name a specific material.

Few candidates made full attempts at part (c). The best responses were carefully structured, covering a range of global issues associated with the design, manufacture and use of products. Part (i) was generally well answered, raising two or more issues: relatively few candidates went beyond the cost to customer for part (ii).

### Question 14

Relatively few candidates opted to answer **Question 14** but there were some excellent attempts.

- (a) (i) Relatively few candidates named the correct tool as a die or die holder.
- (ii) Very few candidates correctly named a flat bottomed drill or forstner bit.
- (iii) Most candidates correctly named a coping saw or scroll saw for cutting a curve in acrylic sheet.
- (b) There were many excellent answers to this question where candidates identified the correct tools and described clearly how the material should be held whilst being cut. The use of annotated sketches was particularly good in this question.
- (c) Candidates needed to improve their knowledge for this question as few candidates fully explained the importance of well-maintained tools when making products. The best responses included details of the speed and ease of making a cut and quality of finish as well as safety implications of using blunt tools.

## Section 2 – Processes

### Question 15

This was not a very popular choice of question but it was answered very well by some candidates. A number of candidates misread the question and described manufacturing details of the clothes rack with minimal description of the peg. Annotated sketching was particularly strong in this question.

- (a) Most candidates stated an appropriate material and gave reasons for their choice. Some candidates needed to develop their knowledge for this question as they only suggested generic terms, wood, metal and plastic and did not achieve a mark.
- (b) (i) Some candidates ignored the instruction to describe how to make one peg and gave details of injection moulding: a process not suitable for one peg. Some of the best responses included full details of turning the peg on a lathe.

- (ii) The best responses to this part included shape profile templates, the use of Vernier callipers and micrometers to check diameters and steel rule checks on lengths.
- (iii) This question was generally well answered with most candidates describing appropriate finishing methods.

### Question 16

There were a number of excellent responses to this question. Parts (b) and (c) were the most popular options. The use of annotated sketches was particularly good for this question.

- (a) A few candidates gave excellent descriptions of the hollowing process. Many candidates needed to improve their understanding for this question as they did not have knowledge of the process of hollowing and incorrectly described other methods of producing the strainer.
- (b) There were a number of excellent full responses to this part. All candidates had an understanding of the basic principles of Injection Moulding. Some candidates however provided limited supporting detail and consequently did not access the full mark range.
- (c) Some candidates had a good understanding of steam bending and clearly described the process of making the side of the guitar. Many candidates did not describe how the shape was formed after the side was steamed.

### Question 17

There were some excellent responses to this question, but many candidates produced very brief responses for each part and did not provide sufficient detail of the processes to access the full mark range.

- (a) (i) Most candidates named a suitable material for the base and correctly described an appropriate forming process. There were a wide range of appropriate materials proposed and valid forming processes described.
- (ii) Candidates needed to improve their knowledge for this question as it was not answered well. A few candidates produced excellent answers using bending jigs but most produced very limited descriptions or inappropriate methods of making the handle. Cutting the shape from a solid block of steel, aluminium or wood is not feasible.
- (iii) Turning an appropriate specific hardwood and casting and turning an aluminium base were the most common responses.
- (b) There were some very innovative proposals for storing the holders, most requiring a simple removal and attachment system for the handle. Modifications involving folding methods for the handle and slight changes to the base were also popular.

### Question 18

Some candidates produced detailed responses for all parts of this question, however some produced very brief answers with very limited detail.

- (a) (i) Most candidates clearly described the marking out of the joint at A but very few went on to describe an appropriate method of joining the steel frame. The best responses fully described how the joint would be welded or brazed.
- (ii) Candidates generally understood the process of laminating with regards to the seat. A significant number of candidates did not make an attempt at this part.
- (iii) A few candidates described an appropriate method of making the end cap. Many were very brief and limited responses.
- (b) This part was generally well answered with very good use of annotated sketching. Many candidates correctly described the joining of the seat to the frame with the use of screws or rivets.

# DESIGN AND TECHNOLOGY

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Paper 6043/02  
Design Project

## Key messages

- It is important that candidates identify a specific problem to be developed by thoroughly investigating the 'theme' and from the investigation, identify several potential problem areas before they move to the formulation of a design brief.
- Candidates can use 2D/3D models or use virtual modelling to help them to make decisions about form, materials and construction.
- Candidates should produce a wide range of potential solutions; evaluation and development of each idea should involve consideration of the Specification.

## General comments

2017 was the second year the revised assessment criteria for the Design Project have been applied; they more sharply focus on the key assessment elements of the Project.

The new assessment criteria have been designed to help teachers focus more precisely on the different levels of achievement within an assessment criterion when marking candidate's work. Candidates need to submit evidence in their Project that includes all assessment elements of the criterion. For example, 'Generation and exploration of ideas', must include the following; a wide range of appropriate potential solutions, detailed evaluation and development of ideas with consideration of the specification. Some work consisting of two or three simple sketches with one word annotations was marked in the higher categories of the marks, this situation sometimes required marks to be reduced during the Moderation process.

