DESIGN & TECHNOLOGY

Paper 6043/12
Product Design

Key messages

Candidates responded well to the given design situations and some excellent design work was seen. Higher achieving candidates combined creativity and technical knowledge in their 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 to **part (a)** and produce design proposals that meet all the design requirements.

Candidates should be advised that in **part (d)** they must evaluate their design proposals, not simply describe them, or repeat the same evaluation point for all three ideas.

Candidates should be encouraged to view the paper as a holistic design exercise, rather than several individual tasks. For example, the materials named in **part (f)** and the method of manufacture outlined in **part (g)**, must be evident in the solution proposed in **part (e)**.

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 **parts (f)** and **(g)**.

General comments

Question 1 was the most popular question. Very few candidates attempted **Question 3**.

The overall standard of work was very good, with freehand sketching and knowledge of materials and processes being strengths for many candidates.

Some candidates were unable to express their thoughts clearly in the written parts of the paper and may have benefitted from adopting a more structured approach. For example, in **part (d)** candidates may have found it beneficial to use a series of bullet points rather than continuous text.

Comments on specific questions

Question 1

(a) Most candidates were able to list four additional points about the function of a mobile phone charging station for a hotel room that they considered to be important. Commonly seen answers referred to being able to easily access the mobile phone when it is charging, ensuring the charging station would fit in with the decoration of the hotel room, the size of the charging station, additional features to be added to the charging station or the charging station must be suitable for a range of different sized mobile phones. Candidates should be advised against repeating points that are given in the question, for example the charging station must be wall-mounted 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 securely attaching a product to a wall. The material for the wall was not stated and so different materials for the wall, such as blockwork and timber, were seen in responses. Commonly seen responses involved the use of screws and Rawl plugs, studs and nuts, magnets and adhesives. The standard of written and visual communication for this question was often excellent, but candidates should be

advised that this question requires sketches and notes. Maximum marks are not awarded for just sketches.

(c) An impressive range of sketches and notes were seen for this question. Many solutions were based on a shelf or small cabinet, but some candidates did not consider how the given wireless charging unit would be incorporated into the design. Some candidates included additional features in their designs, such as a storage facility for charging cables. Stronger responses used a range of presentation techniques, including freehand exploded views, and detailed annotations. Weaker responses often presented three ideas that were similar in form and did not fully meet the design requirements. 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 fewer than three ideas.

(d) The evaluations of ideas were usually very detailed, with candidates able to clearly demonstrate a good understanding of the positive and negative features of their design proposals. Commonly seen responses referred to how easy it would be to use the charging station, how securely the mobile phone would sit on the charging unit or how easy it would be to clean the charging unit. It is important that candidates justify their evaluations rather than making general statements, such as it would work well, if they are to access the full range of marks. Almost all candidates chose one of their ideas to develop further, usually by giving the number of the idea, and justified their choice.

(e) Responses to this question were usually very impressive, with a variety of methods used to show the full solution to the design problem. These methods included freehand orthographic drawings, freehand exploded views, and material lists. Colour was used appropriately to add clarity to drawings. This question specifically asked for construction details and important dimensions but, particularly in weaker responses, these were often missing. Candidates should be advised to consider if the information they have presented would be sufficient to allow a skilled third-party to make the product.

(f) Most candidates were able to name two specific materials that would be used in the construction of their design proposal and gave reasons for their choices. Commonly named materials included medium density fibreboard (MDF), acrylic and pine. Reasons for the choice of material often related to the aesthetic qualities of the material, the strength of the material or how easily it could be cut and joined. Candidates should be advised against giving generic names of materials, such as wood, as these responses are not awarded marks.

(g) Most candidates used a combination of sketches and notes to outline a method that could be used to manufacture one part of their design proposal. Fabrication techniques, including the use of glue, screws and dowels were commonly seen methods of manufacture. Candidates that used plastics in their design proposals often described how a flat sheet of acrylic could be folded into shape. Some candidates described the process of cutting out parts of their design with a laser cutter and then joining with an adhesive and nails or screws. Many excellent responses were seen to this question, but it is important that candidates include the correct names of tools and equipment if they are to access the full range of marks.

Question 2

(a) Most candidates were able to list four additional points about the function of a recycling unit for depositing outdated mobile phone accessories that they considered to be important. Commonly seen responses referred to the capacity of the recycling unit, it must be easy to deposit items in the recycling unit, how easy it would be to empty the recycling unit, or the recycling unit must be stable so that it does not fall over in use. Candidates should be advised against repeating points that are given in the question, such as the recycling unit must have clearly identifiable containers, as these responses are not awarded marks.

