DESIGN AND TECHNOLOGY

Paper 0445/11
Product Design

Key messages

Many candidate responses demonstrated a good understanding of the design context, with creativity and sound technical knowledge.

Candidates should be encouraged to thoroughly read their chosen question to ensure that they avoid repeating points given in the question in their answers.

It is important that candidates are appropriately prepared for the paper so that they can fully demonstrate their designing skills. A few candidates appeared to be unclear about the expectations for some sections of the paper, such as **part (g)**, where a method to manufacturing one part of the solution drawn in **(e)** is required.

General comments

The entry for this paper was very low.

Sketches and notes were a strength in most candidates work, with good creativity demonstrated in **part (c)**.

Some candidates were unable to clearly express their thoughts in the written parts of the paper and may benefit from working on past papers to improve their writing skills.

Comments on specific questions

Question 1

(a) Most candidates were able to list four additional points about the function of the portable seat that they considered to be important. Commonly seen answers related to construction, materials, user comfort or the environment in which the seat would be used. Candidates should be advised against repeating points that are given in the question or giving generic points, such as it must be safe, that might apply to almost any product.

(b) Most candidates used sketches and notes to good effect to show two methods of joining materials to allow for folding or adjustment. Many candidates showed methods involving the use of hinges, telescopic tubes or screw fixings. To score maximum marks, candidates must use sketches and notes to show each method. A small number of candidates produced only sketches and were awarded a maximum of one mark for each method.

(c) Freehand sketches, with annotations and colour, were commonly seen methods used to show design ideas for the portable seat. Whilst a wide range of appropriate design ideas were seen, in some cases the solutions did not fully meet the requirements of the question with features, such as the method of holding the A4 size programme, missing. It is important that all design ideas fully meet the design requirements if candidates are to access the full range of marks.

A small number of candidates produced less than three design ideas and were awarded marks accordingly.

(d) The evaluations of the ideas needed further detail and development, with candidates often describing their designs rather than evaluating the positive and negative features of the designs. It

is important that candidates justify their evaluations, by making statements such as it is made from aluminium so it will be light to carry, rather than making generic statements. Almost all candidates were able to select an idea and justify their choice.

(e) A variety of methods were used to show the full solution to the design problem. These included orthographic drawings, exploded views, isometric views and materials lists. The best responses frequently used three-dimensional and exploded views to communicate sufficient information for a skilled person to make the product. Candidates should be advised against redrawing the design idea presented in **part (c)** and focus on the construction details, materials, dimensions and finishes.

(f) Most candidates were able to name two specific materials that would be used to make their design proposal and give reasons for their choices. Aluminium and pine were commonly seen materials, with reasons usually referring to the working properties or aesthetic qualities of the material. Candidates should be advised against giving the generic names of materials, such as wood, or components such as hinges or screws, as these are not awarded marks.

(g) Most candidates were able to identify and outline a method used to manufacture one part of their design. Commonly seen responses included marking out, cutting, and joining parts with screw attachments, rivets, or welding. It is important that candidates select appropriate methods of manufacture, and include the correct names of tools and equipment, if they are to access the full range of marks. Generic names, such as a saw, are not awarded marks. The most successful responses used a combination of sketches and notes to outline a method of manufacture.

Question 2

No candidates chose to answer this question.

Question 3

(a) Most candidates were able to list four additional points about the function of the portable device that would hold an umbrella that they considered to be important. Commonly seen answers related to the method of attaching the device to a person, user comfort, materials used or additional features of the device, such as storage. Candidates should be advised against repeating points that are in the question, such as the device must leave both the hands free and giving generic points that might apply to almost any product.

(b) Most candidates used sketches and notes to good effect to show two methods that could be used to grip cylindrical shapes. Many candidates showed screw clamps, spring clips or a tube that the umbrella handle would slot into. To score maximum marks, candidates must use sketches and notes to show each method. A small number of candidates used just sketches and were awarded a maximum of one mark for each method.

(c) Some imaginative design ideas were seen for this question, although some candidates focused rather too much on the umbrella rather than a device that would hold the umbrella. It was sometimes unclear how the design idea would work, or whether it would be practical to wear as the device appeared to restrict body movement. It is important that all design proposals fully meet the design requirements if candidates are to access the full range of marks.

A small number of candidates produced less than three ideas and were awarded marks accordingly.

(d) The evaluations of the ideas needed further detail and development, with some candidates unable to clearly demonstrate an understanding of the positive and negative features of their design proposals. Points that focused on the function of the device, especially the opening and closing of the umbrella, were commonly seen. It is important that candidates justify their evaluations rather than making broad statements, such as the design would not work well, if they are to access the full range of marks. Almost all candidates were able to select an idea and justify their choice.

(e) A variety of methods were used to show the full solution to the design problem. These included orthographic drawings, exploded views, isometric views and materials lists. Colour was frequently used to add clarity to the drawings. Most candidates used drawings to show the sizes, materials

and construction of the individual parts of their design proposal but sometimes omitted to clearly show how the parts would be joined together to make a product.

(f) Most candidates were able to name two specific materials that would be used to make their design proposal and give reasons for their choices. Commonly seen materials were steel and aluminium, with reasons for selection relating to the physical properties of the materials, such as weight or strength. Candidates should be advised against giving generic names of materials, such as metal, or generic reasons, such as easy to work with, as these are not awarded marks.

(g) Most candidates were able to identify and outline a method used to manufacture one part of their design. Commonly seen answers included the use of a fabrication techniques and screw threaded attachments. It is important that candidates include the correct names of tools and equipment to be used in the method of manufacture if they are to access the full range of marks. The most successful candidates used a combination of sketches and notes to outline a method of manufacture.

DESIGN AND TECHNOLOGY

Paper 0445/12
Product Design

Key messages

Many candidate responses demonstrated a good understanding of the design context, with a high degree of creativity and excellent technical knowledge.

Candidates should be encouraged to thoroughly read their chosen question to ensure that they avoid repeating points given in the question in their answers.

The benefits of using accurately measured drawings for **part (e)** needs to be carefully considered in terms of the time taken. Many candidates achieved high marks for this part of the paper by using just freehand sketches and notes.

In some cases, the responses to individual questions appeared to be disconnected. For example, the materials named in **part (f)** and the manufacturing method described in **part (g)**, were not evident in the solution proposed in **part (e)**.

General comments

Most candidates responded very well to the given design situations and were able to select a question that fitted with the specialist option that they had studied.

Creativity and materials knowledge was clearly demonstrated through freehand sketching with annotations.

Some candidates were unable to clearly express their thoughts in the written parts of the paper and may benefit from working on past papers to improve their writing skills.

Comments on specific questions

Question 1

(a) Most candidates were able to list four additional points about the function of the desktop stand that they considered to be important. Commonly seen responses related to stability, how the mobile phone would be mounted, whether the screen would be visible or whether the mobile phone could be charged whilst it was in the stand. Candidates should be advised against repeating points that are given in the question or giving generic points that might apply to almost any product.

(b) Most candidates used sketches and notes to good effect to show two methods of supporting an object an angle. Many candidates showed angled surfaces, such as a block of wood that the mobile phone could be propped up against or structures, such as a metal frame, that supported the mobile phone at an angle. Some candidates used different sized slots, sometimes in the surface of the desk, that the mobile phone could be placed in.

(c) Freehand sketches, with annotations and colour, were commonly seen methods used to show design ideas. Whilst a wide range of appropriate design ideas were seen, in some cases the solutions did not fully meet the requirements of the question with features, such as the method of folding flat either unclear or not considered at all. It is important that all design ideas fully meet the design requirements if candidates are to access the full range of marks.

A small number of candidates produced less than three design ideas and were awarded marks accordingly.

(d) Candidates were able to clearly demonstrate an understanding of the positive and negative features of their design proposals. Commonly seen answers focused on the functions of the stand, such as its stability or folding mechanism, or how securely the mobile phone would be held in position. It is important that candidates justify their evaluations, rather than making broad statements, if they are to access the full range of marks. Almost all candidates were able to choose one idea and justify their choice.

(e) A variety of methods were used to show the full solution to the design problem. These included orthographic drawings, exploded views, isometric views and materials lists. The best responses included drawings with sufficient information for a skilled person to make the product. Candidates should be advised against redrawing the design idea presented in **part (c)** and focus on the construction details, dimensions and finishes. Many high scoring candidates showed a design made from acrylic sheet that was then cut and folded to shape. In most responses, these candidates produced a three-dimensional view of the stand and a two-dimensional drawing of the development (net). Weaker responses often did not include construction details or important dimensions.

(f) Most candidates were able to name two specific materials that would be used to make their design proposal and give reasons for their choices. Aluminium, acrylic and pine were commonly seen materials, with reasons usually referring to the working properties or aesthetic qualities of the material. Candidates should be advised against giving generic names of materials such as wood, or generic reasons, such as easy to work with, as these are not awarded marks.

(g) Most candidates were able to identify and outline a method used to manufacture one part of their design. The use of a strip heater for line bending acrylic sheet was a commonly seen response. If candidates are to access the full range of marks, it is important that the method is appropriate, and the correct names of tools and equipment are used. Generic names, such as a heater, are not awarded marks. The most successful responses used a combination of sketches and notes to outline a method of manufacture. In a small number of cases, candidates outlined inappropriate manufacturing methods, such as cutting MDF with an angle grinder.

Question 2

(a) Most candidates were able to list four additional points about the function of the novel packaging system that they considered to be important. Commonly seen answers related to the materials used, transportation, opening of the packaging, surface graphics or how securely the mobile phone would be packaged. Candidates should be advised against repeating points that are given in the question or giving generic points, such as it must be safe, that might apply to almost any product.

