

DESIGN AND TECHNOLOGY

Paper 6043/12
Paper 1

Key messages

- Candidates need to check the requirements of a question. Many candidates did not use sketches in questions requiring sketches and notes.
- When answering questions regarding the stages of a process, candidates need to make a list of important stages before commencing the answer. Sometimes, far too long is spent on details of marking out and the other key aspects of the process are either missed out or limited in detail.
- Candidates should plan their time effectively as some answers were far too lengthy whilst others were very short. Questions, particularly in **Sections 1** and **2**, are designed to have equal rigour and demand and candidates should spend equal time on them.

General comments

Almost all candidates followed the rubric and answered the required combination of questions. There were a number of outstanding papers from candidates, giving full and detailed responses to **Part A** and **Part B**.

Candidates are advised to follow the rubric on the front of the examination as a number of candidates made attempts at all questions.

Annotated sketches were used very well by most candidates to support their answers. Written responses generally contained sufficient and appropriate detail.

Some candidates answered parts of questions on additional sheets without correctly numbering the part. It is important to make it clear that parts of an answer are clearly labelled so that the Examiner can award marks correctly and that candidate details are included on any additional sheets used.

Questions 11, 12 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.

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

Part A

Question 1

Most candidates gave two correct reasons why pewter would be a suitable material for a key fob. Low melting point and malleable were the most common correct answers.

Question 2

A number of candidates did not attempt this question. The best responses were:

ABS – made from finite resource, damage caused by spills when transporting oil.

Pine – deforestation and destruction of wildlife habitats.

Steel – effect of mining ore in the environment, and high energy requirement to process.

Question 3

Most candidates correctly sketched a scribe and tenon saw. Some candidates incorrectly drew a dot or centre punch and did not include a back on the tenon saw.

Question 4

This question was well answered with most candidates correctly stating that shaping a material by wasting involves cutting and/or filing to remove material and shaping a material by deforming involves methods such as bending, twisting or forging.

Question 5

This question was very well answered with most candidates identifying a screwdriver and giving a correct reason for use.

Question 6

This question was well answered with most candidates stating that the material does not need a further applied finish.

Question 7

Many candidates described three stages required during brazing. The question was focused on stages required when **preparing** for brazing, therefore the later stages of the brazing process were not accepted.

Question 8

Most candidates correctly stated that metal working vices would mark or damage the wood.

Question 9

The most common correct responses were

- (a) ABS and polypropylene
- (b) Oak, mahogany and meranti
- (c) Stainless steel and mild steel

Question 10

Most candidates correctly gave hand width and grip diameter as an example of anthropometric data required to design a spade.

Part B

Section 1 –Tools and Materials.

Question 11

- (a) Many candidates correctly named pliers (**A**), tin snips (**B**) and pincers (**C**). Candidates correctly stated a use for tin snips and pincers, most candidates stated that pincers are used to cut wires, fewer candidates stated the purpose for pincers as removing nails.
- (b) (i) Some candidates correctly stated that purpose of the ridges on pliers were to grip items firmly.
 - (ii) Most candidates explained the purpose of the nodules on the tin snips prevents over biting and protects the hands.
 - (iii) Most candidates correctly stated that the rounded end of the pincers acts as a pivot and prevents damage to the wood when extracting nails.

- (c) (i) Few candidates correctly sketched a guillotine (bench shear).
- (ii) Almost all candidates correctly sketched and gave a use for a coping saw.

Question 12

- (a) There were a few excellent, full responses to this part. However, some candidates gave the same property for each material e.g. easy to work, which is not acceptable unless details of the specific property of the material for the use stated are given.
- (b) (i) Most candidates correctly stated that an alloy is made of two or more metals.
- (ii) Many candidates correctly stated that the purpose of an alloy is to improve or contain the desired properties for use.
- (iii) Most candidates stated an alloy. Bronze, brass and steel were the most common correct answers given.

Question 13

- (a) Some candidates gave pine as a suitable material for chair (**A**). The question described the chair as an outdoor chair. A hardwood would be more appropriate and many candidates correctly stated teak, mahogany or oak. Weather resistance and attractive grain were the most common reasons for choice.

Polypropylene was a popular correct answer for chair (**B**). Correct reasons given included colour options, good strength to weight ratio and easy to clean.