## Support for candidates

In line, with the advice given in previous examiner reports, an increasing number of 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. Most centres now support candidates sufficiently to allow them to independently identify a design brief which is within the scope of the theme, within their making capabilities, and the facilities available. This approach provides professional guidance at the early stages of the design process and so ensures the candidate will not struggle because they have not been realistic about their skills and the scope of the overall project. The project theme 'Learning aid' sets out the level of teacher support and guidance which is appropriate under the section 'Notes to Teachers'.

## Comments on specific questions

### *The design folio*

#### **General analysis of theme – Learning aid**

The theme **learning aid** provided a wide range of opportunities for candidates to develop design problem briefs. The majority of candidates found no difficulty in finding a problem area. Mind mapping was used as a focus technique as well as mood boards; some candidates produced mood boards crammed with photos which led to a good understanding of the theme 'Learning aid'.

Five marks are available for the exploration of the theme. The high-level assessment criteria demand a 'thorough investigation with several potential design problem areas identified'. Many candidates set out several possible areas for development. Some candidates gave an exhaustive comment on every thread listed in the theme; it is not the intention of the theme that every thread should be explored. Candidates should be advised to explore those that interest them, be selective or create their own threads. In some cases, candidates spent too much time on this section.

The theme threads are copied here to demonstrate how helpful they can be in assisting a candidate in finding a design problem they wish to tackle.

Candidates should be encouraged to move directly to problem areas from which to identify and clarify a specific design brief. Endless pages filled with words which might loosely be associated with the theme, add little to the important task of identifying a design problem area.

#### **Learning aid – 2017 threads:**

- babies
- pre-school children
- young adults
- pets
- reading and writing
- mathematical principles or formulae
- adults with learning difficulties
- games
- skill developer
- sporting rules
- scientific principles
- remembering important dates or events
- important concepts in school subjects.

Candidates provided a variety of responses to the theme 'learning aid', the range of artefacts included: a bell mechanism for a cat to learn how to enter a house, swimming buoyancy aid, puzzles, chop stick learning aid, sports rules, counting frame, shoe lace tying learning aid, reading aid for a partially sighted person, toys which helped learning, training aid for dogs.

#### **Formulation of design brief resulting in a specification**

Design briefs were generally clear and to the point.

Ten marks are now available in this section. For the higher-level mark range to be awarded a folio must contain a concise design brief, evidence of relevant investigation which identifies the design need and the intended users - leading to a precise list of measurable specification points. Without all of these elements present it is not possible to award full marks in this section.

#### **Generation and exploration of ideas**

In this section, it is helpful if candidates produce a commentary which reveals their thinking during this stage of the design process. Annotations, mini sketches and additional information all help to 'tell the story' as the work goes forward.

The addition of colour and shading always improves the impact of the ideas.

At some point in this section, it is important that consideration/evaluation of the specification points is made, either for each idea or at the end of the section.

## Detailed development of the proposed solution

Development of the proposed idea ranged from a simple final drawing to a step by step analysis of the idea being developed. No formal drawing is demanded in this section but where candidates used Orthographic or a pictorial view of the proposed artefact, the work often gained high marks.

Use of 2D/3D models or virtual modelling can be used to help the candidate make decisions about form, materials and construction.

## Production Planning

Many candidates used a table to organise their production plan. Photographs were often used to good effect in this section. Candidates used pictures to augment the step by step process chart but they should not just present a sequence of photographs without explanation. The photographs are often taken during manufacture, if this is the case, the candidate must comment on the tools, processes and materials being used.

## Communication

For high marks to be awarded folders must contain visually informative, colourful and, where appropriate, annotated sketches, charts and diagrams. The majority of candidates are very competent at presenting a well organised folio, often with a contents page and clearly numbered pages.

The inclusion of proformas/templates used to encourage candidates to make a comprehensive response to a section must not be added to a project without extensive personalisation by the candidate. This approach could restrict the creative and open response many candidates bring to their folders.

Excessive use of CAD packages should be avoided so that candidates can also reveal their own hand skills in visually presenting ideas, sketching and making more formal drawings. The assessment criterion for Communication clearly shows the expectation that candidates must show personal skills in communication.

## *The Artefact*

### Artefact realisation

Many of the artefacts are completed to a high standard and candidates are credited with high marks in this section.

**Note:** 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

Evaluations can usefully contain the following key features:

- objective testing of the artefact
- reference to the design brief and the success or failure of specification points
- detailed conclusions leading to proposals for further development.

Photographs, sketches and information about the performance of the artefact all add to the quality of the evaluation.