(b) Most candidates used sketches and notes to good effect to show two methods that would allow the contents of the package to be seen. Many candidates used cut outs, a clear acetate window or a vacuum formed blister packaging. Some outstanding sketches and notes were seen in the responses to this question. To score maximum marks, candidates must use sketches and notes to show each method. A small number of candidates used only sketches and were awarded a maximum of one mark for each method.

(c) An impressive range of sketches with annotations were seen for this question. Commonly seen responses included the use of folded card or thin plastic sheet to produce packaging. In some responses it was unclear how the package reflected the name ‘Anywhere in the world’ but in other responses this had clearly been considered as a simplified map of the world was included. Some candidates showed designs made from resistant materials, such as wood or acrylic, that were for several mobile phones, rather than one. It is important that all ideas fully meet the design requirements if candidates are to access the full range of marks.

A small number of candidates produced less than three ideas and were awarded marks accordingly.

(d) Candidates were able to clearly demonstrate an understanding of the positive and negative features of their design proposals. Candidates often focused on the security of the mobile phone, stating that it could be damaged or stolen during transportation, or the use of sustainable materials.

It is important that candidates justify their evaluations, rather than making broad statements, if they are to access the full range of marks. Almost all candidates were able to choose one idea and justify their choice.

(e) A variety of methods were used to show the full solution to the design problem. These included orthographic drawings, exploded views, isometric views and materials lists. Colour was frequently used to give clarity to drawings. Construction details were often shown quite clearly through the drawing of a three-dimensional view and a development (net) with labels identifying the materials and joining methods. This question specifically asks for construction details and important dimensions but, particularly in weaker responses, these were often not included in the drawings.

(f) Most candidates were able to name two specific materials that would be used to make their design proposal and give reasons for their choices. Commonly seen materials were cardboard and polypropylene sheet, with the reasons relating to the properties of the material, such as available in a range of colours. Candidates should be advised against giving generic names of materials, such as plastic, or generic reasons, such as easy to work with, as these are not awarded marks.

(g) Most candidates were able to identify and outline a method used to manufacture one part of their design proposal. Cutting out of thin sheet materials, either by hand or with a CAM machine, and vacuum forming were commonly seen responses to this question. It is important that candidates include the correct names of tools and equipment to be used in the method of manufacture if they are to access the full range of marks. The most successful responses used a combination of sketches and notes to outline a method of manufacture. In a small number of cases, candidates outlined inappropriate methods of manufacture, such as joining cardboard with a nail gun.

Question 3

(a) Most candidates were able to list four additional points about the function of a device to attach a bicycle and hold a mobile phone securely that they considered to be important. Commonly seen answers related to the materials, how securely the mobile phone would be held or the environment in which it would be used. Candidates should be advised against repeating points that are in the question, such as the device must allow the mobile phone to be adjusted to a suitable angle or giving generic points that might apply to almost any product.

(b) Most candidates used sketches and notes to good effect to show two methods that could be used to attach an item to a bicycle. Many candidates showed screw clamps, spring clips that were pushed over one of the bars of the bicycle, or adjustable straps. A small number of candidates showed tape as a method of attaching an item to a bicycle. To score maximum marks, candidates must use sketches and notes to show each method. A small number of candidates produced only sketches and were awarded a maximum of one mark for each method.

(c) A range of imaginative sketches with annotations were seen for this question, with many candidates clearly showing how the device would hold the mobile phone and how it would fasten to the bicycle. It was sometimes unclear how the design idea would work and if the mobile phone would be held securely or the rider would be able to access the mobile phone. It is important that all design proposals fully meet the design requirements if candidates are to access the full range of marks.

A small number of candidates produced less than three ideas and were awarded pro rata marks.

(d) Candidates were able to clearly demonstrate an understanding of the positive and negative features of their design proposals. Points that focused on how securely the mobile was held and whether it would fall out when the bicycle went over bumps were commonly seen responses. Some candidates also focused on the how the product would match the wide range of bicycle colour schemes or how easy it would be to manufacture the product. It is important that candidates justify their evaluations rather than making broad statements, such as the design would not work well, if they are to access the full range of marks. Almost all candidates were able to choose one idea and justify their choice.

(e) A variety of methods were used to show the full solution to the design problem. These included orthographic drawings, exploded views, isometric views and materials lists. Colour was frequently used to add clarity to the drawings. Most candidates used drawings to show the construction of the individual parts of their design proposal but sometimes omitted to clearly show how these joined

together to make the product. In responses, it was common to see a three-dimensional view of the product and then exploded or parts views. This question specifically asks for construction details and important dimensions but particularly in weaker responses, these were often missing.

(f) Most candidates were able to name two specific materials that would be used to make their design proposal and give reasons for their choices. Commonly seen materials were aluminium, acrylic and steel with reasons for selection relating to the physical properties of the materials. Candidates should be advised against giving generic names of materials, such as metal, or generic reasons, such as easy to work with, as these are not awarded marks.

(g) Most candidates were able to identify and outline a method used to manufacture one part of their design. Commonly seen answers included the use of a fabrication methods and the use of taps and dies to cut threaded parts. It is important that candidates include the correct names of tools and equipment to be used in the method of manufacture if they are to access the full range of marks. The most successful candidates used a combination of sketches and notes to outline a method of manufacture.

DESIGN AND TECHNOLOGY

Paper 0445/13
Product Design

Key messages

Most candidates responded well to the given design situations and were able to demonstrate their designing skills through imaginative sketches and short written responses.

Candidates should be encouraged to thoroughly read their chosen question to ensure that they avoid repeating points given in the question in their answers.

The benefits of using accurately measured drawings for **part (e)** needs to be carefully considered in terms of the time taken. Many candidates achieved high marks for this question using just freehand sketches and notes.

Candidates should be encouraged to plan the use of their time wisely so that they complete all parts of the question that they have chosen to answer. A small number of candidates did not complete **part (f)** and **(g)** of their chosen question.

General comments

Creativity and materials knowledge were clearly demonstrated through freehand sketching with annotations.

Some candidates were unable to clearly express their thoughts in the written parts of the paper and may benefit from working on past papers to improve their writing skills.

Comments on specific questions

Question 1

(a) Most candidates were able to list four additional points about the function of a sit-on toy vehicle that they considered to be important. Commonly seen answers related to the type of vehicle, steering system, seating arrangements, comfort of the user or colours that would attract a three to four-year-old child. Candidates should be advised against repeating points that are given in the question or giving generic points, such as safe, that might apply to almost any product.

(b) Most candidates used sketches and notes to show two methods of steering a toy vehicle. Many candidates showed a steering wheel or handlebars, although some candidates showed steering systems that used pedals or a rope. The quality of sketches and notes were usually of a standard that allowed the method to be understood. To score maximum marks, candidates must use sketches and notes to show each method. A small number of candidates used only sketches and were awarded a maximum of one mark for each method.

(c) Freehand sketches, with annotations and colour, were the commonly seen methods used to show design ideas. Whilst a wide range of appropriate design ideas were seen, in some cases the solutions did not fully meet the requirements of the question with features, such as the construction of the body of the vehicle, missing. Where the construction was evident, it was usually a plastic moulding or a tubular metal frame. It is important that all design ideas fully meet the design requirements if candidates are to access the full range of marks. Some candidates did little more than redraw the images of vehicles given in the question.

A small number of candidates produced less than three design ideas and were awarded marks accordingly.

(d) Candidates were able to clearly demonstrate an understanding of the positive and negative features of their design proposals. Commonly seen answers focused on the comfort or safety of the user, although some candidates also considered how the design would meet the needs of parents. It is important that candidates justify their evaluations, rather than making broad statements, if they are to access the full range of marks. Almost all candidates were able to select one idea and justify their choice.

(e) A variety of methods were used to show the full solution to the design problem. These included orthographic drawings, exploded views, isometric views and materials lists. The best responses included drawings with sufficient information for a skilled person to make the product. Commonly seen methods of showing the solution were a pictorial view and exploded views of the separate parts. Candidates should be advised against redrawing the design idea presented in **part (c)** and focus on the construction details, including materials, methods of joining the materials and finishes. Weaker responses often did not include construction details or important dimensions.

(f) Most candidates were able to name two specific materials that would be used to make their design proposal and give reasons for their choices. Aluminium, mild steel and specific plastics, such as polypropylene, were commonly seen materials with reasons usually referring to the working properties or aesthetic qualities of the material. Candidates should be advised against giving generic names of materials, such as metal, or generic reasons, such as cheap, as these are not awarded marks.

(g) Most candidates were able to identify and outline a method that would be used to manufacture one part of their design. Blow moulding, injection moulding and fabrication methods, including welding, were commonly seen responses to this question. It is important that candidates include the correct names of tools and equipment to be used in the method of manufacture if they are to access the full range of marks. Generic names, such as a saw, were not awarded marks. The most successful responses used a combination of sketches and notes to outline a method of manufacture.

Question 2

(a) Most candidates managed to list four additional points about the function of the game that they considered to be important. Commonly seen answers related to the game being computer-controlled, images to be used in the game or how actual road junctions could be incorporated into the game. Candidates should be advised against repeating points that are given in the question or giving generic points that might apply to almost any product.

(b) Most candidates used sketches and notes to good effect. However, some candidates did not fully understand the question as few showed two methods of forming model vehicles, such as injection moulding or shaping blocks of Styrofoam. To score maximum marks, candidates must use sketches and notes to show each method. A small number of candidates produced just sketches and were awarded a maximum of one mark for each method.

