

DESIGN AND TECHNOLOGY

Paper 0445/01

Design

General comments

The majority of candidates had clearly been prepared well to respond to the question of their choice on the pre-printed answer sheets provided and this helped them to present the information required for this type of design examination. However, some Centres need to remind their candidates to respond only in the space allocated to a particular part of the question. For example, the evaluation of ideas in **part (d)** should be in the space provided and not alongside drawings of ideas in **part (c)**.

There was quite an imbalance of responses across the three design based questions with **Question 1** being by far the most popular. The Examiner was pleased to see that more candidates attempted **Question 2**, the Graphics based question, than in the previous year. Candidates are, of course, free to answer any one of the questions irrespective of the syllabus option taken.

Comments on specific questions

Question 1

This was the most popular question on the paper and the majority of candidates seemed to understand the design requirements of the question, going on to propose ideas for the barbecue unit that would be appropriate to some degree. Solutions covered a whole range of construction techniques and used all of the materials within the anticipated experience of most candidates.

- (a) The majority of candidates responded reasonably well to this introductory part of the question and suggested additional points about the function of the unit such as: stable in use; lightweight; easy to move; tools held securely; correct height; dry storage for charcoal and matches; tools easily accessible; etc.
- (b) Candidates were generally able to draw two different fittings that could be used to hold items in storage devices. Acceptable responses included: spring clips; rubber straps, drawers; trays; dowels; cup hooks; 'slot' arrangements; grooves; etc. The question did require candidates to draw these methods and candidates who gave a description or name only were awarded only one mark for each response.
- (c) The Examiner was looking for at least three different design ideas for the possible award of full marks and candidates are well advised to make use of all the space available for their responses. Where candidates presented fewer than three **different** design ideas then the maximum mark available was reduced pro-rata. Candidates are expected to produce clear drawings using appropriate techniques so that design detail is clear to the viewer. Drawings can be enhanced in this respect through the use of shading or colour. Drawings should be more than just simple outlines if the general layout and form of the design concept is to be clear to the Examiner. Many candidates used annotation to good effect to provide more information. A maximum of 6 marks is awarded for the quality of communication skills and a further 6 marks for the suitability of designs.
- (d) The intention here is that candidates evaluate each of their design ideas in turn and then identify the chosen idea, with reasons for their choice. Candidates are expected to evaluate at least three design ideas for the award of up to 6 marks and then to identify the chosen idea, giving reasons for choice, for the final 2 marks. Candidates are required to carry out the evaluations in the space provided and not alongside their design ideas in **part (c)**. Some candidates had obviously been encouraged to produce a table so that each design idea could be compared to specification points. Unfortunately, the result was often a set of boxes with ticks or crosses with no reasons or qualifications being given. Candidates are required to comment on good and bad points about

their design ideas, so this type of approach can be awarded a maximum of just 3 marks for the evaluation of design ideas.

- (e) As has been reported in previous years, this part of the design question is still that answered successfully although it would be fair to say that there are signs of improvement. Many candidates produced very good quality drawings but they overlooked the need to provide construction details, as asked for in the question, and therefore reduced the marks available to them. Candidates are not restricted to any particular type of drawing method so long as they can provide the required detail. Many do so through the use of good pictorial views and sensible annotation. It is a requirement of this part of the question that important dimensions are also given on the drawings and these are awarded up to a maximum of 2 marks. The Examiner is always looking for responses that indicate that the candidate knows how products are constructed and assembled.
- (f) Most candidates were able to suggest some of the materials that might be used to construct their final product. As has been said many times before, it is vital that candidates suggest **specific** materials and the use of generic terms such as wood, metal and plastics cannot be awarded any marks at all. Reasons for the choice of material must obviously be relevant and appropriate to the chosen design. For the award of the full 4 marks candidates are expected to identify at least two specific materials with sound reasons for choice.
- (g) As the last part of this design process, the Examiner expected candidates to be able to look ahead to how they might construct part of their designed product using the facilities available in their school workshops. A simple step by step approach should indicate that the candidate is familiar with constructional procedures. Marks were awarded for the appropriateness of the processes suggested and the tools/equipment used.