(b) Most candidate used sketches and notes appropriately to show two methods of identifying containers for items that are to be recycled. Commonly seen responses included written labels, images, symbols, colour coding or raised lettering and images (braille). Some candidates used more technological methods, such as light-emitting diodes or liquid crystal displays to identify the containers. Candidates should be advised that this question requires sketches and notes for full marks to be awarded.

(c) An impressive range of sketches and notes were seen for this question and colour was generally used to good effect. A sketch of the fully assembled recycling unit with supporting annotations was

a common approach. The accompanying annotations often revealed a candidate's true understanding of how the design proposal would be constructed. Some candidates used resistant materials, rather than a lightweight graphic material as stated in the question. It is important that all ideas fully meet the design requirements if candidates are to access the full range of marks.

(d) The evaluations of ideas were generally very impressive with candidates able to clearly demonstrate an understanding of the positive and negative features of their design proposals. Commonly seen responses referred to how the recycling unit would be manufactured, the environment in which the recycling unit would be used or how easy it would be to empty the recycling unit. Some candidates raised points that clearly demonstrated that they envisaged the recycling unit would be static, whilst others raised points that clearly demonstrated that they envisaged it would need moving from one position to another. It is important that candidates justify their evaluations rather than making general statements, such as that it would work well, if they are to access the full range of marks.

(e) A variety of methods were used to show the full solution to the design problem. Responses often included an isometric sketch of the assembled recycling unit, with smaller sketches and supporting annotations showing the construction details. This question specifically asks for construction details and important dimensions but, particularly in the weaker responses, these were often missing. Candidates should be advised to consider if the information they have presented would be sufficient to allow a skilled third-party to make the product.

(f) Most candidates were able to name two specific materials that would be used in their design proposal and gave reasons for their choices. Foamboard, acrylic, corrugated cardboard, corrugated plastic (Corriflute) and polypropylene sheet were commonly named materials. The reasons for the choice of the material often referred to the working properties of the material, the weight of the material, the range of colours available or how easy it would be to add surface graphics. Candidates should be advised against giving generic names of materials, such as plastic, as these are not awarded marks.

(g) Most candidates used a combination of sketches and notes to outline a method used to manufacture one part of their design proposal. Hand fabrication methods, usually involving the use of a craft knife and adhesive, were commonly seen but some candidates outlined the use of Computer-Aided Design (CAD) and Computer-Aided Manufacture (CAM). The quality of notes and sketches was usually sufficient to describe the process, but it is important that candidates include the correct names of tools and equipment in each of the stages.

Question 3

(a) Very few candidates chose this question. Candidates that did answer this question, were able to list four additional points about the function of a device that would cut off connectors from the ends of cables and remove the plastic covering that they considered to be important. Commonly seen responses referred to the device must be adjustable for different sized cables, the device must be easy to operate, or the device must have durable blades that do not require frequent sharpening. Some candidates envisaged the device would be handheld whilst others envisaged it would be bench mounted. Candidates should be advised against repeating points that are given in the question, for example the device must remove the plastic covering from cables 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 cutting copper wire. Many candidates showed methods that involved a shearing force or cropping force to sever the copper wire. In many cases the actual tool, such as wire cutters or a saw was shown in the response.

(c) An impressive range of sketches with annotations was seen for this question, with colour generally used to good effect. It is, however, important that all ideas fully meet the design requirements if candidates are to access the full range of marks. For example, some candidates did not really consider how the device would remove the plastic covering from the copper wire. Some considered this could be achieved by cutting and pulling the plastic covering away from the copper wire and others felt it could be achieved by using heat to burn the plastic covering. A small number of candidates produced fewer than three ideas or three ideas that were similar in form.

(d) The evaluations of ideas were generally very impressive with candidates able to clearly demonstrate an understanding of the positive and negative aspects of their design proposals. Many responses focused on how difficult the device would be to operate, how the device would accommodate difference thickness wires or how easy it would be to remove and sharpen the blades of the device. It is important that candidates justify their evaluations rather than making broad statements, such as this is the best idea as it will work well, if they are to access the full range of marks.