(c) A range of sketches with annotations were seen for this question. Commonly seen responses included showing a computer games console or a board for a game. It was often unclear how the games console would work or how it would be manufactured. The detail of board games was usually of a higher quality and designs often included appropriate graphics, models of cars and street furniture, cards or dice. It is important that all ideas fully meet the design requirements if candidates are to access the full range of marks.

A small number of candidates produced less than three ideas and were awarded marks accordingly.

(d) Candidates were able to clearly demonstrate an understanding of the positive and negative features of their design proposals. Candidates often focused on how real road junctions would be incorporated into the game or making sure that the game provided a level of challenge for the user. It is important that candidates justify their evaluations, rather than making broad statements, if they are to access the full range of marks. Almost all candidates were able to select one idea and justify their choice.

(e) A variety of methods were used to show the full solution to the design problem. These included orthographic drawings, exploded views, isometric views and materials lists. Colour was frequently used to add clarity to drawings. Construction details were often omitted, and it would have been difficult for a third party to make the game from the details given. This question specifically asks for construction details and important dimensions but particularly in weaker responses, these were often not included in the drawings. Stronger responses often used a three-dimensional view, with measurements, and detailed annotations to show their full solution.

(f) Most candidates were able to name two specific materials that would be used to make their design proposal and give reasons for their choices. Commonly seen materials were card, acrylic and foamboard, with the reasons relating to the weight or working properties of the material. Candidates should be advised against giving generic names of materials, such as plastic, or generic reasons, such as easy to work with, as these are not awarded marks.

(g) Most candidates were able to identify and outline a method used to manufacture one part of their design proposal. Cutting out of sheet materials and vacuum forming were commonly seen responses, although the quality of the descriptions was variable. It is important that candidates include the correct names of tools and equipment to be used in the method of manufacture if they are to access the full range of marks. The most successful responses used a combination of sketches and notes to outline a method of manufacture.

Question 3

(a) Most candidates were able to list four additional points about the function of a toy vehicle that would be propelled by an elastic band that they considered to be important. Commonly seen answers related to the weight of the vehicle, operation of the mechanism or materials to be used. Candidates should be advised against repeating points that are in the question, such as there must be an additional moving feature, or giving generic points that might apply to almost any product.

(b) Most candidates used sketches and notes to good effect to show two methods of producing rotational movement from an elastic band. Many candidates showed the elastic band being stretched and then used to propel a vehicle with wheels or the elastic band being wound up to provide a means of propulsion. A small number of candidates produced two methods that were very similar or lacked sufficient detail to show how the elastic band would be used to produce rotational movement.

(c) A range of imaginative sketches with annotations were seen for this question. However, some candidates focused on just the propulsion mechanism, rather than a toy vehicle propelled by an elastic band and with an additional moving feature. It was sometimes unclear how the design ideas would work, with the propulsion system inadequately explained. Some candidates did little more than redraw the images of vehicles given in the question. It is important that all design proposals fully meet the design requirements if candidates are to access the full range of marks.

A small number of candidates produced less than three ideas and were awarded marks accordingly.

(d) Candidates were able to clearly demonstrate an understanding of the positive and negative features of their design proposals. Commonly seen responses focused on winding up the vehicle, starting and stopping the vehicle or how far it would travel. It is important that candidates justify their evaluations rather than making broad statements, such as the design would not work well, if they are to access the full range of marks. Almost all candidates were able to select one idea and justify their choice.

(e) A variety of methods were used to show the full solution to the design problem. These included orthographic drawings, exploded views, isometric views and materials lists. Colour was frequently used to add clarity to the drawings. Most candidates used drawings to show the construction of the individual parts of their design proposal but sometimes omitted to clearly show how these joined together to make the product. This question specifically asks for construction details and important dimensions but, particularly in weaker responses, these were often missing.

(f) Most candidates were able to name two specific materials that would be used to make their design proposal and give reasons for their choices. Commonly seen materials were acrylic, pine and brass with reasons for selection relating to the physical properties of the materials. Candidates should be

advised against giving generic names of materials, such as wood, or generic reasons, such as easy to work with, as these were not awarded marks.

(g) Most candidates were able to identify and outline a method used to manufacture one part of their design. Commonly seen answers included joining parts made from acrylic, pine or brass with threaded fastening, friction fittings, soldering or gluing. It is important that candidates include the correct names of tools and equipment to be used in the method of manufacture if they are to access the full range of marks. The most successful candidates used a combination of sketches and notes to outline a method of manufacture.

DESIGN AND TECHNOLOGY

Paper 0445/02
School Based Assessment

Key messages

- In Assessment Criterion 1, Identification of a need or opportunity with a brief analysis leading to a Design Brief, candidates would benefit from looking at the needs and expectations of the selected user group in more detail. It would be useful to consider the type of environment in which the designed product will be used and highlight key issues.
- In Assessment Criterion 2, Research into the Design Brief resulting in a Specification, an analysis of existing products should help to identify strengths and weaknesses that could be considered during the initial design stage.
- Centres are reminded that practical outcomes and three-dimensional prototype models should not be forwarded with the sample for moderation.

General comments

Centres continue to prepare candidates well for the Project.

Most centres applied marks consistently and accurately. Assessment Criterion 1, Identification of a need or opportunity with a brief analysis leading to a Design Brief, Assessment Criterion 4, Development of the proposed solution and Assessment Criterion 7, Testing and evaluation, tended to be marked slightly generously by some centres.

The choices of projects were generally realistic and appropriate to the demands of the assessment criteria. For some centres, future submissions would benefit from candidates dividing their work into titled sections that follow each of the seven assessment objectives.

Some project folders were very bulky. Paper, printing, and postage costs could be significantly reduced by limiting font size to 12 or 14 and making sure that each A3 sheet is filled with relevant information.

For new centres, or teachers new to the specification, guidance for assessing coursework and other very useful support for 0445 can be found on the school support hub.

https://schoolsupporthub.cambridgeinternational.org

Comments on specific sections

1

Identification of a need or opportunity with a brief analysis leading to a design brief

- Many candidates used questionnaires to gain information on the needs of the user. Some questionnaires were limited in scope. Candidates would benefit from looking at the needs and expectations of the selected user group in more detail. It would be useful to consider the type of environment in which the designed product will be used, to highlight key issues.

2

Research into the design brief resulting in a specification

Most candidates researched existing products in this section. The research should analyse the existing products in more detail to identify strengths and weaknesses that could be considered during the initial design stage. Candidates should also gather other relevant information and data such as ergonomic or environmental factors and the type, size and shape of items to be used with the product.

Any information about materials or processes must be analysed for suitability for the product being designed and made. Generic text about a range of materials and processes will not gain marks.

Some research presented was too brief, candidates need to explain the information that they have found in more detail. They should make final conclusions from their investigations by explaining what they have found out and what they intend to take forward. This will help to produce a detailed specification for the product to be designed.

For some candidates, specifications were limited and generic. The points need to be focused on the specific brief and justified to direct designing. They are vital in providing check points for evaluation in the designing, developing and testing sections.

3

Generation and exploration of design ideas

There were a number of examples of creative and innovative design work. The quality of presentation was generally good. However, a number of candidates did not produce an appropriate range of possibilities, focussing on a single idea.

To gain a high mark in Assessment Criterion 3 a wide range of imaginative ideas should be considered. Candidates ought to use the specification points to evaluate proposals and explain why one design is better than another. Reasoning and justification is important in deciding upon a proposal to develop further. A number chart or a tick box table to evaluate ideas on its own will not access the middle or high range marks.

4

Development of proposed solution

Some centres were slightly too generous in their assessment of this section. Some candidates made good use of three-dimensional modelling to help visualise the size, shape and proportions of the design proposal.

To access the higher mark ranges candidates should show evidence of trialling and experimentation, to make informed decisions about the materials, construction possibilities and finishes for the product they wish to make.

5

Planning for production

This section was assessed accurately by the majority of centres. Most candidates produced a clear dimensioned working drawing and a detailed plan of the stages for manufacture.

This plan should include an effective sequence of operations and should state what they intend to do rather than a retrospective diary, which was evident in some folders.

6

Product realisation

Wherever possible, candidates fully completed the manufacture of a practical outcome. There were many good quality products presented by candidates, with appropriate manufacturing, assembly and finishes applied.

Photographic evidence of the key stages of manufacture of the product, emphasising key features and the quality of construction was generally excellent.

7

Testing and evaluation

Where possible, candidates carried out some form of testing of their product and produced an evaluation. Some candidates did not have a detailed specification to generate a detailed and meaningful evaluation against the specification. Tick lists with no explanation are not appropriate without additional evaluative comment.

Some candidates did not consider improvements or modifications. It is important that after testing, candidates should identify the main strengths and weaknesses of the product and use sketches and notes to suggest proposals for further improvement or further development.

The focus of the evaluation should be on the success of the outcome and not on the candidate's individual journey through the designing and making process.

DESIGN AND TECHNOLOGY

Paper 0445/31
Resistant Materials

Key messages

- Candidates need to read the questions **carefully** before attempting to answer and try to focus on the key elements of each question. The marks allocation given to each question and the space provided to answer the question provides candidates with a clear indication of what is required.
- Candidates need to improve their knowledge and understanding of the practical processes and techniques required to 'work' the resistant materials, wood, metal and plastic. To achieve this candidates need to be able to 'match' tools and equipment to specific purposes.
- Candidates need to improve their drawing skills. They must try to provide clearly drawn sketches when attempting questions that begin with the statement: *Use sketches and notes to....* In addition, notes should enhance and make clearer what they have drawn and not simply state the obvious.

General comments

Section A

Candidates need an all-round knowledge and understanding to answer all questions successfully in this section. Most candidates did not demonstrate a basic understanding of the processes, tools and equipment required.