Question 2

This question was obviously intended for candidates following the Graphic Products option and it was anticipated that semi-resistant materials would be used in the manufacture of the birthday card. Unfortunately, as has been the case in the past, many candidates failed to give due regard to the practicalities of such a product by not considering materials and constructions in sufficient detail.

- (a) Most candidates were able to suggest additional functional requirements of the card such as: stable when opened; attract attention; appealing to young children; colourful; number 5 included; movement does not frighten when opened; etc.
- (b) Candidates were aware of mechanisms that could be used on paper and card and responses included drawings of: cams; levers; cranks; sliders; rubber bands, discs; etc.
- (c))
- (d)) See **Question 1 (c) – (e)**
- (e))
- (f) Most candidates were familiar with methods that could be used to apply colour to the birthday card and these included coloured film; coloured card; lay on colours; various printing methods; paints; etc.
- (g) As the last part of this design process, the Examiner expected candidates to be able to look ahead to how they might produce a prototype birthday card using the facilities available in their school graphics room. Unfortunately, some candidates were too general in their response and did not link the methods suggested to the card design proposed. A simple step by step approach should be able to indicate that the candidate is familiar with constructional procedures. Marks are awarded for the appropriateness of the processes suggested and the tools/equipment used.

Question 3

This question, which was intended for those candidates following the Systems and Control option, was more popular than in previous years. Candidates proposed some interesting design ideas for the drink can collection system and many were based on the shape of a large can.

- (a) Additional points about the function of the can collection system included: attracts attention; stable in use; use of non corrosive materials; easy to clean; easy to empty; no injury to users; allow only cans inside; etc.
- (b) Candidates seemed aware of devices that could be used to sense when a can had been deposited and those considered appropriate included: light sensor; pressure pad; trap door; lever movement; flap; low voltage electrical continuity; etc.
- (c))
- (d))
- (e)) See **Question 1 (c) – (g)**
- (f))
- (g))

DESIGN AND TECHNOLOGY

Paper 0445/02
Graphic Products

General Comments

This was the second November examination paper for the new syllabus. The A3 format proved to be popular. Candidates were required to complete all questions in **section A (A1, A2 and A3)** and then go on to answer **either B4 or B5** from **section B**. This instruction was not followed by all candidates. **B4** was the most popular of the option questions for candidates.

The standard of work was comparable to that of the previous year.

There are areas of the syllabus however, in which further improvements are needed. These include, in particular, the drawing of regular polygons and ellipses. Drawing to scale is also an area needing improvement. Candidates must be able to understand both 1st and 3rd angle orthographic projection and be able to draw the projection symbols correctly.

With the syllabus change to 'Graphic Products' from 'Communication', Centres must focus their activities within the scope of the application of this subject area, to Graphic Products. Future candidates would benefit from practical activities based on the questions in this paper.

Comments on specific questions

Question A1

Supermarket sign

Many of those who attempted this compulsory question on the paper, scored high marks. Most candidates completed the letters **B, L, E**, correctly. The letter **S** was not always produced in the same style as the given letters. One mark was awarded for the correctly shaped letter and one mark each for spacing and height alignment. Many candidates scored between 3 and 6 marks. The construction of the equilateral triangle, given the width of the sign, created many inaccurate drawings.

Question A2

Different shaped 'Stickers'

This question was attempted by all candidates, giving many the opportunity to show their expertise at geometrical construction. The pentagon within a Ø80 circle proved to be difficult for many candidates. One mark was awarded for each polygon drawn with the correct number of sides and one mark was awarded for the polygon being 'Regular'.

Question A3

Point of Sale display Stand

Unfortunately, not all candidates attempted this compulsory question, losing the 10 marks available. A small number of candidates misread the question and drew the display stand incorrectly as a full size development (net).