(e) A variety of methods were used to show the full solution to the design problem. These included freehand orthographic drawings, freehand exploded views, isometric views, and materials lists. In some responses, the details of how the device would cut the copper wire and remove the plastic covering were unclear and these responses would have benefitted from additional sketches and notes. Candidates should be advised to consider if the information they have presented would be sufficient to allow a skilled third-party to make the product.

(f) Most candidates were able to name two specific materials that would be used in their design proposal and gave reasons for their choices. Commonly named materials included mild steel, stainless steel, aluminium and acrylic, with the reasons relating to the working properties of the material or the ability of the material to withstand the forces required to cut the copper wire and remove the plastic covering. Candidates should be advised against giving generic names of materials, such as metal, as these are not awarded marks.

(g) Most candidates used a combination of sketches and notes to outline a method that could be used to manufacture one part of their design proposal, with the use of a laser cutter being the most common process, but hand fabrication methods were also proposed. Some candidates only described a stage in a making process, such as drilling a hole, rather than the complete process used to make a part of their design. It is important that all 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.

DESIGN & TECHNOLOGY

Paper 6043/02
School Based Assessment

Key messages

- Most candidates selected a project that focussed on their specialist option, allowing them to further their experience, knowledge and skills in their chosen option. Some candidates pursued a focus that involved appropriate knowledge, materials and skills from other options, which is allowed.
- Centres are reminded that they are not required to forward 3D outcomes or models with the sample. Clear photographic evidence of work is sufficient. All relevant work should be presented in hard copy as an A3-size folder.
- Marks can only be awarded against specific assessment criteria where evidence is clearly presented in the portfolio. There must be photographic evidence of the practical outcome if marks are awarded on the CASF.

General comments

There were many examples of outstanding work presented for moderation in this assessment session. There were many exciting and challenging briefs resulting in innovative and well-made products.

Presentation of work was generally of a good standard; mostly structured in a concise and logical manner that reflected the assessment criteria. The work of many candidates showed a good integration of sketching, modelling and on-going evaluation indicating mature and fluent design thinking.

Candidates should avoid overly embellishing their work, by using excessively large fonts, or creating unnecessarily lengthy folders by not utilising pages efficiently.

Moderators found the teacher annotation of project work on the ICRC forms to be very helpful.

The number of new centres entering candidates continues to grow. Teachers new to the specification can access guidance for assessing coursework and other very useful support for 0445/02 on the teacher's support hub.

Comments on specific sections

1 Identification of a need or opportunity with a brief analysis leading to a Design Brief

Most centres assessed this criterion accurately and consistently. There was clear evidence of an investigation and analysis to develop one design need or opportunity. Most candidates clearly identified the needs of the intended user/s or client/s through interviews and/or carefully produced questionnaires.

Some candidates specify the product outcome at the start of their project. Statements in the design brief such as, 'I am going to make a coffee table', is an example of where a candidate has identified the project outcome, and this should be avoided. A design brief, which can be created in conjunction with a client, should be used to outline the problem that the candidate's design will solve. It can then be referred to throughout the project.

2 Research into the Design Brief resulting in a Specification

This Assessment Criterion was generally assessed in line with accepted standards. Some candidates would have benefitted from applying more focus on research into the design brief; a considerable amount of wide-ranging information about materials, tools, finishes and manufacturing was presented by some, much of the information having limited reference to the selected design and make task. Detail of such research should only be presented if it is directly relevant to the candidates' own design and make task.

Some of the information would be more useful in the development of the proposed solution in Assessment Criterion 4.

Many candidates collected useful research information from the analysis of existing products. Detail of processes research should only be presented if it is directly relevant to the candidates' own design and make task. Candidates should highlight the particular design strengths and weaknesses of existing products and use this information when generating a specification and when designing.

Many candidates presented full and objective research into the design brief and intended user/s by gathering relevant information and data such as ergonomic/anthropometric considerations, environmental factors and the size and shape of items to be used in or with the product being developed.

3 Generation and exploration of Design Ideas

There were many examples of outstanding design work, where candidates presented a good range of conceptually different imaginative and creative solutions. Clear annotation was used to clarify ideas with reference to the specification. Technical aspects relating to appropriate materials and constructions were explored and ideas clearly evaluated.