Section B

This section always has several questions with large mark allocations requiring a combination of clear and accurate sketches supported by detailed written notes. It is essential that candidates attempt **all** parts of the question to gain access to all possible available marks.

Comments on specific questions

Section A

Question 1

(a) Most candidates were unable to name a biscuit joint correctly. 'Biscuit' was the only acceptable answer.

(b) A domino joint, butt joint and dowel joint were good alternative methods of joining the lengths of hardwood.

Question 2

(a) Very few candidates identified draw filing.

(b) Wet and dry paper is commonly used to describe silicon carbide paper. Very few candidates were familiar with this term.

(c) Most candidates gave at least one good safety precaution taken when using a buffing wheel; the most common precautions related to the use of eye protection and the need to tie back hair and loose clothing.

Question 3

There were some good answers showing a completed flush hinge. Many candidates recognised that a left-hand side flap would fold inside that shown on the right-hand side.

Question 4

Most candidates could not identify aluminium as the metal that could be anodised.

Question 5

No candidates could name the surface plate and scribing block that are used to mark lines accurately on metal.

Question 6

There were some good answers provided by only a few candidates. Benefits of steam bending the chair included the absence of traditional joints making it quicker to manufacture and the unusual, curved shapes that could be produced.

Question 7

Most candidates understood why there was a need for easier access to the leaflets and showed some sort of recess, mostly on the front of the holder.

Question 8

Resistance to corrosion and lightweight were the most common advantages of carbon fibre reinforced plastic (CFRP) over the mild steel for the body shell. Many candidates gained at least one mark for this question.

Question 9

(a) Most candidates gained at least one mark for naming a suitable hardwood for tray B, the most common hardwood being oak. Some candidates named softwoods such as pine. Candidates should be familiar with a variety of hardwoods and softwoods, their properties and uses. Only a few candidates named a suitable thermosetting plastic such as melamine and many named thermoplastics such as acrylic.

(b) Many candidates were under the common misconception that the plastic tray would be lighter in weight than the hardwood tray. It would be heavier. There were some excellent reasons given, including the rounded moulded shape, more durability and water resistance so that it could be cleaned more easily.

Question 10

(a) Only a few candidates stated the correct process, blow moulding, to produce the plastic bottle.

There are only a limited number of processes used in the manufacture of plastic products with which candidates need to be familiar.

(b) Only a few candidates named polythene, or one of its variants, PET, PETE and polyethylene correctly.

(c) Only a few candidates showed an understanding of why many products made from plastic are not recycled. Some good answers referred to the fact that some plastics cannot be recycled, that some are contaminated, that there are no facilities or even the laziness of the public.

Section B

Question 11

(a) Most candidates gave at least one property of hardwood that made it suitable for the rocking horse, the most common relating to its durability and attractiveness.

(b) The question stated clearly that the handhold should be comfortable, and candidates needed to show how it could be fitted. There were some excellent answers showing a comfortable handle fitted to the rocking horse. Many candidates showed a handle through the head of the horse and gained at least one or two marks, but many did not show clearly how it could be secured either in the sketches or added notes. The 'comfortable' feature had to be shown or described to gain that specific mark.

(c) The best methods of joining the leg to the rail included a mortise and tenon joint or dowel joint. Only a minority of candidates named and sketched these. Many candidates named and sketched a through housing joint which ***could*** be used but which would not be as strong as the accepted joints.

(d) This question required a basic knowledge of steam bending wood. While few candidates demonstrated a detailed knowledge of the process, some did understand that steam would 'soften' the wood enabling it to be bent around a former. This answer alone secured two marks for candidates. However, the method by which the steam was produced and how it actually softened the wood was less convincing.

(e) Only a few candidates gained marks for explaining how the designer considered anthropometrics in the design of the rocking horse. There were some good answers relating to the 'reach' of a child holding the handholds, the length of the child's legs to the rocker and relating the design to the sizes of different parts of the child's body.

(f) (i) Many candidates described how the plastic rocking horse could be considered safer than the hardwood rocking horse. The best answers referred to plastic being lighter in weight and not injuring the child if it fell onto them, the more curved and rounded shape of the plastic and a backrest to provide better support.

(ii) Many candidates gave good reasons why the hardwood rocking horse would be more expensive to batch produce. Most answers considered that the hardwood rocking horse was 'fabricated' from numerous pieces of hardwood and they would need to be joined, which in turn, would require more labour and therefore increased costs.

Question 12

(a) There was a wide variety of plastics available to choose from that would be suitable for the trays. Most candidates selected an appropriate plastic.

(b) Vacuum forming is a process that most candidates are familiar with and there were some very good answers combining sketches and notes to describe the process. Since there were six marks available for this question the majority of candidates were able to achieve marks for showing or describing at least one or two important stages in the process.

(c) (i) The vast majority of candidates named a suitable material, wood, metal or plastic, for the base of the desk tidy.

(ii) Reasons for their choice often related to the material being heavy, providing stability. Durability and appearance were often stated appropriately.

(iii) Many candidates could not provide two practical dimensions for the base. 'Clues' as to appropriate sizes for the base were provided by the dimensions added for the size of the trays given in Fig. 12.1.

(iv) Candidates' attempts to show how the base could be produced using the material of their earlier choice were generally lacking in detail. To make the base, candidates needed to consider four key elements: marking out, cutting, shaping and finishing. Very often candidates provided information about one or two elements but seldom all four. Often the tools and equipment used were not always appropriate for their choice of material.

(v) The column could be joined to their chosen base by drilling a hole in the base and then securing it in position using an appropriate adhesive or by using a screw. As in the previous question, details were often either not given or were impractical.

(d) Many candidates understood that to support the trays on the column some sort of 'collar' would be required and many candidates were rewarded for this idea. The details of the material used for the collar and the method of fixing to the column were very often not provided or were inappropriate.

(e) Candidates were generally well-informed about environmental issues. Many candidates provided at least one benefit of using products that would otherwise be thrown away. The most common benefits included saving raw materials, reduced impact of landfill and reduction of plastic waste.

Question 13

(a) (i) The most important advantage of using a manufactured board rather than solid wood for the shelf is that it would be stable and not liable to warping. Only a minority of candidates gave this answer. The most common correct answer was that manufactured boards are generally cheaper. Many candidates provided two popular misconceptions. Manufactured boards are not lighter in weight nor are they easier to work.

(ii) This was a higher order question that required candidates to differentiate between two manufactured boards; plywood and MDF. Cost was an irrelevance but MDF is easier to work and can provide a better surface finish.

(b) (i) While many candidates named an appropriate marking out tool that could be used on metal, including a scriber or odd-leg calipers, the use of felt tips and marker pens was not appropriate.

(ii) Most candidates understood the importance of using a centre or dot punch before drilling a hole in metal. There were many good answers describing how the centre punch would provide a 'dent' in the metal that would prevent the drill from slipping out of position.

(c) The use of a power router to machine grooves and rebates is an excellent method. Many candidates did not focus on the checks necessary to the router before using it but concentrated on the use of personal protection equipment (PPE). There were, however, a few excellent answers describing how the tool would be checked to ensure it was secure, no trailing leads, the depth and width of cut set correctly and a check to ensure that there were no bare wires.

(d) (i) There were some excellent answers provided showing the use of a try square pushed against the tube to check to see if it was vertical. Many candidates described the use of a spirit level (often referred to as just a 'level,' which was acceptable) and achieved maximum marks. While the use of a spirit level does not appear in the D&T syllabus content, it was encouraging that candidates were able to use their wider practical knowledge to good effect.

(ii) Most candidates had knowledge of at least one or two items of materials or equipment used in the brazing process, in particular the blow torch and brazing rod. The purpose of the flux to keep the metal clean and prevent oxidisation was the weakest of the four items.

(e) The majority of candidates provided methods of securing the shelf that were impractical. Only a minority provided workable solutions, most showing the use of a small screw that could be inserted from underneath the shelf and making sure that the head of the screw was hidden below the surface of the shelf. Often the quality of sketches made it difficult to determine exactly what the candidate was trying to show.

(f) Many candidates were familiar with the appearance of MDF and correctly described it as unattractive.

The application of a clear finish would allow the unattractive surface to be seen. Some candidates stated correctly that paint could be used to match the existing environment and that a painted finish would cover unsightly marks more effectively.

(g) There were six marks available for candidates to show how the bracket could be constructed from a single length of hardwood. Marks were awarded for each of the details that candidates needed to provide: marking out, cutting, shaping and joining. Most candidates achieved at least one or two marks for this question but many candidates denied themselves marks by simply not addressing all four points.

DESIGN AND TECHNOLOGY

Paper 0445/32
Resistant Materials

Key messages

- Candidates need to read the questions **carefully** before attempting to answer and try to focus on the key elements of each question. The marks allocation given to each question and the space provided to answer the question provides candidates with a clear indication of what is required.
- Candidates need to improve their knowledge and understanding of the practical processes and techniques required to 'work' the resistant materials, wood, metal and plastic. To achieve this, candidates need to be able to 'match' tools and equipment to specific purposes.
- Candidates need to improve their drawing skills. They must try to provide clearly drawn sketches when attempting questions that begin with the statement: *Use sketches and notes to....* In addition, notes should enhance and make clearer what they have drawn and not simply state the obvious.

General comments

Section A

Candidates need an all-round knowledge and understanding to answer all questions successfully in this section. Most candidates did not demonstrate a basic understanding of the processes, tools and equipment required.

Section B

This section always has several questions with large mark allocations requiring a combination of clear and accurate sketches supported by detailed written notes. It is essential that candidates attempt **all** parts of the question to gain access to all possible available marks.