Aluminium, cast iron and stainless steel were the most common correct responses for chair (**C**), easy to cast to shape and sufficiently strong to support weights the most popular correct reasons given.

- (b) This question was very well answered.
 - (i) Most candidates correctly suggested varnish and paint for a suitable applied finish for chair (**A**).
 - (ii) The most common correct suggestions for a suitable applied finish for chair (**C**) were powder coating, paint and galvanising.
- (c) (i) Many candidates incorrectly identified acrylic as a suitable material for a foot on chair (**C**). The most common correct response was nylon.
- (ii) Almost all candidates correctly stated the lathe or an injection moulder could be used to make the feet.
- (d) Many candidates correctly described marking out of the joint in detail and a few went on to correctly describe the accurate cutting out, using a tenon saw and chisel. A number of candidates used a coping saw which would not be appropriate in this case.

Question 14

- (a) Many candidates stated two correct properties that a material should have to be suitable for the comb. Some candidates gave 'strong' as an answer which did not gain credit. The strength must be qualified. Durable and lightweight were the most common correct answers.
- (b) Most candidates correctly stated a valid reason to either select or reject the material for the manufacture of the comb. Some repeated the same single word answers for each material e.g. durable. This is not acceptable; reasons require further detail and should apply specifically to the material given.

- (c) Many candidates correctly identified injection moulding as a method of ensuring that the teeth of the comb are identical.
- (d) Most candidates correctly described an appropriate method. Injection moulding was accepted for polystyrene, milling (CNC) was correctly described for aluminium and mahogany.

Candidates used sketches and notes particularly well in this part of the question.

Section 2 – Processes.

Question 15

A popular question, answered well by some candidates but a significant number had limited understanding of turning on a lathe to give a full answer to **part (d)**.

- (a) (i) Most candidates correctly named a suitable wood for the handle. Beech and oak were very common correct responses. Many gave valid reasons for choice, smooth finish and no splinters were the most popular correct responses.
- (ii) Many candidates correctly named brass or cast iron as a suitable material for the bell. A significant number correctly gave sonorous, good sound quality and non-corrosive as reasons for choice.
- (b) This question was not attempted by a number of candidates. Many correctly explained the ergonomic features of hand size and grip and the need for comfort when using the bell.
- (c) The most popular correct responses by candidates were using an abrasive to obtain a smooth finish and then apply polish by cloth or buffing. Some suggested paint which would not be appropriate for an item which is to be struck.
- (d) Some candidates gave excellent answers with full and detailed descriptions of turning the handle on a lathe. Some described hand methods which would have produced a round and smooth handle and were awarded credit.

Question 16

The most popular processes chosen were casting the candle holder and marking out, shaping and joining sheets of MDF. Most candidates produced full and detailed responses for two of the processes given.

- A** Casting the candle holder – many excellent answers with candidates using clear sketches to describe the key features of the process.
- B** Marking out, drilling and tapping mild steel strips – the least popular option with few candidates including all the key parts of the process. Many candidates incorrectly tapped both strips of steel.
- C** This question was generally very well answered with responses that included marking out, shaping and joining sheets of MDF. Some candidates did not refer to the accurate positioning of the holes and to the need for a clearance hole.

Question 17

Few candidates attempted this question Answers needed further detail and development.

- (a) (i) Most candidates presented very brief descriptions of how circular shapes and holes could be made in mild steel sheet.
- (ii) Few candidates produced full and detailed descriptions.
- (b) Many candidates correctly described the process of plastic coating of a mild steel part, including the key stages of preparation of the surface, heating the part and immersing in a fluidising tank.

Question 18

A very popular question with a number of candidates achieving full marks. Some candidates produced very brief notes with no sketches for their questions requiring sketches and notes and consequently did not access the higher mark range. A significant number of candidates did not finish all parts of this question.

- (a) Most candidates correctly named a butt hinge or piano hinge to connect the desk lid to the body.
- (b) (i) Many candidates gave full details of marking out and correctly fitting the hinge.
(ii) Most candidates gave appropriate methods of attaching the leg to the body. Using nails was not accepted for a child's desk.
- (c) The majority of candidates fully described an effective method of keeping the lid open without it falling.
- (d) There were some excellent ideas for improving the desk including equipment storage, footrest and methods to avoid trapped fingers.

