

# DESIGN AND TECHNOLOGY

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Paper 6043/01

Paper 1

## General comments

The general performance of candidates was good this year. Most candidates followed the rubric by answering the correct combination of questions and used the time available well. There were a number of outstanding scripts from candidates, fully detailed and showing a clear and in-depth knowledge and understanding of design and technology. Candidates and Centres are congratulated on the high quality of work presented.

Some candidates did not use the time allocation well and produced very limited responses for some questions in **Part B** or did not attempt the required four questions.

Most candidates made very good use of annotated sketches. Written responses were generally full and of appropriate detail, although some candidates gave single word responses to questions requiring a description and consequently access to the full mark range was limited.

Whilst most candidates made good attempts at all questions in **Part A**, a significant number answered only two or three questions.

**Questions 11 and 12** were the most popular questions in **Part B Section 1 – Tools and Materials**.

**Questions 14, 15 and 16** 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 question paper and mark scheme.

## Comments on specific questions

### Part A

#### Question 1

Most candidates correctly named two processes that could be used to make the shop sign.

#### Question 2

A well answered question, the majority of candidates accurately sketched a pad saw and a junior hacksaw.

#### Question 3

Some candidates correctly gave 'preventing oxidisation' and 'breaking down surface tension allowing the flow of solder/spelter' as reasons for using a flux. A large number of candidates did not attempt this question.

#### Question 4

Many candidates correctly identified the hot wire cutter. Not all candidates went on to state its purpose; cutting polystyrene foam.

#### Question 5

A generally well answered question. Most candidates named at least two wood finishes.

### Question 6

Most candidates stated that annealing would soften a metal or relieve internal stresses. To achieve full marks, candidates needed to explain the metal would need to be heated to a desired temperature and left to cool to bring about the change.

### Question 7

The best responses stated factors such as, the height of the desk for comfortable usage; the need for storage or placement of equipment; and the width of the desk to take into consideration the width of the user's legs. Some candidates made single word answers such as 'height' and 'width' with no reference to the desk or user and consequently did not access the full marks available.

### Question 8

Some candidates gave three correct answers. Many candidates accessed one mark by stating a chuck. A significant number of candidates did not make an attempt at this question.

### Question 9

Most candidates gave two correct reasons why aluminium was chosen for the drinks can. 'Lightweight' and 'easily shaped' were the most common correct responses.

### Question 10

Many candidates correctly named expanded polystyrene as a suitable plastic for the insulated packaging of food. Relatively few candidates correctly named melamine (formica) as a suitable plastic for a kitchen table surface. PVC and polyurethane foam were the most common correct responses for upholstery use. Most candidates correctly named acrylic for the illuminated sign.

## Part B

### *Section 1 – Tools and Materials*

#### Question 11

A very popular question, generally well answered.

- (a) Most candidates correctly named the claw hammer and screwdriver and stated their purpose. Relatively few candidates named the rawhide mallet but many stated that it would be used for shaping thin metal and achieved credit.
- (b)(i) Virtually all candidates correctly stated that the wood would be used to prevent damage to the workpiece when removing nails. Most used a simple sketch to make the point clear.
- (ii) Many candidates were awarded credit for stating that the rawhide mallet would not get damaged when used on metal.
- (iii) Most candidates correctly explained that the insulated handle would protect the user from shock when carrying out electrical work.
- (c) Many candidates correctly sketched a nail punch. Fewer candidates correctly sketched pincers. Many incorrectly sketched pliers.

### Question 12

(a) Generally well answered. The most common correct responses were:

	<i>Reason for selection</i>	<i>Reason for rejection</i>
<i>Aluminium</i>	Will not rust	Could have sharp edge
<i>Beech</i>	Attractive/close grain	Could split/break if solid
<i>Acrylic</i>	Easy to form	Brittle, breaks easily

(b) Most candidates correctly described using a strip heater to bend the acrylic. Some described the steam bending of beech. Only a few candidates correctly described heating aluminium with a blowtorch to help the bending process.