Comments on specific questions

Section A

Question 1

Many candidates stated an appropriate safety precaution for the two processes. The most common correct answers for the pillar drill referred to securing the material to be drilled and the use of eye protection. The use of a mask to prevent dust inhalation was a good answer when using a sanding disk.

Question 2

Most candidates were unable to identify high carbon steel as the material that could be hardened.

Question 3

There were ***some*** excellent answers with candidates showing a clear sketch of a recognisable KD (Knock-Down) fitting. However, many candidates were not familiar with KD (Knock-Down) fittings and provided sketches showing the use of dowels, nails, or screws with an adhesive.

Question 4

(a) Very few candidates named both the claw hammer and the pincers. More candidates identified the claw hammer than the pincers. Some variations such as 'pinchers' was accepted.

(b) Most candidates understood the purpose of the scrap wood positioned below the hammer: to protect the wood from being damaged.

Question 5

(a) and (b) Very few candidates could name the machine vice or the lathe process to produce the 'grip' on the handle of the machine vice. The machine vice is the best method of securing materials when using a drilling machine to drill holes. 'Knurling' is the lathe process used to provide the 'grip' on the handle of the machine vice.

Question 6

(a) Only a few candidates were able to state what the term 'fabricated' meant.

There were *some* excellent answers that included the key phrase, 'to join parts together'.

The bracket was made by joining together three separate parts.

(b) The bracket could be made or 'moulded' using one piece of material. Casting, sand casting and die-casting were the correct answers provided by only a few candidates.

Question 7

Very few candidates provided a practical design for a jig that could be used when bending acrylic sheet. There were ***some*** excellent designs that showed some form of 'stay' joining the fixed and adjustable boards while allowing for adjustment and locking in position. Many designs did not allow for adjustment or locking in position.

Question 8

Most candidates gained marks for correctly identifying the uses for a chinagraph pencil, scroll saw and hand file. Many candidates could not provide a correct use for the buffing machine. The most common incorrect answer referred to the buffing machine being used to bend the acrylic.

Question 9

Most candidates stated correctly that Shape Memory Alloy is a 'smart' material that reacts to temperature.

Question 10

(a)(b) and (c) This question tested the candidates' knowledge and understanding of solid wood and how it 'behaves' when it dries out or is exposed to varying conditions. Only a few candidates appeared to understand that solid wood will shrink when it dries, that this creates 'movement' in the wood and if allowance is not made for this, the wood can warp, twist, 'cup' or split. 'Movement' is a very important practical issue when designing and making products using solid wood.

Section B

Question 11

(a) Many candidates gave at least one property of oak that made it suitable for the stool. The most common properties were durability, attractive appearance and toughness.

(b) Most candidates were not familiar with a sliding bevel or how a sliding bevel could be used when marking out one of the legs.

(c) (i) There were ***some*** excellent sketches showing a through housing joint. However, there were some inaccurate sketches that were unrecognisable and could not be awarded credit. Many candidates showed the joint drawn in the step (which was impractical) rather than in the leg shown in Fig. 11.2.

(ii) Most candidates did not identify the portable power tool as a router.

(iii) Many candidates provided an appropriate safety precaution to be taken when using portable power tools; the most common relating to checking the electrical connections to the tool, no trailing leads and to make sure that the work piece was secured. Although the question stated clearly that the precautions must be 'other than PPE (Personal Protection Equipment)' many candidates described the use of various items of eye and ear protection.

(d) This question was well answered by many candidates. Many candidates drew two dowels in the ends of each leg, stated an appropriate diameter for the dowel and either stated or showed appropriate spacing.

(e) This question was well answered by many candidates Most 'strengthening' solutions showed a 'brace' that could be joined to the legs of the stool, (usually by nails or screws and glue), or a wedge of solid wood inserted between the legs.

(f) (i) Many candidates simply gave a general advantage for applying a finish rather than the specific advantage of an oiled finish over a painted finish. The most common correct answer stated that an oiled finish enabled the natural grain of the wood to be seen. Other correct answers included an oiled finish would be easier to apply or that it would not chip and peel like a painted finish.

(ii) The answers to this question highlighted the need for candidates to read questions carefully.

Most answers simply informed Examiners why glasspaper is used. The question required candidates to give benefits of glasspapering the step '***before'*** it was glued to the legs.

When working with constructions using wood it is good practice to glasspaper the parts before they are assembled because it makes the process more efficient and much easier to carry out.

(g) Many candidates achieved some of the six marks available for this question. Marks were awarded for specific details stated in the question. The purpose of bullet points, especially in questions with high allocations of marks, is to help the candidates to focus on what needs to be recorded. There were ***some*** very good designs showing an appropriate comfortable hand-hold that was fixed to the stool at the required height. However, candidates needed to improve on the constructional details given as these were the weakest part of many answers.

Question 12

(a) Many candidates stated correctly that the use of CAD was more accurate than traditional drawing methods. Fewer candidates provided a second advantage The best answers related to ease of editing, the sharing of CAD files and the facility to transfer files to CNC machines for CAM (Computer Aided Manufacture).

(b) Most candidates achieved at least one mark for providing one benefit of using aluminium for the chassis of the car; the most common answers being that it was lightweight, corrosion resistant and easy to work/bend.

(c) (i) Very few candidates achieved maximum two marks for this question with many achieving only one mark. The most common correct features of the mould were that it must have draft angled sides, rounded edges and a smooth surface.

(ii) Most candidates attempted this question. However, in many cases, answers needed to be more clearly expressed. The reasons why polystyrene needed to be heated to the correct temperature when vacuum forming were that if it was not heated enough it would not form and if it was overheated there was a risk of the plastic melting and stretching.

(iii) Most candidates gained marks for completing at least some of the stages of the flow chart outlining the vacuum forming process.

(d) (i) Many candidates were able to name one hand tool that could be used to cut out the shape of the aluminium chassis. The most appropriate tools were a hacksaw and tinsnips. Use of a guillotine and a piercing saw were also accepted. Many candidates selected hand tools that are used with wood rather than metal, for example, a coping saw and a tenon saw.

(ii) Most candidates recognised that a file could be used to make the cut edges of the aluminium smooth and safe to handle. For a second mark the edges needed to be finished with an abrasive paper such as silicon carbide, ('wet and dry') paper.

(iii) Many candidates stated correctly that the aluminium wheel supports could be bent to shape using a hammer or mallet and gained one mark. For maximum three marks candidates needed to show how the metal would be secured, (in a vice or clamped to a work bench) and use of some sort of former over which the metal could be shaped.

(e) (i) While many candidates named injection moulding correctly as the process used to manufacture the plastic wheel, the majority of candidates named an inappropriate process such as extrusion or blow moulding.

(ii) The majority of candidates achieved at least one mark for showing some form of axle. Subsequent marks were available for showing how the wheel could be fitted to the axle and how it could be allowed to rotate freely. Very often the sketches necessary to show the practical details were unclear or not provided.

Question 13

(a) (i) Most candidates recognised that the reason for removing the corners of the mahogany would make it easier and/or safer to 'turn' the shape.

(ii) There were some excellent answers stating checks that should be carried out before switching on the woodturning lathe. The most common checks included making sure that the mahogany was held securely and that the 'fork centre', (not usually accurately named), was secure. Checks relating to personal safety such as wearing eye protection were not considered to be relevant.

(iii) Many candidates provided a variety of tools and equipment that could be used to check the diameter of the mahogany when it was 'turned'. The most appropriate tools included outside, (external'), calipers, vernier calipers and a digital micrometer.

(iv) Very few candidates were able to name an appropriate lathe tool. The most common correctly named lathe tool was a chisel. Some candidates named a gouge and a scraper which were excellent answers. The use of files was not appropriate.

(b) There were many good answers to this question with candidates describing how scrap wood could be used to prevent damage to the brass tubes when held in an engineer's vice. An alternative answer stating that the vice should not be overtightened was also accepted.

(c) (i) Most candidates understood the purpose of the brass caps. The most common correct answers stated that they made the product more attractive or prevented damage or splitting to the ends of the mahogany.

(ii) Most candidates understood the advantages of using pre-manufactured components and stated at least one advantage over making them in a school workshop. The best answers included that it would save time or that the components would be of a higher quality than those made in a school workshop.

(d) (i) Most candidates named at least one correct marking out tool. There were many marking out tools available from which to choose, including a pencil, steel rule and a try square.

(ii) There were only two acceptable methods by which the mitre could be produced. One method involved the use of a jack or smoothing plane and the second method involved use of a mitre saw.

Most candidates were unable to provide sketches and notes describing either of these methods but concentrated on the inappropriate use of saws, files and chisels that would not produce an accurate mitre.

(e) There were six marks available to candidates for showing a drawer that would fit into the base of the jewellery stand. It was vital that candidates provided good sketches and accurate legible notes. Questions of this type always ask candidates to provide details of 'the constructions and materials used'. Many candidates achieved some of the six marks available, but many denied themselves marks by not addressing the key points of the question.

Many candidates did work out, or attempt to work out, the overall sizes of a drawer that would fit inside the base. Many candidates attempted to show at least some of the constructions, but few gained maximum marks for the question.

(f) Most candidates could not describe how the 1 mm thick brass strip could be cut and shaped to produce a handle that could be attached to the front of the drawer. Candidates needed to have knowledge and understanding of some basic tools, equipment and processes that could be employed to produce the handle made from brass strip.

DESIGN AND TECHNOLOGY

Paper 0445/33
Resistant Materials

Key messages

- Candidates need to read the questions **carefully** before attempting to answer and try to focus on the key elements of each question. The marks allocation given to each question and the space provided to answer the question provides candidates with a clear indication of what is required.
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- Candidates need to improve their drawing skills. They must try to provide clearly drawn sketches when attempting questions that begin with the statement: *Use sketches and notes to....* In addition, notes should enhance and make clearer what they have drawn and not simply state the obvious.

