DESIGN AND TECHNOLOGY

Paper 6043/12
Paper 1

Key messages

- Candidates should plan their time effectively for this question paper. Many candidates appeared to have run out of time and the last question often appeared rushed, lacking detail.
- Candidates are advised to read the requirements of a question carefully so that they respond appropriately as some candidates produce very brief, single word responses when more detail would access higher mark ranges. Many candidates miss out on marks in Part **A** when the question command requires an explanation or to give a reason.

  Candidates are advised to practice past paper questions as a number of candidates misinterpreted questions and consequently could not access the full mark range.

General comments

Almost all candidates followed the rubric and answered the correct combination of questions and used the time available well. There were a number of excellent scripts from candidates this year, with candidates answering questions correctly, giving full detail and showing a clear and in-depth knowledge and understanding of design and technology.

Some candidates, however, needed to improve on their time management as they produced very limited responses for some questions in Part **B** or did not attempt the required four questions.

Most candidates used annotated sketches well to support answers. 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. This is particularly evident in Part **A**. Please refer to the key messages section.

Whilst most candidates made good attempts at all questions in Part **A**, some candidates only made an attempt one or two questions.

Questions 11, and **12** 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.

Part A

Question 1

Most candidates correctly named at least two of the three types of drilled hole. Some candidates did not state clearance hole for hole **B**.

Question 2

Candidates needed to improve on their knowledge for this question as very few correctly stated that the Ø5 hole is drilled to allow the tap to bite and cut the thread.

Question 3

This question was generally well answered. Many candidates correctly explained the terms case hardening and tempering. Some candidates incorrectly explained the general hardening process, not the hardening of the surface of the steel for case hardening.

Question 4

Candidates needed to improve their knowledge for this question as many did not attempt this question. A few candidates had a good knowledge of smart materials and gave correct answers.

Question 5

Most candidates achieved at least one mark by describing one anthropometric detail – the most popular correct responses being hand grip size and hand breadth.

Question 6

This question was well answered with most candidates stating at least two safety precautions with appropriate reasons. Some candidates gave general workshop precautions, not related to drilling sheet metal, and did not achieve credit.

Question 7

(a) Most candidates stated an appropriate specific wood and gave a reason for choice. Beech was the most common correct response with close grain, hard to split given as the main reason.

(b) Polyethylene was the most common correct response, with transparency to see the food product given as a main reason.

Question 8

Most candidates gained both marks by sketching a try square and stating its purpose.

Question 9

This question was very well answered with most candidates achieving at least 2 marks. The washer and rivet were answered correctly, many candidates incorrectly named component **C** a bolt.

Question 10

Many candidates correctly explained that the datum line is used as a reference line to take other measurements from, which reduces compound error.

Many candidates needed to improve on their knowledge for this question as they did not make an attempt.

Part B

Section 1 – Tools and Materials.

Question 11

A very popular question, generally well answered.

(a) Almost all candidates correctly named the G-cramp (**B**) and correctly stated its purpose. Many correctly named the woodworking vice (**C**) and stated its purpose. Relatively few candidates correctly named the machine vice (**A**) or stated that it would be used for holding work for drilling.

(b) (i) Very few candidates correctly stated that the v-shaped channels were to hold round or hexagonal section bar firmly when drilling.

(ii) Most candidates explained the reasoning for the shape of the g-cramp frame – the most common response was the ability to join thick pieces together with waste pieces to prevent damage.

(iii) Most candidates correctly explained that the wooden face plates were to prevent wood from being damaged when held.

(c) (i) Most candidates correctly described the method of using waste pieces to prevent work being damaged.

(ii) Almost all candidates correctly described the use of a rod to help further tighten the vice.

Question 12

(a) There were a few excellent, full responses to this part. Many candidates however gave the same use for each material e.g. Furniture, without detailing the specific properties of the material for an aspect of the furniture. Candidates must be specific in detailing the use and the properties required.

(b) Relatively few candidates correctly described the sustainable nature of timber. The best responses referred to the practice of planting a tree when one is felled or the ability to re-use timber.

(c) Most candidates knew what the term timber conversion meant. Many included converting timber into useable planks, veneer and paper.

(d) (i) Almost all candidates correctly sketched plain sawing.

(ii) Most candidates correctly sketched quarter sawing.

(e) Most candidates correctly stated plain sawing as the cheaper to carry out as it is the simpler process requiring a one directional cut.

Question 13

The least popular choice of question in this Section, generally not answered well. Relatively few candidates achieved marks in the middle/higher mark ranges.

(a) Most candidates correctly explained the suitability of aluminium for the cupboard handle. It does not corrode and the ability to take a good finish were the most common correct reasons.