(c) Most candidates gave a correct reason for each of the situations. The most common correct responses being:

- rounding the corners of the aluminium to prevent injury to the user;
- waxing the beech handle to enhance its appearance and give protection from staining;
- film on the surface of acrylic to enable marking out and prevent scratches.

### Question 13

Not a popular choice of question and generally not well answered. Very few candidates achieved marks in the middle/higher mark ranges.

(a) Very few candidates described how each material had been modified to improve its strength.

(b) Explanations were often lacking appropriate detail and were incorrect. Very few candidates referred to the use of a well finished mould to provide a smooth finish on the boat. Some candidates described the use of a former to hold the laminations whilst gluing. Whilst some candidates were awarded credit for the effect on the cutting edge of grinding across the blade, very few candidates considered the effect of heat caused when grinding, which can affect the structure of the metal.

(c) Very few candidates recognised the heat resistance qualities of melamine. Some candidates correctly asserted that adding carbon to steel makes the steel harder. Very few candidates mentioned that mild steel can be case hardened by heating the mild steel and dipping it into a carbon-rich compound.

## Section 2 – Processes

### Question 14

A popular question with a full range of responses, including some outstanding attempts.

(a) The majority of candidates stated two correct properties that a material should have to be suitable for the skittle.

(b) This part was answered very well. Most candidates selected option (i) 'injection moulding' and option (ii) 'casting'. Many answers were fully detailed and supported by very high quality annotated sketches. Although a few candidates attempting option (iii) 'turning on a wood turning lathe' produced detailed responses, the majority of attempts at this option were very thin and lacking the technical detail required to access the middle and higher mark ranges.

### Question 15

Although a popular choice of question, it was not answered well by many candidates. Most candidates tended to answer one option well but appeared to not have as good knowledge and understanding of the second option.

Many candidates correctly described the process of cleaning then heating the mild steel wire rack and dipping it into a fluidizing tank. Relatively few fully described the process of marking out and cutting a finger joint, though the marking out was generally well described. Very few candidates fully described the process of countersink riveting.

### Question 16

- (a) Almost all candidates stated two appropriate properties for the winding device.
- (b)(i) Most candidates fully described the marking out process for the side pieces.
  - (ii) Many candidates described a detailed drilling process but not all accessed the full marks by ensuring true alignment of the holes.
  - (iii) A few candidates produced excellent responses to this part but most candidates did not produce a valid or effective method of joining the handles to the sides.
- (c) Most candidates used clear sketches to show an improvement for the handle.

### Question 17

There were a number of excellent responses to this question, however, many candidates failed to fully complete all parts.

- (a) Most candidates suggested a suitable material for the work station and gave valid reasons for their choice.
- (b) There were a few outstanding attempts to this part, fully detailed descriptions and excellent annotated sketches to support the answer. Too many candidates did not select a valid method of construction, or fully complete this part.
- (c) Most candidates produced appropriate improvements, although many responses were very brief and limited in detail.

### Question 18

Most candidates produced detailed responses for at least two of the terms given. A few candidates produced full and detailed responses for all options.

- A** Soft soldering – generally well answered, with candidates using clear sketches to describe the key features of the process.
- B** Use of knock down fittings – some candidates produced detailed responses showing an example of a KD fitting to demonstrate its features. Many candidates made very brief attempts or did not fully complete this part.
- C** Blow moulding – generally well answered, candidates correctly described either extrusion blow moulding or free blow moulding. Clear, well annotated sketches were a feature on this question.
- D** Knurling – very few candidates produced a correct response to this question.

# DESIGN AND TECHNOLOGY

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Paper 6043/02  
Design Project

## General Comments

The theme topic with the title of **Portability** provided a wide range of starting points for candidates to develop into problem areas. The majority of candidates found no difficulty in finding a problem to develop and the theme provoked an appropriate volume of research at this stage. Candidates generally defined what they thought the word portability meant, sometimes referring to dictionary definitions or views of relatives and friends. Candidates' personal definitions varied but included: carrying, moving, transporting, carried or moved with ease, capable of being transferred from one place to another. Many candidates sensibly looked at two or three general areas before they went on to identify a specific problem area they wished to pursue. Some candidates remained vague about what interested them and so as the work progressed, their design folio tended to lack direction.

