DESIGN AND TECHNOLOGY

Paper 6043/01
Paper 1

Key messages

Candidates should be reminded to follow the rubric.

In order to access the full range of marks available, diagrams must include sufficient detail and annotations.

General comments

The majority of candidates followed the rubric and answered the correct combination of questions and used the time available well. It was pleasing to see that there were a number of outstanding scripts, full of appropriate detail and showing that candidates had a clear and in-depth knowledge and understanding of design and technology. The use of annotated sketching was generally good but some candidates did not include sufficient detail when asked to sketch specific tools or describe processes.

A significant number of candidates did not use the time allocation well and produced very limited responses for some questions in Part B; some did not attempt the required four questions. Several candidates made very brief attempts at most or all the questions. This is to be discouraged as only four questions will be accepted and a lot of valuable time is wasted which could be used more profitably to add more detail to the required number of questions.

Written responses were generally full and of appropriate detail, although a significant number of candidates did not make an attempt at some questions or gave single word or very brief responses to questions requiring a description, and consequently did not access to the full mark range.

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

Questions **11** and **13** were the most popular questions in Part B Section 1 – Tools and Materials.

Questions **15** and **18** were the most popular choices in Part B Section 2 – Processes.

Comments on specific questions

Part A

Question 1

Most candidates stated a suitable material that could be used to make the bucket but not all candidates gave an appropriate reason for their choice.

Question 2

A well answered question, the majority of candidates accurately sketched a marking gauge and a scriber.

Question 3

Some candidates correctly defined the terms ductility and elasticity. Most correctly identified a material that was elastic, fewer named a material that was ductile. Many candidates did not attempt this question.

Question 4

A few candidates correctly named the centre drill and described how it is used to either locate a centre for further drilling or preparing a bar to accept a tailstock centre on a lathe.

Question 5

Very few candidates identified the dovetail joint. Some candidates gave fully correct answers explaining the mechanical advantages of the joint, many using a drawer as an example.

Question 6

There were a number of candidates who achieved full marks in this question by using a sketch to clearly identify two features of a former. Tapered draft angle and vent holes were the most common correct answers.

Many candidates sketched a vacuum forming machine but did not focus on the features of the former.

Question 7

This question was generally answered well. Most candidates stated the weather resistant properties of aluminium; a significant number did not give a second reason.

Question 8

Many candidates gave three correct answers of **(a)** wet and dry paper, **(b)** glasspaper and **(c)** emery paper. Different correct names and types of abrasives were accepted.

Question 9

Very few candidates acknowledged the problems of planning end grain and correctly identified a shooting board or the use of a sacrificial piece of wood to prevent splitting.

Question 10

Many candidates correctly described how to use a template and marker or chinagraph pencil to mark out the shape on acrylic. A scriber was not accepted as it leaves a permanent mark and can cause deep scratches which are hard to remove.

Relatively few candidates correctly described the use of a solvent or cement such as Tensol to permanently attach the shape to the key tag.

Part B

Section 1 –Tools and Materials.

Question 11

This question on saws was very popular and generally well answered.

(a) Many candidates correctly named the hack saw, the coping saw and tenon saw. A dovetail saw was also accepted for saw C. Most stated a correct use for each.

(b) (i) Very few candidates explained with a sketch that with the blade set at 90° a greater depth can be cut. Many candidates did not attempt this part.

(ii) Some candidates correctly explained how the blade would be held in the two pins and the handle turned to tension the blade. Many candidates did not attempt this part.

(iii) Most candidates correctly explained that the back gives stiffness to the blade to enable a straight and accurate cut.

(c) (i) Very few candidates correctly sketched a tension file.

(ii) Many candidates correctly sketched a hole saw.

Question 12

Very few candidates attempted this question on smart materials. Most of those who attempted it answered part **(a)** exceptionally well showing detailed knowledge and understanding of smart materials.

Some candidates did not go on to complete part **(b)**. Of those who did attempt part **(b),** the best responses made reference to the destruction of the rain forest for part **(i)**, the non-renewable nature of ores and the need for recycling for part **(ii)**, and the difficulties posed by extracting and transporting oil to create plastics for part **(iii)**.

Question 13

This question on personal protection equipment was very popular and generally answered well. Most candidates achieved very high marks for part **(a)**. Some candidates did not state a specific use for the items shown and gave generic 'to protect the user' type responses which did not achieve a mark.