This Assessment Criterion is generally marked consistently but often too generously. A significant number of centres are overgenerous in their assessment. In some instances, candidates produced a range of very similar concepts with limited annotation. To achieve the higher mark ranges, candidates would benefit from producing a wider range of creative design possibilities. Candidates should initially record any ideas, however impractical they may appear at the time, and evaluate them against the specification, so that informed, reasoned decisions can be made about possible modifications or the rejection of particular proposals.

4 Development of Proposed Solution

This section was assessed slightly generously by some centres. Assessment Criterion 4 requires the candidate to clarify the main features of the proposed solution. Most candidates made good use of 3D modelling to visualize the size, shape, and proportions of the design proposal. Some went on to trial and test aspects of the proposed solution and modify as appropriate. Not all candidates had evidence of decisions made regarding the most suitable materials, methods of construction and finish and explanations of why they were selected. Details of components and their sizes, which would be required for manufacture, need to be established.

5 Planning for Production

This Assessment Criterion was assessed slightly generously by some centres. Most candidates presented good quality, fully dimensioned, working drawings of their final design. Some used CAD to good effect in the generation of working drawings. Candidates should use CAD software if that can include dimensional detail if possible.

To achieve the highest mark ranges, candidates should include a cutting/material list, and drawings should include all key dimensions, additional fixtures used, e.g. hinges and screws, and specific finishes applied.

Most production plans were clear and detailed and presented in the form of a logical sequence of stages of manufacture including appropriate details such as material lists, fittings and finishes.

Some candidates used the photographic log of making to detail stages of production which is not appropriate in this section. The plan must be produced before the commencement of manufacture.

6 Product Realisation

Virtually all candidates fully completed the manufacture of a practical outcome. Some of the work produced was of an high standard with candidates demonstrating the ability to manipulate materials sensitively and use technologies successfully. The care, attention to detail and skills demonstrated by some candidates was of a high standard.

Centres are generally accurate and consistent in their assessment of the practical outcome.

Some centres were over generous in this criterion, which would be indicated in the Moderator's Report with a clear explanation of why marks have been adjusted. Please ensure that you have access to the centre's Moderator's Report.

The guidance material available on the Support Hub and in particular the 0445 Coursework Handbook is very useful to gauge standards.

Marks allocated to making should reflect the overall complexity of the product. To achieve the highest mark range, the product must be complete and finished to a very high standard. It must function well, meet the requirements of the specification, and be made with precision and accuracy.

7 Testing and Evaluation

Most candidates fully completed their product and provided evidence of some form of testing. Many candidates were able to test the product in the environment in which it was intended.

Candidates should present clear photographic evidence of the testing and identify the strengths and weaknesses of the product. After testing, candidates should draw meaningful conclusions leading to proposals for further development. Modifications should ideally be in the form of sketches and notes.

Candidates should also evaluate the product against the against their specification.

Some candidates included comments and evaluation from clients or potential users of the product which is to be encouraged.

DESIGN & TECHNOLOGY

Paper 6043/32
Resistant Materials

Key messages

- ***Section A*** questions require short, sometimes one-word, answers testing their knowledge and understanding of the syllabus content.

  Candidates need to read the questions **carefully** so that they are clear about what needs to be addressed. Mark allocations and the space provided for answers should also give candidates a clear indication of what is required.

- Candidates need to improve their knowledge and understanding of the practical processes and techniques required when working with wood, metal and plastic. In order to achieve this, candidates must be able to match tools and equipment to specific purposes.

- Many questions require candidates to provide sketches and notes.

  Candidates need to improve their drawing skills so that they can communicate their ideas clearly and their written skills so that additional notes are legible and relevant.

General comments

Section A

In this section candidates need an all-round knowledge and understanding in order to answer all questions successfully in this section. Many candidates demonstrated a basic understanding of the processes, tools and equipment required.

Section B

This section always has questions with large mark allocations that require a combination of clear and accurate sketches supported by detailed written notes. It is essential that candidates attempt **all** parts of the question otherwise they deny themselves available marks.

Comments on specific questions

Section A

Question 1

Candidates required a basic understanding of seasoning to gain marks for this question. The best answers referred to the wood not been seasoned properly or that it had been exposed to a change in temperature.

Question 2

(a) Many candidates named stainless steel for the saucepan body. Cast iron was named by a minority of candidates. Many candidates named a metal that was not a ferrous metal.

(b) The most common correct thermosetting plastic for the saucepan handle was phenol and melamine formaldehyde. Many candidates named a plastic that was not a thermoset.

Question 3

Very few candidates were familiar with the three materials that would be used when 'laying up' glass fibre.