DESIGN AND TECHNOLOGY

Paper 6043/02
Design Project

Key messages

Where candidates set out a clear and concise Design Brief, they often go on to present a sharply focused design folio.

Competency in sketching leads to good communication skills in the design folio. The use of colour is excellent in helping candidates communicate their ideas.

Testing the product is critical to fulfil the expectations of the evaluation process.

General comments

Schools are increasingly able to provide CAD packages which allow candidates to provide 2D and 3D sketches and drawings, these are often printed onto A3 sheets of paper. Many candidates tend to print one picture per sheet of A3, this is not very economical and should be discouraged. It also increases the weight of the folio which must add cost to the transit of the folios.

Design folios sometimes lacked sufficient evidence to be placed in a higher assessment criteria category. It may be useful for candidates to be aware of what is expected in the folio for high marks to be achieved. Maybe a checklist approach would help candidates ensure they have the correct elements to suit each section of marks available for the folio.

Comments on specific questions

The Design Folio

General analysis of theme – ‘Protection’

The theme ‘**Protection**’ provided many opportunities for candidates to identify a design problem they wished to develop.

Many of the candidates found no difficulty in finding a problem area to develop. Some started with a dictionary definition of the word ‘protection’, others listed their thoughts on what the word might mean for them. Whatever the process, most candidates managed to focus on a problem or problems they wished to research further. Candidates who identified a problem area personal to them seemed to generate a clearer problem brief and specification. This approach also provided more depth of information when the design problem was developed.

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 expected that every thread should be explored. Some 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.

‘Protection’ – 2019 threads:

- young children and babies
- valuable or delicate items
- pets and small animals
- containers, boxes and cases
- display, showcase
- moisture, sun, wind
- carrying, transporting, moving
- pencils, pens, rubbers
- earphones and charging equipment
- CD’s
- Security of personal belongings
- heat and cold.

Some examples candidates suggested are as follows.

Protection from danger in – for example, workshops and sharp edges, kitchens and hot food, bathrooms and slipping. Protection of items – for example, valuables, personal devices, collections, hobbies. Protection of animals and people and precious items. Jewellery boxes and desk organisers protecting desk items were popular.

Formulation of design brief resulting in a specification

The syllabus suggests that a candidate should ‘demonstrate an ability to clarify, through research, a problem area to include the creation of a precise design brief and relevant specification points.’ Some candidates needed to improve on how to identify specification points which were either relevant or specific. General statements which did not describe the limits or parameters of the specification point remained loose and poorly defined later in the folio. In contrast, some candidates tied down the specification points very well which led them to deliver focused research and development.

Generation and exploration of ideas

For the higher levels of attainment, the assessment criteria expect a wide range of appropriate potential solutions. A reasonable number of ideas would be over three and less than five. Candidates need to make sure that the ideas are fundamentally different and not one idea which is developed; because this process is assessed in the next section. Use of colour or shading always enhances the quality of the communication. Use of CAD continues to increase; all candidates should also show some of their sketching skills as well.

Detailed development of the proposed solution

Many candidates offered some excellent work at this point in the design process. Approaches varied but overall, they were focused on providing enough development to be able to make the product. Some candidates used 2D/3D models or virtual modelling. The work presented also needs to record reasoned decisions about form, materials and constructions resulting in the production of detailed drawing and a materials list.

Production planning

Candidates offered many ways of presenting a production plan. An efficient way of presentation was where a candidate set out a table which identified the stage in the process, its purpose and then sketched the process and the tools required and added further comments where necessary.

Communication

As mentioned earlier in the report, good communication skills are key to presenting a high-level folder for assessment. It was clear that some candidates had evolved effective ways of communicating ideas through their sketches. Some showed an ability to present clear good quality 3D sketches, using colour where

appropriate and adding annotations where required. Some candidates needed to further improve on how to represent their ideas to be able to communicate their ideas effectively.

The Artefact

Artefact realisation

Photographs are an important way in communicating what the final outcome of the realisation looked like. It is helpful where the photographs have been taken to capture details of construction.

Evaluation

The syllabus suggests that candidates should 'write an evaluation which includes an analysis of the performance of the artefact in relation to the original design brief and specification. '(Testing of the artefact should be reported with recommendations for further development)'. Candidates who adopted this approach usually provided a comprehensive evaluation which gave enough evidence to warrant high level marks for the Evaluation section.