General comments

Section A

Candidates need an all-round knowledge and understanding to answer all questions successfully in this section. Most candidates did not demonstrate a basic understanding of the processes, tools and equipment required.

Section B

This section always has several questions with large mark allocations requiring a combination of clear and accurate sketches supported by detailed written notes. It is essential that candidates attempt **all** parts of the question to gain access to all possible available marks.

Comments on specific questions

Section A

Question 1

(a) Most candidates were unable to name a biscuit joint correctly. 'Biscuit' was the only acceptable answer.

(b) A domino joint, butt joint and dowel joint were good alternative methods of joining the lengths of hardwood.

Question 2

(a) Very few candidates identified draw filing.

(b) Wet and dry paper is commonly used to describe silicon carbide paper. Very few candidates were familiar with this term.

(c) Most candidates gave at least one good safety precaution taken when using a buffing wheel; the most common precautions related to the use of eye protection and the need to tie back hair and loose clothing.

Question 3

There were some good answers showing a completed flush hinge. Many candidates recognised that a left-hand side flap would fold inside that shown on the right-hand side.

Question 4

Most candidates could not identify aluminium as the metal that could be anodised.

Question 5

No candidates could name the surface plate and scribing block that are used to mark lines accurately on metal.

Question 6

There were some good answers provided by only a few candidates. Benefits of steam bending the chair included the absence of traditional joints making it quicker to manufacture and the unusual, curved shapes that could be produced.

Question 7

Most candidates understood why there was a need for easier access to the leaflets and showed some sort of recess, mostly on the front of the holder.

Question 8

Resistance to corrosion and lightweight were the most common advantages of carbon fibre reinforced plastic (CFRP) over the mild steel for the body shell. Many candidates gained at least one mark for this question.

Question 9

(a) Most candidates gained at least one mark for naming a suitable hardwood for tray B, the most common hardwood being oak. Some candidates named softwoods such as pine. Candidates should be familiar with a variety of hardwoods and softwoods, their properties and uses. Only a few candidates named a suitable thermosetting plastic such as melamine and many named thermoplastics such as acrylic.

(b) Many candidates were under the common misconception that the plastic tray would be lighter in weight than the hardwood tray. It would be heavier. There were some excellent reasons given, including the rounded moulded shape, more durability and water resistance so that it could be cleaned more easily.

Question 10

(a) Only a few candidates stated the correct process, blow moulding, to produce the plastic bottle.

There are only a limited number of processes used in the manufacture of plastic products with which candidates need to be familiar.

(b) Only a few candidates named polythene, or one of its variants, PET, PETE and polyethylene correctly.

(c) Only a few candidates showed an understanding of why many products made from plastic are not recycled. Some good answers referred to the fact that some plastics cannot be recycled, that some are contaminated, that there are no facilities or even the laziness of the public.

Section B

Question 11

(a) Most candidates gave at least one property of hardwood that made it suitable for the rocking horse, the most common relating to its durability and attractiveness.

(b) The question stated clearly that the handhold should be comfortable, and candidates needed to show how it could be fitted. There were some excellent answers showing a comfortable handle fitted to the rocking horse. Many candidates showed a handle through the head of the horse and gained at least one or two marks, but many did not show clearly how it could be secured either in the sketches or added notes. The 'comfortable' feature had to be shown or described to gain that specific mark.

(c) The best methods of joining the leg to the rail included a mortise and tenon joint or dowel joint. Only a minority of candidates named and sketched these. Many candidates named and sketched a through housing joint which ***could*** be used but which would not be as strong as the accepted joints.

(d) This question required a basic knowledge of steam bending wood. While few candidates demonstrated a detailed knowledge of the process, some did understand that steam would 'soften' the wood enabling it to be bent around a former. This answer alone secured two marks for candidates. However, the method by which the steam was produced and how it actually softened the wood was less convincing.

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Question 12

(a) There was a wide variety of plastics available to choose from that would be suitable for the trays. Most candidates selected an appropriate plastic.

(b) Vacuum forming is a process that most candidates are familiar with and there were some very good answers combining sketches and notes to describe the process. Since there were six marks available for this question the majority of candidates were able to achieve marks for showing or describing at least one or two important stages in the process.

(c) (i) The vast majority of candidates named a suitable material, wood, metal or plastic, for the base of the desk tidy.

(ii) Reasons for their choice often related to the material being heavy, providing stability. Durability and appearance were often stated appropriately.

(iii) Many candidates could not provide two practical dimensions for the base. 'Clues' as to appropriate sizes for the base were provided by the dimensions added for the size of the trays given in Fig. 12.1.

(iv) Candidates' attempts to show how the base could be produced using the material of their earlier choice were generally lacking in detail. To make the base, candidates needed to consider four key elements: marking out, cutting, shaping and finishing. Very often candidates provided information about one or two elements but seldom all four. Often the tools and equipment used were not always appropriate for their choice of material.

(v) The column could be joined to their chosen base by drilling a hole in the base and then securing it in position using an appropriate adhesive or by using a screw. As in the previous question, details were often either not given or were impractical.

(d) Many candidates understood that to support the trays on the column some sort of 'collar' would be required and many candidates were rewarded for this idea. The details of the material used for the collar and the method of fixing to the column were very often not provided or were inappropriate.

(e) Candidates were generally well-informed about environmental issues. Many candidates provided at least one benefit of using products that would otherwise be thrown away. The most common benefits included saving raw materials, reduced impact of landfill and reduction of plastic waste.

Question 13

(a) (i) The most important advantage of using a manufactured board rather than solid wood for the shelf is that it would be stable and not liable to warping. Only a minority of candidates gave this answer. The most common correct answer was that manufactured boards are generally cheaper. Many candidates provided two popular misconceptions. Manufactured boards are not lighter in weight nor are they easier to work.

(ii) This was a higher order question that required candidates to differentiate between two manufactured boards; plywood and MDF. Cost was an irrelevance but MDF is easier to work and can provide a better surface finish.

(b) (i) While many candidates named an appropriate marking out tool that could be used on metal, including a scriber or odd-leg calipers, the use of felt tips and marker pens was not appropriate.

(ii) Most candidates understood the importance of using a centre or dot punch before drilling a hole in metal. There were many good answers describing how the centre punch would provide a 'dent' in the metal that would prevent the drill from slipping out of position.

(c) The use of a power router to machine grooves and rebates is an excellent method. Many candidates did not focus on the checks necessary to the router before using it but concentrated on the use of personal protection equipment (PPE). There were, however, a few excellent answers describing how the tool would be checked to ensure it was secure, no trailing leads, the depth and width of cut set correctly and a check to ensure that there were no bare wires.

(d) (i) There were some excellent answers provided showing the use of a try square pushed against the tube to check to see if it was vertical. Many candidates described the use of a spirit level (often referred to as just a 'level,' which was acceptable) and achieved maximum marks. While the use of a spirit level does not appear in the D&T syllabus content, it was encouraging that candidates were able to use their wider practical knowledge to good effect.

(ii) Most candidates had knowledge of at least one or two items of materials or equipment used in the brazing process, in particular the blow torch and brazing rod. The purpose of the flux to keep the metal clean and prevent oxidisation was the weakest of the four items.

(e) The majority of candidates provided methods of securing the shelf that were impractical. Only a minority provided workable solutions, most showing the use of a small screw that could be inserted from underneath the shelf and making sure that the head of the screw was hidden below the surface of the shelf. Often the quality of sketches made it difficult to determine exactly what the candidate was trying to show.

(f) Many candidates were familiar with the appearance of MDF and correctly described it as unattractive.

The application of a clear finish would allow the unattractive surface to be seen. Some candidates stated correctly that paint could be used to match the existing environment and that a painted finish would cover unsightly marks more effectively.

(g) There were six marks available for candidates to show how the bracket could be constructed from a single length of hardwood. Marks were awarded for each of the details that candidates needed to provide: marking out, cutting, shaping and joining. Most candidates achieved at least one or two marks for this question but many candidates denied themselves marks by simply not addressing all four points.

DESIGN AND TECHNOLOGY

Paper 0445/42
Systems and Control

Key messages

- All compulsory questions in ***Section A*** should be attempted. Only one question from ***Section B*** should be attempted.
- Where there is no response to a question there is no chance of a mark being awarded.
- Description and explanations should be answered in sentences rather than as short notes.
- In calculation questions, units should be applied to the answer wherever it is appropriate or is asked for in the question.
  Any working should always be shown as it is possible to gain marks from this even if the final answer is incorrect.
- Clear, legible writing and annotation to sketches are vital; where responses cannot be read no mark will be awarded.
- Candidates should take care not to repeat facts that are given in the question as part of their own response.

General comments

In ***Section A*** almost all questions had been attempted. The questions were generally well answered with only a few resulting in 'no response'.

The key content was well known, resulting in clear responses.

Stronger candidates had at times provided more detail than was necessary for the marks to be awarded.

Sketches were generally of good quality and most notes added were relevant to the response.

In ***Section B*** few candidates had attempted more than one question. It is important for candidates to read all the questions carefully before making a choice.

Comments on specific questions

Section A

Question 1

(a) Most candidates recognised the satellite dish as a shell structure.

(b) In almost all cases a valid alternative shell structure had been given. A few candidates appeared to have misread the question, providing examples of either frame or mass structures.

Question 2

Forces resisted by the compression and tension springs shown in the question were correctly identified by most candidates. The third example, a torsion spring was only identified by stronger candidates.