Many candidates drew the tray in the orientation with the tray at the front and the upright panel at the back. Where candidates drew a different orientation, this did not affect the marks awarded.

Most candidates drew the tray to the correct size and the front upright to scale. Whilst many drew sloping sides to the tray, these were not always to the correct size. The vertical height of the tray was drawn correctly by many candidates and the panel was shown with a taper on each side. Many candidates drew in the lugs that hold the stand together.

Question B4

Card model of Delivery Van

This was by far the most popular of the two choice questions. Many candidates scored more than half marks for their answers.

This question was derived from an actual 'Graphic Product'.

A classroom exercise to cut-out and make the model van from their own development would be most beneficial to future Candidates' understanding of this Graphic Product.

- (a) Many candidates drew a one piece development. The space available on the question paper allowed candidates to draw the development in whatever orientation they wished.

Most developments had two sides and the end panel drawn correctly. A small number of candidates omitted the four wheels in their development. Candidates who drew the profile of the cab correctly, transferred the sizes from the cab to the folded out front.

- (b) Completing the van by adding detail, presented many candidates with the problem of exactly which panel on the folded out front contained the windscreen and also exactly what size the panel and the windscreen should be. Many candidates drew sufficient glue tabs but not all were of a suitable size.

Question B5

Counter-top display unit

This question was attempted by less than half of the candidates. The working and order of the instruction in the question should lead the candidate to the correct response. Overall, candidates gained a wide range of marks for their answers.

This question was also derived from a real 'Graphic Product'.

A cut-out and make activity using this question, would benefit many candidates in the future.

- (a)(i) A front view in the direction of arrow **X** gave candidates the opportunity to draw an ellipse to a given major and minor axis. Many candidates drew this fish shape centrally on the base. The addition of the tail fin, 25 mm inset from the end of the base, proved difficult for many. Most candidates drew in the pectoral fins on the centre line and added the features of mouth and eye correctly.

- (ii) Many candidates managed to project a plan either above or below the view already drawn. The base proved to be very accurately drawn in all cases. Most candidates managed to draw the fish body centrally with the two pectoral fins on both sides of the central fish body. Many candidates failed to get the exact true length of the body. The pectoral fins were generally drawn to the correct length but not to the correct width. The fins should stick out 20 mm from the side of the stand.

- (b) A range of orthographic projection symbols was seen. Very few candidates drew a correct symbol that matched the views they had drawn.

Of those candidates who attempted this part of the question, many produced workable solutions to the problem of attaching the pectoral fins to the body of the fish.

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Paper 0445/03
Resistant Materials

General comments

Section A

This section tests a very wide area of knowledge concerned with materials, tools and processes used when working with resistant materials. Candidates' appeared more confident answering questions about wood rather than plastics and especially metals. If candidates want to achieve the highest marks it is essential that they are able to answer questions from all areas equally well.

Section B

There were many excellent answers to parts of questions describing processes used for specific purposes. These were typified by good, large, clear sketches and accurate technical, detailed notes. Sometimes, however, it was variable quality of communication by way of sketches or written notes that meant candidates failed to achieve the maximum marks available for some questions.

Comments on specific questions

Section A

Question 1

Many candidates incorrectly named a marking gauge as a tool for marking the line across the grain. The correct tool was the cutting gauge which few candidates named. There were numerous alternative correct answers provided, including try square and marking knife.

Question 2

Most candidates named a tenon saw or chisel to remove the waste material. This question tested candidates' knowledge of metal finishes. Most answers for the garden gate were correct, stating paint. Fewer candidates stated galvanising as the method of preventing corrosion to a dustbin. Many candidates correctly stated plastic coating or dip coating for the wire shelves in a fridge.

Question 3

Many candidates recognised that the fork would be made by the process of lamination in **(a)**, but in **part (b)** there were many vague answers about 'strength'. 'Strength' must be qualified; for example, the grain of each layer glued together provides extra strength rather than bending one solid piece.

Question 4

The best answers described the tapered sides and the rounded corners. Some candidates stated that the shape of the mould allowed in to be removed from the plastic after vacuum forming.