(b) Very few candidates stated correctly the surface finish as knurling. Most candidates received a mark for explaining the improvement in grip on the handle.

(c) Many candidates gained credit on this question correctly naming a drill bit and tap. Tap wrench was also a popular correct response.

(d) (i) Most candidates correctly named the machine as a centre lathe. Lathe was accepted.

(ii) Candidates needed to improve their knowledge for this question. Very few candidates achieved full marks on this question. **B,** tool post and **C**, tailstock were correct responses from many candidates but few answered **A** chuck and **D** saddle correctly.

(iii) Whilst most candidates correctly gave two specific safety hazards and precautions taken, some candidates gave general workshop hazards and precautions and did not achieve credit.

Question 14

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

(a) Many candidates stated two correct properties that a material should have to be suitable for the bowl. Some candidates gave ‘strong’ as an answer which did not gain credit. The strength must be qualified.

(b) (i) Most candidates correctly stated a hand tool to cut the shape from aluminium sheet.

(ii) A scroll saw was the most popular correct answer for a machine tool to cut the shape from 3 mm acrylic.

(iii) Most candidates correctly stated dip coating and paint as appropriate finishes for steel sheet.

(c) This question was generally well answered. Many candidates, however, did not acknowledge the requirement to name equipment used before applying a finish. Paint brush was not given credit.

(d) Most candidates correctly described methods of achieving a finish on the cut edge of acrylic, filing, the use of wet and dry paper and careful use of a flame were all acceptable responses.

(e) There were a wide range of correct procedures to form the bowl shape proposed. Some candidates incorrectly described the process of vacuum forming as they did not take into account that the shape is cut.

Section 2 – Processes.

Question 15

The least popular question in this Section. There were many excellent answers with candidates using well annotated sketches to support their responses. A small number of candidates did not acknowledge the size of the tray and misinterpreted it as a small tray to put soap in.

(a) Most candidates correctly named a suitable plastic for the shower tray.

(b) Very few candidates correctly explained the importance of the draft angle when making the tray as a requirement for the tray to be easily extracted from the former.

(c) Most explanations of vacuum forming were full and detailed. Some candidates lost marks for not including detail of the former. Several candidates correctly outlined the process of laying up with GRP.

(d) Most candidates gave two valid improvements to the design of the shower tray. Improved grip by adding small ribs to the base and improving drainage were the most common responses.

Question 16

Most candidates produced detailed responses for at least two of the terms given. Some candidates needed to read the requirements of the question carefully as they produced full and detailed responses for all options which may have lost them time for other questions.

(a) Rebate joint – generally well answered with candidates using clear sketches to describe the key features of the process. Some candidates unnecessarily described the process of preparing the material section before marking out and cutting the joint which may have led to them spending too long on this question.

(b) Brazing – the least popular option but most responses were full and detailed.

(c) Drilling, bending, gluing – a popular choice, generally very well answered. Many candidates correctly described most processes, using clear, well annotated sketches.

Question 17

There were relatively few attempts at this question. To access higher marks, candidates needed to spend time on producing more detailed answers for this question.

(a) Most candidates chose a suitable wood from which the brick could be made. Beech was the most common correct response.

(b) (i) Most candidates correctly described the marking out and cutting of the blocks. To gain higher marks, some candidates needed to improve on their knowledge for this question as they needed to include the use of templates or jigs to ensure that all blocks were identical in length.

(ii) Most candidates correctly described the marking out and drilling of the holes. To gain higher marks, some candidates needed to improve on their knowledge for this question by including how to ensure accuracy by using templates and/or jigs.

(c) Most candidates correctly stated an appropriate material to produce 10 000 bricks, ABS and High Impact Polystyrene were popular correct responses.

(d) Most candidates described in detail the injection moulding process, the best responses included details of the mould which would be prepared for the production of multiple components.

Question 18

(a) (i) Most candidates proposed valid methods of joining the framework at **A** with a mortice and tenon joint the most common. Some candidates proposed using nails; this would be inappropriate for a child's easel.

(ii) Many candidates correctly described the cutting of a groove or rebate as a method of inserting the chalkboard into the easel framework.

(iii) The best responses to the method of joining the tray to the easel framework included the cutting of a housing to support the tray or the detailed description of using screws and glue.

(b) There were some excellent modifications from candidates that would have effectively and easily allowed height adjustment. To access the middle or higher mark ranges, many candidates needed to provide more detail in their response.

DESIGN AND TECHNOLOGY

Paper 6043/13
Paper 1

Key messages

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  Candidates are advised to practice past paper questions as a number of candidates misinterpreted questions and consequently could not access the full mark range.