Question 4

To answer this question well, candidates first needed to know what a half-lap joint was and then be able to complete the drawing to show it. There was a wide range of accuracy in sketches, and many candidates were unfamiliar with the half-lap joint.

Question 5

(a) Only a small minority of candidates named diecasting as the process by which the toy would be produced when made from zinc-based alloy.

(b) Many candidates gave injection moulding, and some gave 3D printing as processes by which the toy could be produced when made from ABS.

Question 6

(a) A minority of candidates named the tool used to measure the diameter of the metal rod as outside or external calipers.

(b) Many candidates recognised that the calipers would be set against a rule to read the actual measurement.

However, most candidates did not show the exact position of one of the tips of the caliper. A steel rule should be used in workshop situations; the reason being that there is no waste material on the end of a steel rule, unlike wooden or plastic rules. Therefore, the tip of the caliper is placed up against the end of the rule.

Question 7

Only a few candidates were familiar with the term 'quality control'. Some candidates provided answers that would be part of a product evaluation, whereas the question specifically asked for checks that would be carried out **after** the casing had been manufactured. The best answers referred to checking the dimensions of the casing, checking for deformation or surface blemishes or checking that the two halves of the casing fitted together.

Question 8

There were some very good answers to this question. The highest scoring answers showed three specific items when bending the mild steel sheet: a method of securing the sheet metal, the use of a former around which the metal could be shaped, and the method of force applied. Many candidates provided irrelevant details such as how the shape would be marked out and many incorrectly described how the sheet would be heated before it could be bent to shape.

Question 9

Only a minority of candidates demonstrated an understanding of ergonomics. Many candidates made statements about the radio; for example, 'the radio has a large handle……' without focussing on the ergonomic feature '…that would fit in the hand and make turning easier'.

Question 10

Only a few candidates were able to show how the 6 mm thick wood could be planed without holding it in a vice. There were a few high scoring answers showing the 6mm wood held up against a strip of wood that was fixed to the bench top. Most candidates showed the wood secured with G cramps that would interfere with the planing.

Section B

Question 11

(a) Many candidates gave at least one property of beech that made it suitable for the toy bus. The most common properties included hardwearing, does not splinter and finishes well. However, beech is not particularly easy to work, nor is it cheap.

(b) The most common suitable construction was a mortise and tenon joint. Candidates gained one mark for naming a suitable joint and a maximum of three marks for showing an accurate sketch of the joint.

(c) (i) The majority of candidates named a suitable machine saw that could be used to remove the waste wood. The most common correct answers included a jig saw, circular saw and a scroll or Hegner saw.

(ii) Most candidates provided a safety precaution to be taken when using a disk sander. The most common precautions included the use of safety glasses (goggles), and to keep fingers away from the disk.

(iii) The edge of the wood to be planed needed to be shown horizontally in the vice. A minority of candidates showed the wood in the correct position.

(iv) Many candidates named a smoothing or jack plane correctly. Some candidates referred to the use of sandpaper (glasspaper) even though the question asked candidates to name a type of bench plane.

(d) (i) Most candidates recognised that a contact adhesive would set immediately or that it would not require clamping.

(ii) There were many good safety precautions stated that were necessary when using a contact adhesive. The most common safety precautions referred to the use of a face mask, gloves and a well-ventilated area.

(iii) When weights were added to the scales a fitting was required that would fix the arm, arrow and upright parts together and allow the arm to move. Many candidates simply showed some kind of pivot (dowel or metal rod), for which credit was given. A pivot without a means of locking the parts was not a practical solution.

The best solutions included the use of nuts and bolts or screws. Some candidates showed a wing nut which could be tightened or loosened by fingertips.

(e) (i) The most suitable dill bit used to bore a 30 mm diameter hole was a forstner or saw tooth bit.

Many candidates named a flat bit or a hole saw which would not be practical.

(ii) Very few candidates described the best method of drilling to a specific depth; that of setting the depth gauge on the drilling machine itself. Most candidates described a method worthy of some credit, such as; to wrap a length of tape around the drill at a depth of 15 mm or to make a mark on the drill bit itself as an indicator when the 15 mm depth was achieved.

(f) (i) Many candidates did not understood that the purpose of the draft angle on the mould was to ensure that the moulding could be removed easily from the mould.

(ii) Many candidates showed the correct positions of the heater, mould and plastic sheet in the correct positions.