Question 5

- (a)** Most candidates knew that the wood could split, splinter, crack, snap or break.
- (b)** Unfortunately many candidates were unable to describe a method of preventing the damage. The best answers described clamping the wood horizontally onto scrap wood and boring vertically, while others described how the hole could be bored safely by turning the wood vertically in the vice.

Answers that suggested using a pillar drill received no marks as the question stated 'using a brace and bit'.

Question 6

The vast majority of candidates drew an accurate rebate.

Question 7

Many candidates knew what was meant by the term 'plastic memory'. Some answers simply referred to the property of thermoplastics that allows them to be reheated and reformed. This gained one mark only.

Question 8

Many candidates understood the purpose of the 'safe edge' on a hand file. Some excellent answers referred to the fact that the safe edge has no teeth while other answers explained clearly why the safe would prevent accidental filing of the vertical surface shown.

Question 9

- (a) The majority of candidates did not understand the term 'annealed'. Some answers thought it was a type of finish that could be applied to copper. There were some excellent answers that referred to the hardening of the material and the need to make the copper soft to enable it to be shaped. Some candidates correctly stated the need to make the copper more malleable.
- (b) Those candidates who did understand the purpose of annealing generally went on to describe how copper could be annealed. Although most answers included the use of heat, many candidates thought that the copper would be quenched immediately. In this case they were rewarded with one mark only.

Question 10

This question tested candidates' knowledge of between-centres wood turning.

- (a) Only a minority of candidates named correctly the tee rest or tool rest and tailstock.
- (b) Some candidates recognised the need to remove the sharp corners of the wood but were less accurate about how this would be achieved. For example, the use of glasspaper is not appropriate while the use of a jack plane would be most appropriate. The best answers referred to the need to find the centres on the ends and punching or drilling centres to locate.

Section B**Question 11**

- (a) The properties of acrylic that made it suitable included its ability to be formed easily, general ease of working, inherent attractive colours or transparent appearance and its impact resistance. Lightness was not considered important for the design of the game neither was strength considered specific enough.
- (b)(i) Candidates named many correct marking out tools that could be used on acrylic, although they need to be aware that a scribe will permanently scratch acrylic and that a traditional pencil will not make a clear mark unless the acrylic has a backing sheet.
- (ii) Most candidates named appropriate tools to remove the waste, including a variety of saws, files and the sanding disc.
- (iii) Fewer candidates were able to name tools to finish and polish the edges. The mark scheme interpreted the term 'tools' widely and allowed candidates to name wet and dry paper (not emery cloth) and polishing compound. The most common correct tools included the use of files, scrapers and polishing mop.

- (c) (i) The acrylic sheet needed to be clamped down because of the risk of the material slipping at the edge of the drill and spinning and the possibility of subsequent cracking. These two points were rewarded with two marks. Many candidates achieved one for stating only that the acrylic would crack or break.
- (ii) There were many excellent sketches showing good details of the method by which the acrylic would be clamped. Many answers included G cramps and the use of scrap wood onto which the acrylic would be drilled.
- (d) (i) Candidates were given the opportunity to describe the vacuum forming process and could achieve a maximum of four marks. There were many very good answers with good detailed notes. The mark scheme rewarded reference to the plastic being clamped securely, the heating of the plastic, use of a mould, sucking the air out and raising the platen and mould into the soft plastic. There were many clear sketches to accompany detailed notes.
- (ii) Candidates' knowledge of blow moulding was much weaker. It was still possible for candidates to achieve high marks for references to the use of heat, clamping and air being blown into the machine which forced the soft plastic against the inside of the mould. However, many candidates incorrectly referred to the process of injection moulding or extrusion blow moulding using heated granules rather than the 2 mm thick acrylic stated in the question.
- (e) The best answers, showing how the cover and base of the game could be joined, included the use of screws, nuts and bolts or pop rivets. The mark scheme rewarded an appropriate method, but to achieve maximum marks candidates needed to show clearly details about the method. For example, if using screws, what type of head, length and gauge of screw would be used.