Question 3

The property of concrete given was generally related to its strength in compression. Credit was given to those who had referred to the durability or low cost of concrete.

Wood was the correct answer for a renewable resource, with only a few giving solar power, which although renewable is not a material.

Any ferrous metal was correct for corrosion in damp conditions. To gain the mark a named metal had to be given.

There were several possibilities for properties of plastics; ease of forming or moulding was the one most often seen.

Question 4

This question caused some difficulty for candidates. In most cases the correct motions had been identified but their use as input and output was incorrectly given. Where this was the case, a single mark was awarded. Those who had both aspects correct, gained two marks.

Question 5

(a) Reasons for mechanisms requiring lubrication were well known and candidates generally gained both marks.

(b) Almost all candidates had identified oil and grease as being suitable for lubricating mechanisms. A few had responded with 'graphite' or 'ptfe', both of which were acceptable.

Question 6

The sketches and notes were frequently of a wheelbarrow, which was correct and gained both marks. It should be noted that there are several other commonly found second order levers, such as a spanner, which candidates should be made aware of.

Question 7

The question required understanding of a simple electronic circuit. Most candidates understood the difference between series and parallel circuits. The third mark for the voltage that would show on the voltmeter was correct in almost all cases. The component affected by pressing the switch was correctly identified. The fact that the switch was a push-to-break type was only noted by the stronger candidates who recognised that operating the switch would result in the LED turning off rather than on.

Question 8

Knowledge of sub-multiples of the units for capacitance was not well known. In many cases the answers were entered into the table as largest to smallest. Those who had placed any two of the units correctly gained a single mark.

Section B

Question 9

(a) (i) This question required the candidates to understand what a web is and then to draw it in the correct position, between the marked points **X** and **Y**. Stronger candidates gained both marks; weaker candidates frequently failed to draw a suitable shape for the web, indicating depth and thickness.

(ii) The question required four gussets to be added to the round pillar. In many cases the gussets were not drawn spaced around the pillar, losing one of the available marks.

(iii) Stronger candidates were able to accurately describe the purpose of the rib and gussets. Weaker responses referred only to an increase in the strength of the structure without mentioning the improved resistance to distortion.

(iv) There was a tendency for the responses to start with a valid reason for disassembly and then go on to repeat that reason.

The reason found most often related to accessing the interior of the casing for repair.

(b) (i) An important fact given in the question was frequently overlooked; the two steel tubes were each 2 metres long. This would put considerable strain on any end to end joining method and ruled out the butt weld that was the method seen most often. A support, either inside the tube or going around the outside and extending each side of the joint was needed for the method to be functional. For this reason, only the stronger candidates gained more than one mark.

(ii) In contrast to the previous part, many of the responses used strengthening around the outside of the tubes to reinforce the joint. Suitable locking methods such as screws or bolts were used by most candidates. There were a minority of candidates who had chosen to use glue on the joint. This is not a temporary method and so did not gain credit.

(c) (i) Almost all candidates had a basic understanding of equilibrium and gained the mark.

(ii) Those who understood the method used to calculate the force were able to calculate the distance to the centre of counterweight **A**. This question was a good example of the benefits of including all working. There were several responses that gained at least two of the marks before failing to calculate the final answer accurately.

(iii) Stronger candidates were very clear on the difference between static load and moving load. Weaker candidates frequently knew what made up a part of the load but were unable to place it in the correct category.

(iv) Only one reason for using prefabricated parts was required but, in several cases, more than one reason was given. Any reason that reflected the need to disassemble the tower crane gained credit.

(v) In this part, two marks were awarded for a fully justified point but only one mark for mentioning a relevant fact in the explanation. To gain the full three marks available, a recognition that factor of safety involves building the structure to withstand an unknown force, larger than that usually expected, was needed.

Question 10

(a) (i) The position of the fulcrum was correctly identified in most responses.

(ii) In several cases the lever was incorrectly identified as being first order.

(iii) Stronger candidates had completed the mechanical advantage calculation correctly. Errors were mainly with those who had divided the length of the load arm by the length of the effort arm.

(iv) Nearly all candidates gained a mark for giving a single advantage of a cam clamp compared to a screw operated clamp. Stronger candidates recognised that the smaller space taken up by the cam clamp was an advantage. Weaker candidates had frequently relied on a reference to the ease of use.

(b) (i) Only the stronger responses referred to the fact that a ratchet wrench does not have to turn through a full 360º or that the wrench will only rotate in one direction without slipping.

(ii) The action of the reversing lever was not fully appreciated by weaker candidates. Stronger responses recognised that this feature allows a nut to be removed as well as tightened.

(iii) Several responses featured accurate sketches of alternative mechanisms using a ratchet and pawl mechanism. Any tool or mechanism where the rotary motion could only be in one direction was given credit. A few weaker candidates did not give any response.

(c) (i) The question first required an understanding of velocity ratio.

Either a description or the equation for finding the velocity ratio was acceptable.

(ii) After finding the velocity ratio of the pulley system the amount of rope that would be pulled through to lift the load by 100 mm could be calculated. There was one mark for the velocity ratio and one mark for stating the length of rope pulled. Several weaker candidates did not answer this part.

(iii) Understanding of efficiency in mechanical systems was generally good. A few responses referred to frictional losses in general with a higher number being more specific and giving the physical effect of friction on the moving parts.

(d) Stronger candidates gained all three marks available for the question. In the weaker responses, the driving and driven gears were reversed, which would have caused a decrease in speed. The direction of rotation of the driven shaft was controlled by using an idler from any of the remaining gears, the number of teeth being immaterial.

(e) (i) A plain bearing was the answer required in this part. Responses were divided between plain, roller and ball bearing. The indication given in the drawing was the nylon strip that fitted between the moving parts.

(ii) Reasons for using nylon as a bearing material were recognised by stronger candidates, with most stating the low cost of the material and the fact that it does not require regular lubrication.

Question 11

(a) (i) The first switch symbol was recognised as being a push-to-make switch. The alternative answers for symbols 2 and 3, which were SPST and SPDT also gained marks.

(ii) Reasons for using a relay in a circuit could have referred to isolation of two parts of a supply or the ability to control a high output current. The two specialised uses of a relay given in the syllabus; reversing a motor and latching an output were also acceptable. Answers which were vague such as ‘controlling the potential difference’ did not gain the mark.

(iii) The description of meaning of 12 V DPDT required reference to both the coil voltage and the type of switch arrangement to gain both marks.

(iv) This part referred to the output contacts of the relay and responses required mention of the maximum current and voltage that could be switched when the relay changed state.

(b) (i) The circuit diagram required the emitter of the transistor being connected to the 0 V rail; this was the most frequently seen.

Connecting the collector to the output was the second requirement. The third mark was for one additional component, a pull up resistor, connected between the collector and +9 V.

(ii) Advantages of a transistor switch were related to the small physical size possible.
Few responses mentioned the lack of moving parts or the high switching speed.

(iii) Labelling of transistor legs using a pin diagram was generally completed accurately.

(c) (i) The AND gate was recognised by stronger candidates from the description given.

(ii) Candidates who tackled this part methodically gained all three marks.

Inputs had to be connected to both NOR gate legs to create NOT gates, inverting the input signal. The outputs from the two NOT gates were then taken to a third NOR gate, with the output of this going to the Air Conditioning system.

Candidates should be advised to use the most convenient gates in an IC if there is a choice; this will minimise the number of crossed over connections.

(iii) The unused inputs were those connected to the fourth, unused NOR gate.

(d) (i) The signal shown was a continuous on/off signal. The correct type of circuit could either have been arrived at by knowing the correct answer, which was astable, or it could have been tackled by crossing off all incorrect answers, thus leaving the correct answer.

(ii) The astable calculation gave the correct formula and values of components. Candidates had to substitute into the formula and carry out the calculation. Stronger candidates managed to do this accurately. With this type of question, it is always advisable to include all working along with the answer. In this case the units for the final answer should have been added.

(iii) The meaning of the term 'polarised' was not known to all candidates although it is a term than can be applied to several different components.

DESIGN AND TECHNOLOGY

Paper 0445/51
Graphic Products

Key messages

The focus of this assessment is Graphic Products. Future candidates would benefit from practical activities based on the questions contained in this paper with a focus on drawing accurately using instruments.

General comments

Candidates were required to complete all questions in ***Section A*** (**A1**, **A2** and **A3**) and then go on to answer either **Question B4** or **B5** from ***Section B***. An equal number of candidates chose to answer **Question B4** and **B5**. A small number of candidates did not follow the rubric instruction and answered all questions.

There are areas of the syllabus where some candidates did not generally perform well and further improvements are needed. With the increased use of computers in Graphic design and Graphic products, candidates need to be aware of CAD/CAM equipment, how it is used and the advantages of it. Tools and equipment used to shape modelling materials was an area of the paper where candidates needed to improve on their marks. The textural rendering of 3D shapes to illustrate particular materials is also an area where many candidates needed further improvement.

Comments on specific questions

Section A

Question A1

Shoe Shop logo

This question required candidates to complete the half size drawings of a shoe shop logo to the dimensions given. To achieve high marks on this question candidates needed to accurately draw the parts of the shopping bag and logo in the correct positions and to the correct sizes.

(a) Candidates were required to draw the outline of the shopping bag and handle. Most candidates achieved full marks for this. Some candidates drew one of the handles with an incorrect radius.

(b) Candidates were required to draw the octagon and two isosceles triangles to correct sizes and in the correct positions. The majority of candidates scored full marks for this. A significant number of candidates drew a regular octagon, but to an incorrect size.