(g) Most candidates showed how the pan could be attached to the arm so that it could be removed.

The most common methods included the use of hooks or a ‘notch’ cut out of the arm.

Question 12

(a) Most candidates suggested two items of research that a designer would consider when designing the holder for the controller and headset. The most common items included the sizes of the controller and headset, their weight and the location for the holder.

(b) Many candidates gave advantages of using MDF rather than plywood for the parts of the holder.

The most common advantages included its smoother surface and that it was cheaper and easier to work.

(c) (i) The majority of candidates recognised that using a template to mark out the shape of the base of the holder would be more accurate and quicker than drawing the shape without the template.

(ii) Most candidates understood that using a template made of thin metal sheet when marking out a batch would be more durable, whereas card would tend to wear and lose its shape.

(iii) Many candidates named saws that could be used to cut out the shape of the base. There was a combination of saws such as a tenon saw that would be used to cut straight edges while machine saws such as a scroll saw could be used to cut both straight and curved edges.

(d) The most common method of joining the upright and supports to the base was a mortise and tenon joint followed by a dowel joint. For maximum marks, candidates needed to show a tenon with 'shoulders' while those candidates who drew a dowel joint needed to show a maximum of three dowels.

(e) Many candidates gained some marks for this question. Many candidates did not give the name of a specific type of adhesive and simply stated 'glue'. Good answers referred to a type of adhesive; for example, PVA or a trade name such as 'Evostik Resin W'.

Methods of clamping were generally good with G cramps and sash or F cramps shown.

The checks carried out included removing excess adhesive and checking that the cramps were not over-tightened.

(f) (i) Many candidates were familiar with the use of a sanding block (cork rubber) to 'sand' the surfaces of the MDF. The most important benefit was that even pressure could be exerted which would result in a smoother surface.

(ii) Many candidates recognised that primer paint was used to prepare the surface for the final coats of paint but did not go on to state how it would prevent the surface from absorbing the paint and seal the pores of the wood.

(iii) Many candidates understood that an advantage of applying paint using a 'spray gun' would be quicker, that it would prevent brush strokes appearing and that it would give a more even finish.

(iv) Most candidates recognised the dangers associated with spray painting. Common precautions included a well-ventilated area and the use of a face (respirator) mask.

(g) This question asked candidates how an evaluation of the final product would be carried out and **not** an actual evaluation of the product. The best answers referred to carrying out a check against the original specification and giving the product to a potential customer who completed a questionnaire on its performance.

Question 13

(a) The most appropriate benefits of using veneered chipboard for the shelves of the unit included that it was cheaper than using solid wood and that it was more stable and would not warp or shrink.

(b) Many candidates did not understand the term 'jig' when it applied to sawing 170 mm lengths of mild steel tube. The benefit of a sawing jig is that it can be used when cutting the lengths quickly by eliminating the need to mark out each individual length and include a method of holding the work

securely without the need for using a vice or cramp. Only a minority of candidates used sketches and notes to meet this criterion.

(c) (i) Many candidates named incorrectly a file as an abrasive that could be used to clean the joint before brazing. Correct answers included 'wet and dry' (silicon carbide) paper and steel (wire) wool.

(ii) Only a small minority of candidates understood the purpose of a flux when brazing. There were a few excellent explanations stating that flux prevented oxidisation around the joint being brazed, or that oxidisation prevented the brazing rod from flowing into the joint.

(iii) The majority of candidates showed some sort of 'cap' or cover that would make the exposed end of the mild steel tube more attractive.

(d) (i) Most candidates gained at least one mark for naming two marking out tools that could be used to mark out the centres for the holes. The most common correct answers included a steel rule, try square and scriber. Some excellent answers referred to the use of a dot or centre punch.

(ii) For maximum four marks, candidates need to show how the mild steel sheet could be secured, the use of some sort of former around which the sheet could be bent and the method of force (a hammer or mallet), by which the bend could be achieved.

(iii) The majority of candidates chose 'annealing' as the process used to make the metal softer.

(e) Figure 13.4 showed clearly the gap between the end of the shelf and part of the end frame.

Candidates were asked to show a method by which the shelf could be supported across the gap. Very often the clarity and accuracy of sketches made it difficult to understand candidates' solutions.

There were three bullet points listed that should have helped candidates to focus on the important requirements of the question. Many candidates did not address all three points and, as a result, denied themselves potential marks.