Responses to part **(b)** were either incomplete or lacking sufficient detail to access the full mark range. Candidates should be reminded that the instruction 'to describe' requires enough detail to fully answer the question. Many responses were exceptionally brief, using one or two words, and could not access marks. Part **(c)** was answered well although some candidates did not take into account the large size of sheet would not fit onto most pedestal drilling machines. Many candidates did not include a waste piece when drilling to avoid damaging a work surface.

Question 14

Relatively few candidates attempted question **14** on designing and constructing a cycle helmet, but there were some outstanding attempts.

(a) The majority of candidates stated two correct properties that a material should have to be suitable for a cycle helmet. Some candidates misread the question and stated materials. Lightweight and resistance to impact were the most common correct responses.

(b) Most candidates gave valid reasons why the materials listed in part **(b)** would be unsuitable.

(c) Very few candidates described an appropriate test to check the suitability of materials. Some who had chosen impact resistance correctly described simple impact tests where comparisons could be made using different materials. Many candidates misread the question and described throwing the helmet against a wall or dropping it on the floor. The test was to be for the suitability of a material to be used, not to test the helmet.

(d) Most candidates stated a suitable material for a prototype helmet for part **(i)**.

Most candidates sketched two tools that could be used to make the slot in a helmet of their chosen material. Some of the sketches lacked sufficient detail to be easily identified and did not access the full mark range.

Section 2 – Processes

Question 15

This question on a toothbrush holder was a very popular choice and answered well by many candidates. Part **(b)** was answered particularly well with excellent use of annotated sketching to show full detail of the processes required.

(a) Most candidates stated an appropriate material and method of finishing the material.

(b) All parts very well answered although some candidates did not include drilling a hole to allow a saw/file to cut the slot for part **(ii)**.

(c) This part was very well answered with most candidates proposing smaller holes in the base to allow the toothbrushes to stand upright.

Question 16

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

(a) Some candidates produced a full description of the process of cutting a bridle joint and achieved very high marks. Some candidates only described the cutting of one part of the joint and did not access the full mark range.

(b) There were a number of excellent full responses to this part. All candidates had an understanding of the basic principles of blow moulding. Some candidates provided limited supporting detail and consequently did not access the full mark range.

(c) Relatively few candidates attempted this part on turning a brass light pull. Some produced full and detailed responses.

Question 17

There were a number of excellent responses to this question on creating a lamp. Many candidates however, produced brief responses 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 frame and correctly described an appropriate forming process. There were a wide range of appropriate materials proposed and valid forming processes described.

(ii) Heat forming acrylic around a cylindrical former was the most popular response, although some candidates correctly cut the shape from an appropriate sized tube.

(iii) Turning an appropriate specific hardwood and casting and turning an aluminium base were the most common responses.

(b) Some candidates produced an appropriate method of allowing the frame to rotate on the base. The best responses included the use of threaded systems and acknowledged friction and the appropriate tightness of the method to allow smooth rotation.

Question 18

This question on construction a child's toy was popular, with a wide range of responses seen. Some candidates produced detailed responses for all parts of the question. Many candidates produced very brief answers with very limited detail.

(a) Most candidates suggested appropriate materials for the supports, guide rails and the beads. Some candidates did not give a valid reason for their choice of materials.

(b) Parts **(i)** and **(ii)** were generally answered very well. Some candidates spent too long on fully describing the marking out procedure for part **(i)** and did not give enough detail on cutting the support to shape. There were some valid descriptions of how to make the bead, injection moulding of a single bead would not be appropriate.

(c) Many candidates correctly described the application of colour to the guide rails and beads. Where plastic materials had been selected, candidates correctly stated that the colour would be selected when sourcing the plastic.

DESIGN AND TECHNOLOGY

Paper 6043/02
Design Project

Key Messages

Centres should 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'. This will guide candidates but will allow them to independently identify a design brief which is within the scope of the theme, within their making capabilities and within the facilities available. This approach provides professional guidance at the early stages of the design process and so ensures the candidates are realistic about the scope of the overall project.

General Comments

Candidates need to submit evidence in their Project that matches the expectations of the assessment criterion. In some cases, it was apparent that candidates were unaware of the need to ensure they included specific elements within a section to be able to be access the top end of the mark scheme. For example in **'Generation and exploration of ideas'** it is important to include 'consideration of the specification' as each idea is explored. Without this aspect, full credit cannot be awarded in this assessment criterion.

Comments on specific tasks

The design folio

General analysis of theme – Containers

The theme **Containers** provided a wide range of opportunities for candidates to develop design problem briefs. The majority of candidates successfully identified a problem area. Mind mapping was used as a focus technique as well as mood boards. Many candidates produced mood boards crammed with photos which led to a good understanding of 'containers'. Many candidates started by defining what the word 'containers' meant. In some cases, candidates simply copied a definition from the internet. Whilst this might be a good idea for their wider research, helping to focus in and develop the theme, it does not always add to the Project when several pages are occupied by 'cut and paste' copies of definitions taken from the internet.