General comments

All candidates followed the rubric and answered the correct combination of questions and used the time available well.

Most candidates use annotated sketches well to support their answers.

Attempts were made at all questions in Part **B** with **Questions 11** and **14** the most popular in ***Section 1*** – Tools and Materials.

Questions 15 and **16** were the most popular choices in Part **B** ***Section 2*** – Processes.

Part A

Question 1

Candidates needed to improve their knowledge of sketching a section through blockboard. Many candidates correctly sketched a cross section of plywood.

Question 2

Most candidates gained a mark for hammer. Candidates needed to improve their knowledge of workshop tools as few gained both marks by giving the full name, a cross pein hammer.

Question 3

This question was generally well answered with many candidates achieving 2 or more marks.

Question 4

Most candidates correctly identified a suitable material for the manufacture of a boat hull.

Question 5

Candidates needed to improve their knowledge for this question as few correctly stated that Tensol cement is used for joining acrylic and flux is used when brazing or soldering. Candidates also needed to improve their understanding of the stages of using Tensol cement or flux.

Question 6

Some candidates correctly sketched a chisel and a rasp, few included the bevel edge on the chisel.

Question 7

A few candidates explained the meaning of hardening. Some candidates needed to improve their understanding of annealing that it is a heat treatment used to increase the malleability of a metal.

Question 8

Some candidates gained both marks by stating two valid reasons for using acrylic for the menu holder.

Question 9

Candidates needed to improve their knowledge for this question as few stated correctly that the smooth edge on a file is to allow working into corners and that the brass strip on the wooden stock of a try square is to ensure accuracy.

Question 10

Candidates needed to improve their knowledge for this question as few candidates stated that a shape memory alloy is a smart material that returns to its original shape when heated and most did not give a correct appropriate use of a shape memory alloy.

Part B

Section 1 –Tools and Materials.

Question 11

The most popular question, generally well answered.

(a) Many candidates correctly named the micrometer (**B**) and correctly stated its purpose, and correctly named the steel rule (**C**) and stated its purpose. Relatively few candidates correctly named the marking knife (**A**).

(b) (i) Candidates needed to improve their knowledge for this question as few correctly explained the reason why the blade is only sharpened on one side on the marking knife.

(ii) Most candidates correctly explained the reasoning for the lock on the micrometer to hold the measurement when removing from the workpiece.

(iii) Some candidates correctly explained that the measurements start on the end of the steel rule to allow measurement up to an edge.

(c) (i) Most candidates correctly sketched a mitre square and explained its purpose.

(ii) Some candidates correctly described the use of a centre punch to prepare for drilling a hole.

Question 12
There were very few responses to this question.

(a) Candidates needed to improve their knowledge for this question as few correctly named a suitable adhesive for each of the situations. Some candidates needed to show more understanding of surface preparation and application. Some candidates correctly stated safety precautions when using adhesives.

(b) There were limited responses to this question part. Although some candidates selected correct processes for joining with heat, some did not provide sufficient technical detail to access the middle or higher mark ranges.

Question 13

Relatively few candidates attempted this question.

(a) This question was answered well with most candidates correctly stating at least three kitchen products that could have been made from the listed materials.

(b) Candidates needed to improve their understanding for this question as few explained the properties of the material that made it suitable for the examples they had given. Responses needed to be more detailed.

Question 14

A popular question, although candidates needed to fully attempt each part.

(a) Many candidates stated two correct properties that a material should have to be suitable for the bowling pin. Some candidates gave 'strong' as an answer which did not gain credit. The strength must be qualified.

(b) Most candidates gave valid reasons why the materials given would be unsuitable for a bowling pin.

(c) Few candidates answered this part fully. There were some correct outlines of the process used to produce the bowling pin, but answers needed to be more detailed to access the higher marks.

(d) Few candidates correctly described the use of a template or measuring system to check the shape and size of the bowling pin.

Section 2 – Processes.

Question 15

A very popular question in this Section, with some good responses. Many candidates used well annotated sketches to support their answers.

(a) (i) Most candidates correctly named a suitable material for the base; acrylic being the most common correct response.

(ii) Stainless steel was one of several correct suitable materials given for the cutter

(b) Most candidates gained high marks for the description of the manufacture of the base. Fewer candidates achieved high marks for the description of the manufacture of the cutter.

(c) This question part was well answered. Most candidates sketched appropriate solutions to hold the roll of tape more securely in the base.

Question 16

Candidates made attempts at all three processes with an even selection, Processes B and C marginally the most popular.

The descriptions of the press forming of the dish and cutting the housing joint were generally more detailed but to access the higher mark ranges, most candidates needed to produce more detailed responses that included the technical information required.