Question 12

- (a) (i) Most candidates achieved marks for marking out the shape of the support.
- (ii) Most candidates understood the difference between marking out with a pencil and a scribe, but few were able to link this to the bend lines and the sawn lines.
- (iii) Most candidates recognised that a hacksaw or abra file saw could be used to remove the waste. Some candidates named tinsnips and, while these could be used, the question did ask for a "specific saw".
- (iv) Most candidates correctly named a flat or hand file.
- (b) When bending the aluminium sheet the mark scheme specifically rewarded the following: the method of holding the sheet; the force required to bend the aluminium and the technical accuracy of the sketches. There were some excellent answers showing the metal held in a vice, the use of a hardwood block as a former and a mallet used to apply the force. Some candidates used folding bars and a hammer with scrap wood.
- (c) (i) Generally, the overall knowledge displayed about sand casting was poor. Candidates were able to achieve some marks by references to filling with sand and melting and pouring the molten aluminium.
- (ii) The best safety precautions referred to the use of a leather apron and face visor. There were many descriptions of 'eye protection' which, although more vague, were awarded a mark.
- (d) The most suitable method of fixing the aluminium support to its wooden base without glue involved the use of screws or nuts and bolts. Candidates could only achieve maximum marks if they showed details such as the number of screws used, the type of head, length etc. In the case of using nuts and bolts, it would only work if the nut was recessed into the underside of the base. Some candidates ignored the part of the question that stated "...without the use of an adhesive (glue)" and received no marks.
- (e) (i) Most candidates could state what was meant by the term 'self-finished'. However, answers to (e) (ii) were less convincing. Many candidates described the use of fine grade emery cloth or wet and dry paper but then applied a finish.

Question 13

- (a) Most candidates scored well on this question. The measurement that proved most difficult was the width of the shelf. The correct width was between 120-140 mm to allow for the inclusion of sliding doors.
- (b)(i) There were many excellent corner joints drawn, the most popular being finger or comb joints and rebated lap joints.
- (ii) Candidates generally were able to name correctly the joint they had drawn.
- (c) There were many excellent sketches showing how the shelves could be made adjustable. The most popular answers involved the use of dowel or similar pegs fitting into holes positioned at different heights. Many candidates cut out housings into which the shelves could be fitted. There were some excellent answers that used bought-in standard components.
- (d)(i) Very few candidates achieved maximum marks for this question. For glass sliding doors to fit and work properly there needed to be two grooves in the top and bottom of the cabinet. Many candidates drew only one; this would not allow the glass doors to pass each other. To enable the doors to be removed meant that the groove at the top of the cabinet needed to be twice the depth of that at the bottom so that the glass could be lifted, inserted, and then allowed to drop into the bottom groove.
- (ii) The main advantage of sliding doors over hinged doors is that they take up less room.
- (e) The stages in preparing the surfaces and applying varnish were very well answered. The details provided included using different grades of glasspaper, starting with a medium grade and ending with a fine grade and wiping off dust after each sanding. Where candidates stated that they would apply a coat of varnish and then, as a separate stage, state that they would wait for it to dry, this was marked as a single stage worth one mark only.

DESIGN AND TECHNOLOGY

Paper 0445/04
Systems and Control

General comments

Good responses were characterised by the use of appropriate technological terminology and were supported by examples drawn from candidates' hands on experience of processes, components and project work. The use of annotated sketches was also indicative of good responses. There was evidence of a good level of general technological understanding across the whole syllabus. Mechanisms responses showed clear evidence of good teaching, preparation and practical application of knowledge. A small number of candidates attempted the Electronics and Logic question, but responses were characterised by good levels of knowledge and understanding. Candidates' knowledge and understanding of structures was less satisfactory.

Comments on specific questions

Section A

Question 1

- (a) Most candidates identified the use of a thermistor to sense change in temperature.
- (b) Most candidates were able to state an appropriate application for the thermistor, such as in a freezer, car or frost alarm.