(c) Candidates were required to complete the missing parts of the SHOE SHOP lettering. Most candidates correctly completed the letter ‘H’ but many candidates failed to complete the letter ‘O’ with appropriate semi circles or did not attempt it at all.

Question A2

This question asked the candidates to demonstrate knowledge of different lettering styles and thermochromic inks.

(a) Candidates were required to state one way that lettering styles can be changed. ‘Font’ was the most popular correct answer for this question. Most candidates achieved the mark for this question.

(b) Candidates were required to describe how thermochromic inks works. To achieve full marks candidates needed to state that the colour of the inks change when subjected to heat. Many candidates gave incorrect answers explaining that heat is used to make lettering stick to a surface.

Question A3

Development (net) of a shoe box

In this question, candidates were asked to complete the development (net) of the shoe box to a scale of 1:3. Most candidates achieved high marks on this question. Some candidates lost marks by drawing the glue flaps incorrectly or not using appropriate conventions for the fold/cut lines.

Question B4

Model of a shoe rack

This question was derived from an actual 'Graphic Product' made as a concept model.

(a) Candidates were required to complete the orthographic views of the shoe rack model to a scale of 1:3. Candidates were given a part completed end view and were required to complete the outline.

(i) Many candidates drew the end view to an incorrect width and/or height but achieved some of the marks available.

(ii) Candidates needed to project from their completed end view to draw the front view correctly. Many candidates completed the right-hand side piece to an incorrect width or missing the front corner line. Most candidates projected one of the rails correctly but did not accurately project all three.

(iii) Few candidates added any hidden detail to the tubes or end pieces and so did not achieve marks for this part of the question.

(b) For this question, candidates were required to demonstrate their knowledge of Styrofoam and modelling.

(i) Candidates were asked to name two properties of Styrofoam that make it suitable for the model of the shoe rack. Many candidates achieved both marks on this question. Some candidates gave a property of Styrofoam but this property did not relate to the model of the shoe rack so did not achieve a mark.

(ii) Candidates were required to explain the purpose of making a model. Most candidates achieved at least one mark but many gave insufficient explanation to achieve both marks.

(c) Candidates were asked to complete the table to show appropriate tools that could be used to complete the making of the model shoe rack. There was a wide range of responses from candidates. Many candidates named inappropriate types of knife or saw to cut the Styrofoam or were not specific enough when naming tools and equipment by giving answers such as 'saw' or 'glue' which did not achieve marks.

(d) Candidates were required to render the parts of the shoe rack to look like specific materials.

(i) Most candidates added appropriate colour or shading and some grain pattern to the end piece but the quality of rendering was generally insufficient to achieve the third mark.

(ii) Most candidates added appropriate colour but shading was added inappropriately and very few candidates achieved full marks.

Question B5

Shoe display stand

(a) Candidates were required to complete the isometric view of the display stand to a scale of 1:10. Many candidates achieved some of the marks available by drawing the main column and base of the stand but struggled to draw the three shelves correctly. The candidates who correctly read the orthographic views and worked from the given start point achieved the best results.

(i) This part of the question required candidates to show knowledge of mass production techniques used for graphic products made from corrugated card. Many candidates achieved the mark for this.

(ii) The lettering on the shoe display stand was produced using a computer. Candidates were asked to describe a method of transferring the lettering for the point-of-sale display from the computer to the display stand. Many candidate responses described printing methods used on paper or printing directly onto the corrugated card which were unsuitable due to the rigid nature of the material.

(b) This part of the question asked candidates to show an alternative method of temporarily securing the two edges of the display stand together without the use of adhesives. Candidates who showed a suitable method using appropriate flaps and slots that allowed the stand to stay locked together achieved the best results. Many candidates gave answers that used magnets or products such as Velcro to secure the two sides. However, these require adhesive to be fixed to the cardboard and were only awarded one mark as a result.

(c) Candidates were required to draw a bar chart to show the sales of each show type. Candidates who chose an appropriate scale for the chart based on the answer space available achieved the best results. Some candidates lost marks for not labelling the X or Y axis. Other candidates produced different types of chart or did not accurately draw the bars to the correct size.

DESIGN AND TECHNOLOGY

Paper 0445/52
Graphic Products

Key messages

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General comments

Candidates were required to complete all questions in ***Section A*** (**A1**, **A2** and **A3**) and then go on to answer either **Question B4** or **B5** from ***Section B***. An equal number of candidates chose to answer **Question B4** and **B5**. A small number of candidates did not follow the rubric instruction and answered all questions.

There are areas of the syllabus where some candidates did not generally perform well and further improvements are needed. With the increased use of computers in Graphic design and Graphic products, candidates need to be aware of CAD/CAM equipment, how it is used and the advantages of it. Tools and equipment used to shape modelling materials was an area of the paper where candidates needed to improve on their marks. The textural rendering of 3D shapes to illustrate particular materials is also an area where many candidates needed further improvement.

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DESIGN AND TECHNOLOGY

Paper 0445/53
Graphic Products

Key messages

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General comments

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There are areas of the syllabus where some candidates did not generally perform well and further improvements are needed. With the increased use of computers in Graphic design and Graphic products, candidates need to be aware of CAD/CAM equipment, how it is used and the advantages of it. The use of flowchart symbols and letter presentation methods was an area of the paper where candidates needed to improve on their marks. The accurate construction of ellipses is also an area where many candidates need further improvement of their knowledge and skills, along with thick and thin line technique.

Comments on specific questions

Section A

Question A1

Clock Face Construction

This question required candidates to complete the half size drawings of a clock face to the dimensions given. To achieve high marks on this question candidates needed to accurately draw the parts of the clock face in the correct positions and to the correct sizes.

(a) (i) Candidates were required to draw the outline and clock face. Most candidates achieved good marks for the octagon shape although many drew the size incorrectly or irregularly shaped. Many candidates also drew the bottom section to the wrong size. To achieve good marks on this question, candidates need to use the given axis lines to set out and draw the remaining parts of the clock.

(ii) Candidates were required to draw the rectangular space for the image. The majority of candidates were able to draw a rectangle in the space below the clock face although a significant number of candidates did not position the rectangle evenly within the space below the clock face.

(iii) Candidates were required to add the missing hour marks and number 12 on the clock face. Most candidates correctly added the marks in the correct positions but with inconsistent lengths compared to the given one. Many candidates drew the number 12 but with inappropriate proportions.

(b) This question required candidates to add the minute hand to the clock face to the sizes given. Many candidates achieved full marks on this question. Some candidates drew the hand to the correct sizes but in the 9 o'clock position or did not draw the hand.

Question A2

(a) This question asked the candidates to demonstrate knowledge of computers and how they could be used to acquire images for use on the clock. Most candidates did not achieve high marks on this question. Many candidates stated that they could design or find an image and print it but did not give sufficient details of how the image could be downloaded or transferred.

(b) Candidates were required to tick the correct scale from the given options for the sports car image. Few candidates correctly chose the 3:1 scale.

Question A3

Flowchart of the dry transfer application process.

In this question, candidates were asked to complete the flowchart to show the process for applying the dry transfer to the space on the clock. Most candidates did not achieve marks on this question. Some candidates labelled the YES and NO correctly on the decision box but showed no knowledge of the dry transfer process. This is an area of the specification that may require further study.

Question B4

Isometric view of the wall clock

This question was derived from an actual product made from three different parts.

(a) Candidates were required to complete the isometric view of the assembled wall clock to a scale of 1:3.

(i) Many candidates correctly completed the back board from the given starting lines.

(ii) Candidates needed to project from the given sides of the main body to complete the remainder of the outline. Many candidates completed the bottom and right-hand edges of the main body but to the wrong sizes. These were not projected in isometric which often meant subsequent sides did not achieve marks.

(b) For this question, candidates were required to construct the elliptical shape of the clockface to the sizes given. Most candidates achieved marks for the correct major and minor axis and some construction. Many candidates did not plot sufficient points to construct a smooth clean ellipse shape.

(c) Candidates were asked to complete the estimated two-point perspective view of the clock mechanism using the given vanishing points. Many candidates achieved full marks on this question. Some candidates lost marks for drawing the right-hand vertical edge of the mechanism too near to VP2.

Question B5

Digital clock

(a) Candidates were required to complete the planometric views of the digital clock to a scale of 1:2. Many candidates achieved most of the marks available by drawing the side and sloping front of the clock to the correct sizes. Most candidates drew the rectangular border around the numbers on the front face. Many candidates did not gain full marks for the drawing of the large top button due to drawing the button in an incorrect position or size. The candidates who correctly read the orthographic views and worked from the given start point achieved the best results.

(b) (i) This part of the question required candidates to show knowledge of thick and thin drawing technique and apply to the Styrofoam insert. Many candidates did not attempt this question. Many candidates were able to add the outline in thick but added no further detail or added other thick lines incorrectly. This is an area of the specification that may require further study.

(ii) Candidates were asked to state a suitable process for mass producing the Styrofoam inserts. Many candidates achieved the mark for stating a suitable method such as injection moulding.

(iii) Candidates were asked to name a property of Styrofoam that makes it suitable for the insert. Some candidates gave a property of Styrofoam, but this property did not relate to the insert so did not achieve a mark.

(c) Candidates were required to draw a development (net) of the digital clock package to a scale of 1:4. Many candidates drew the six sides of the package correctly. Candidates who included the glue flaps consistent with the given ones on the package and used appropriate line conventions achieved full marks.

(d) This part of the question asked candidates to show an alternative method of temporarily securing the end of the box without the use of adhesives. Candidates who showed a suitable method using appropriate flaps and slots that allowed the end to stay locked together achieved the best results. Many candidates gave answers that did not firmly secure the end of the box.