The published theme provided a number of possible ideas (threads) for the candidates to pursue. The threads are included to ensure that every candidate can access the theme and by seeing a wide range of starting points appreciate the breadth of the theme. Some candidates only pursued one thread whilst others tackled several of the threads. It is not expected that candidates should exhaust every thread before they develop a design area further.

Eleven threads were provided, many candidates understandably followed the 'personal items' thread, whilst a range of threads proved popular, for example, 'carrying food and drink', 'safe movement of small animals', 'using tools', 'personal items' and 'equipment in different locations'.

As noted in previous reports, some excellent design briefs were initiated by a relative or friend of the family who had a problem to solve. In many instances where a candidate had identified a problem in this way the candidate revealed a clear direction and focus on the key design issues in the folio.

Candidates provided a variety of responses to the theme and the range of artefacts included: personal office items – mobile office box, animal carrier, outdoor games carrier, watching television tray, safe storage and transport of tools, test tube storage rack for School science lab, carrier of teachers' classroom sized set squares and tee squares, car rubbish tidy, tool box on wheels, pen/pencil case, camping equipment carrier, makeup or jewellery box.

Many candidates included some form of 'project planning' tool, this often took the form of a Gantt chart. Candidates who completed a planning document and revisited it during the progress of the project, in general, presented a well organised and comprehensive folio. Candidates who just shaded blocks of lessons or weeks did not show a full understanding of the use of such a planning document.

## Comments on Individual Assessment Criteria

### Part A - Design Folio

#### General Analysis of Topic

In line with the advice given in previous annual 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. The published project theme sets out the level of teacher support and guidance which is appropriate under the section 'Notes to Teachers'. 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 maximise the opportunity because they have been realistic about the scope of the overall project.

Use of bubble diagrams, mind maps, scatter charts and other approaches all help candidates to complete a full analysis of the theme, candidates usually identified a design area they wanted to pursue.

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

Short, clear and concise statements produced the best design briefs. Most candidates identified a design brief which focused on a specific problem to be developed and consequently the design briefs were clear and to the point. Only a few candidates made general statements about producing 'something' to solve a problem.

Some candidates did not seem clear about the role of the specification, specification points need to be specific to the context of the problem being developed. Many candidates make general statements which could apply to any problem. Specification points which remain general, for example, 'must be safe', 'must be stable' 'look nice' do not provide an adequate basis for evaluating the artefact once it has been manufactured.

### **Exploration of Ideas**

This section continues to be completed well by candidates; the sketches and notes usually display a good understanding of the problem area. Better responses included evaluative comments and thoughts which not only add value to the ideas section but can also, if clearly labelled as evaluation comments, contribute to the overall assessment of the evaluation.

### **Detailed Development of 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.

Some candidates made such a comprehensive response in the ideas section that they had no further refinements to add for the development section; guidance to candidates would help them balance the work across the two assessment sections.

### **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 a specific page/s 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. Repetitive information copied from a text book regarding tools and materials, adds little value to the work in this section.

### **Production Planning**

Many candidates used sketches of tools and processes to augment the step by step process chart which is required for this section of marks. Photographs were also used to good effect in this section.

### **Communication**

Communication covers the whole folio and marks were awarded to folders which were visually informative, colourful and, where appropriate, used annotated sketches, charts and diagrams. Many Centres now use computer software to enhance the design work of candidates. Excessive use of CAD packages should be avoided so that candidates can reveal their own hand skills when they are visually presenting ideas, sketching and making more formal drawings. Many pages of computer created writing do not add value to the folio.

## **Part B - The Design Artefact**

### **Suitability of Proposed Solution**

Candidates were often awarded high marks for this section, it is important that all aspects of suitability are taken account in the assessment of the work presented by candidates.

## Workmanship

Most candidates presented well finished artefacts. The quality of the work presented reflects the confidence candidates have in their practical skills at this stage of the design process.

**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 were presented in either a very comprehensive way or they lacked structure and were superficial. Better evaluations incorporated the following areas:

- Judgement of performance against the specification points
- Testing the artefact in the context of use
- Suggestions for modification of the artefact