Question 2

Most candidates identified three types of motion.

Question 3

Diagrams of a third order lever were generally accurate and well presented, with load, effort and fulcrum correctly labelled.

Question 4

Candidates were usually able to complete the block diagram showing the correct energy conversions from chemical through electrical and light to heat.

Question 5

- (a) Most candidates could give an appropriate example for the use of a rack and pinion gear system. The most frequent response was in a car steering mechanism.
- (b) Most candidates were able to describe the motion conversion for the operation of the rack and pinion system, though the change in direction or axis was not mentioned by some.

Question 6

- (a) Most candidates identified an appropriate application for the reed switch, usually in burglar alarm sensors.
- (b) Candidates were usually able to successfully draw the reed switch and most were able to label the diagram accurately.

Question 7

Few candidates were able to explain the use of bread-boarding, using discrete components in a pegboard model and test circuits prior to hard soldering of a circuit.

Question 8

Most candidates were able to complete the definition of a moment of force.

Question 9

- (a) Many candidates were able to identify torsion as a twisting force.
- (b) Most candidates were able to state an appropriate example of torsional forces in systems, usually in drive shafts.

Question 10

Most candidates identified the belts or pulley types shown in this question.

Section B**Question 11**

- (a) Candidates found it difficult to describe fully the operation of the circuit, in particular the biasing of the transistor.
- (b) The interfacing function of the relay was largely omitted by many candidates.
- (c) Most candidates identified the use of the diode to protect the transistor from back EMF.
- (d) Few candidates were able to describe the use of the resistor for biasing of the transistor.
- (e) Few candidates were able to describe the use of a second transistor (Darlington pair arrangement) to increase the sensitivity of the circuit.
- (f) Many candidates were able to determine the value of the resistor pairing in the potential divider shown.
- (g)(i) Most candidates were able to explain the use of colour coding on resistors as a means of indicating its nominal value.
 - (ii) Some candidates were able to explain the tolerance value of a resistor as a means of assessing its accuracy.
- (h)(i) Most candidates were able to complete the truth table for a NOT gate.
 - (ii) Surprisingly few candidates were able to draw the symbol for a NOT gate accurately.

Question 12

- (a) Few candidates were able to explain how a cranked handle increases the mechanical advantage and thus decreases the amount of effort needed to operate the system. This is a fairly basic concept.
- (b) The leg clamp makes use of an eccentric cam to effect a pinch action, but the use of such a device was not known or understood by a large number of candidates.
- (c) This was answered much better, with most candidates being able to explain the stabilising and stiffening effect of the leg stay.

- (d) Most candidates were able to describe the motion conversion from rotary to linear movement by the thumb screw.
- (e) The operation of a rack and pinion system to adjust the height of the camera platform was understood.
- (f) Few candidates were able to explain fully the effect of shear force.
- (g) (i) Few candidates were able to explain fully the use of a lever to amplify angular movement – another example of mechanical advantage.
 - (ii) The second order lever was usually correctly identified.
 - (iii) Few candidates were able to explain fully the ability of a lever to magnify small movements. A copy of Fig.4 would have been a good start with the addition of a small downwards movement on the left creating a large upward movement on the right.
- (h) (i) Most candidates were able to describe the use of a construction kit to model a mechanical system.
 - (ii) Most candidates were able to describe another modelling process.
 - (iii) Most candidates were able to explain the reasons for modelling a mechanical system prior to constructing it in resistant materials in terms of testing and developing it.