Question 17

There were few attempts at this question. Responses needed to be more detailed to access the middle or higher mark ranges.

Question 18

There were no complete attempts at this question.

DESIGN AND TECHNOLOGY

Paper 6043/02
Design Project

Key messages

The theme offers a starting point for the design brief investigation. Candidates who took time to explore the theme benefited by identifying a design problem they understood and wanted to develop.

Candidates who possess good communication skills in sketching generally bring improved communication throughout the Design Project.

Evaluation should always refer to the success or failure of the artefact in meeting the specification points set out at the beginning of the Design Project journey.

General comments

Increasingly schools have access to various computer aided programmes and associated hardware. Whilst the use of such CAD packages is encouraged it is important that the Design Project demonstrates a variety of communication skills including 2D/3D hand drawn sketches. Some candidates use programmes to print the written word and insert pictures taken from the internet. Sometimes this approach results in inefficient use of the A3 format, some candidates placing only a few words on a sheet, thus increasing the volume and cost of the Design Project. The use of colour printers enhances the presentation of the overall folder, whilst this is helpful, candidates should include some hand sketched drawings which demonstrate their personal communication skills.

It may be helpful to ensure that candidates are familiar with the higher-level assessment objective statements. Without the Design Project containing all of the elements expected, a candidate cannot be awarded the highest marks available. A good example of this is the high level assessment statement for Evaluation. The statement indicates a number of elements which should feature in the Evaluation section of the Design Project. ‘Objective testing with reference to the design brief and specification points’ and ‘Detailed conclusions leading to proposals for further development’; without all of these elements the high marks are difficult to achieve.

Comments on specific tasks

The Design Folio

General analysis of theme – ‘Movement’

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

Most candidates found no difficulty in finding a problem area to develop. As in previous years mind mapping was used as a focus technique as well as mood boards; some candidates produced mood boards filled with photographs which led to a good understanding of the theme; it is important that the information is accompanied with a commentary by way of annotations and notes.

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. Many candidates started with a dictionary definition of the word 'movement'.

'Movement' – 2018 threads:

children's amusement, including rattles, toys and games
pull or push along toys including moving parts
tricycles, scooters, bicycles, buggies
transporting items
oscillating and reciprocating
people's mobility problems
opening and closing items
mechanical movement, for example, motors and gears
moving delicate or precious items
wheelbarrow, cart, trolley, sack barrow
hinges, catches, stays and locks.

Some of the examples that candidates suggested are as follows:

Any type of device with wheels, for example, trolley, wheelbarrow, movement of large items.
Toys which involved movement provided by a child or toys that made movement when pushed or pulled.
Opening or closing of items.
Mobility problems.
Examples using reciprocating or oscillating movement were rare.

Formulation of design brief resulting in a specification

Candidates were generally able to state a concise design brief which helped them attain higher marks in this section. Sometimes candidates struggled to identify specification points which were either relevant or specific. General statements, for example, 'the product should be made from wood', 'the product should be medium size' are not helpful and give little support to an evaluation process at the end of the design process which critically assesses the success or not of a specification point. For example, a specific reason for a hardwood (e.g. Oak) stating why its properties are valuable would provide a good specification point which could be assessed at the end of the project in the Evaluation section.

Generation and exploration of ideas

Candidates who provided a wide range of ideas generally went on to identify and successfully develop one idea. Some candidates repeated an idea in the next section with little development. The use of colour or shading always enhances the quality of the communication.

Detailed development of the proposed solution

Use of 2D/3D models or virtual modelling was used to good effect at this point, helping candidates to make decisions and evidencing the development process. Candidates are increasingly using CAD to provide a formal drawing at this stage. This approach is to be encouraged and is assessed in equal terms where a candidate has produced detailed drawings by traditional hand drawn techniques.

Production planning

Photographs were often used to show the different stages of production. The photographs or hand drawn sketches helpfully made note of the stages, processes, and the tools/machines involved. A series of photographs or illustrations without any detail of the production planning could not be awarded high level marks. Some folders revealed that, in a few cases, candidates were not familiar with the formal names of some tools.

Communication

Most folios were well organised and presented. Some followed a pre-prepared contents list which rather than provide a helpful checklist became too much of a burden for the candidate, which in turn led to a disorganised folio being presented for assessment. Candidates should be encouraged to provide a simple contents list which directly relates to numbered sheets/pages in the folio.

The Artefact

Artefact realisation

Many folders contained photographs of excellent artefacts which have clearly been constructed to a high standard.

Evaluation

Evaluations need to assess, through testing, the performance of the artefact, make reference to the original design brief and specification and suggest improvements which could be made.

Photographs and illustrated improvements/modifications were useful.