The majority of candidates sensibly looked at two or three areas before they went on to find a problem area they wished to pursue. In the assessment criterion, limited credit is available for this section of the Project (General analysis of the theme). Candidates should therefore be advised to spend a proportionate amount of time on this section.

The theme threads can be helpful in assisting a candidate in finding a design problem they wish to tackle. Candidates are not required to provide an exhaustive analysis of the theme. Candidates should be encouraged to move directly to problem areas and to identify and clarify a specific design brief from these areas. In some cases candidates produced lengthy descriptions which were loosely associated with the theme but which added little to the important task of identifying a design problem area.

A significant number of candidates spent time investigating 'shipping containers'. Whilst this can be helpful, candidates seemed challenged to identify a design problem which was personally relevant. Candidates need to move on quickly from areas which will not provide a tangible problem brief area.

Many of the threads were designed to take a candidate forward to a problem at this stage. Some candidates only pursued one thread whilst others tackled several of the threads. It is not expected that candidates should exhaust every thread.

As in previous years, a few excellent design briefs were inspired by a relative or friend who had a real life problem to solve. Where a candidate had identified a personal context in which to answer a design problem, they were able to provide more depth and detail in the folio.

Candidates provided a variety of responses to the theme 'containers'. The range of artefacts included: chemistry lab chemical station, articulated container for bottles, container for baby items when out and about, shoe organiser, container for garden fertiliser with trowel holder, tailor's portable repair kit, portable pen and pencil container, picnic hamper, nuts, bolts and washer container, make up box, electrician's caddy, display for old artefacts and jewellery boxes. Money boxes were a popular choice. Most candidates had gone beyond designing a square or rectangular box in their response to the container theme. Many had, through their research, identified a personal theme which then resulted in complex shaped containers being produced, for example, a piano and animal shaped boxes were produced.

Formulation of design brief resulting in a specification

Design briefs were generally clear and to the point. Only a few candidates made general statements about producing 'something' to solve a problem.

Some candidates struggled to identify specification points which are specific to the context of the problem being developed. Specification points which remained general, for example, 'contain x', 'must be safe' did not provide an adequate basis for evaluating the artefact once it had been manufactured.

Stronger folios contained a concise design brief, evidence of relevant investigation which identifies the design need and intended users, leading to a precise list of measurable specification points. All of these elements are required in order to access the full range of marks.

Generation and exploration of ideas

Candidates are often proficient at producing a range of ideas which will potentially fulfil the design brief and specification. The addition of colour and shading improved the impact of the ideas.

Some candidates produced an initial sketch of an idea and then added annotations and sketches which showed mini developments of an aspect of the idea. At some point in this section, it is important that consideration and evaluation of the specification points is made, either for each idea or at the end of the section when all the ideas have been set out. This will allow candidates to access marks at the top of the mark scheme.
Some candidates continue to generate more than 3–4 ideas. In some cases the quality of the content suffered and often the idea presented was no more than a simple single line drawing of an outline.

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 required in this section but where candidates used orthographic or a pictorial view of the proposed artefact the work was often presented more clearly.

Use of 2/3D models or virtual modelling helps the candidate make decisions about form, materials and construction. In some folios candidates produced photographs of the making of the model. Space devoted to this work should be kept to a sensible amount.

Production Planning

Photographs were often used to good effect in this section. Many candidates used pictures to support the step by step process chart which is required for this section. It is important to guide students so they do not photograph the actual making of the product and then present the photograph collection in the folio without any explanation of the processes which are involved.

Communication

Strong folders contained visually informative, colourful and, where appropriate, annotated sketches, charts and diagrams. The majority of candidates were very competent at presenting a well organised folio, often with a contents page and clearly numbered pages.

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

The quality of the workmanship continues to be very high. The work reflects the confidence candidates have in their own practical skills at this stage of the design process.

It is important that every folder contains a good quality photographic evidence of the finished artefact. This allows the moderation process to judge the detail of the finished artefact and so confirm the judgements made by the centre.

Evaluation

Evaluations continue to be varied. Some involve a simple summary paragraph but others are more thorough and contain the following key aspects:

objective testing;
reference to the design brief;
reference to the specification points;
detailed conclusions leading to;
proposals for further development.

Photographs, sketches and other information can all add to the quality of the evaluation.