Question 13

- (a) Tension and compression forces acting on the test piece were usually correctly labelled.
- (b) It was good to see that many candidates were able to calculate the values of the reactions at the supports.
- (c) Few candidates were able to give a use for ribbing in structures (e.g. plastics packaging), or name the laminated display board shown. Most candidates were able to sketch an example of triangulation and to give an appropriate application such as a roof truss. Most candidates were able to give an appropriate application for folding (e.g. cardboard packaging).
- (d) Few candidates were able to explain how the 'I' beam needs to be shaped so as to deal with the maximum forces that are concentrated at its outer edges. Mention of the weight saving from the use of this type of beam was also credited.
- (e) Candidates were able to identify the elastic region (A), the plastic region (B) and the point where the steel failed (C). Explanations were less secure.
- (f) (i) Few candidates were able to determine the value of the stress on the sample shown. They should know that $\text{stress} = \text{load} \div \text{cross sectional area}$.
 - (ii) Few candidates were able to explain how by increasing the cross sectional area of the sample stress is reduced.
 - (iii) Few candidates were able to determine the strain on the sample. Again it is a requirement that they know that $\text{strain} = \text{change of length} \div \text{original length}$.

DESIGN AND TECHNOLOGY

Paper 0445/05
School Based Assessment

General comments

A very good range of work was submitted for moderation. The work covered all of the material areas, although Resistant Materials type work was the most common and Systems and Control the least popular. The overall standard of work was comparable with previous seasons. It was clear that there are many talented designers who have been well supported by their teachers.

The coursework samples were generally well presented for moderation, and the Moderator was able to follow the order of the design folders in considering the marks awarded by Centres. Centres are reminded of the need to include both the Coursework Assessment Summary Form 0445/05/CW/08 and the Moderator copy of form MS1 with the sample of work sent to CIE. Without these two documents moderation cannot proceed.

Evidence of internal moderation was variable. Centres are reminded that where two or more groups study the subject internal moderation must take place to establish a single rank order for the Centre.

The vast majority of projects were A3 in size. It is acceptable to use A4 size paper but a mixture of A3 and A4 sheets is discouraged. It is not necessary to send the practical work for moderation; rather sufficient photographs should be included to show overall appearance and particular details.

There is growing evidence of the use of ICT in projects, particularly for research and working drawings. There are a small number of Centres that are using ICT inappropriately to turn the design folders into a report that includes a large number of pages of largely irrelevant research printed from the Internet. Centres are reminded that appropriate use of ICT is encouraged but maximum marks can also be achieved through hand drawn methods. Simple copying from the Internet, or other sources, without acknowledging them can be regarded as plagiarism.

Comments on specific assessment headings

Identification of a need leading to a Design Brief

Most candidates presented a design brief that left no doubt as to what was to be made. There was less clear evidence of candidates having considered the design need or the needs of the user. In most cases the Centre assessment of this objective was accurate and few marks required adjustment.

Research into the Design Brief resulting in a Specification

The quality of research was variable. Some candidates collected large amounts of information that had little relevance to the design brief. In some Centres there was also an over reliance on the superficial analysis of existing products. Both of these approaches are to be discouraged. Candidates should be encouraged to identify the key areas that they need to research and then analyse the data they have collected in order to produce a design specification. The majority of candidates were able to identify relevant specification points.

Generation and exploration of Ideas

Many candidates should be congratulated on the range and quality of design ideas presented in this section of the design folders. However, it should be noted that it is important that candidates show a wide range of different ideas and do not allow themselves to focus on just one or two concepts with superficial variations. For the award of marks in the highest band it is important that candidates examine the ideas presented and annotate them to show how aspects of the specification have been addressed.

Development of Proposed Solution

This area was often the weakest in the design folders. Whilst most candidates made some choices at each step from initial ideas to final product, unfortunately, these decisions were not always recorded. Centres wish to focus on how decisions have been made to guide them in the award of this mark. For the higher marks candidates must have undertaken testing and trialling in order to make reasoned decisions about form, materials and construction methods. It is, therefore, expected that candidates will have trialled a number of alternatives and then stated why they have chosen one.

Planning for Production

This area was a real strength in many design folders. The quality of the working drawing was usually very good and supported by an accurate materials list. An increasing number of candidates had used CAD packages to produce their working drawing. Most candidates also presented a clear sequence of the manufacturing process for their developed design. There was some evidence of retrospective planning (planning written after the making had taken place) and this is to be discouraged.

Product Realisation

Photographic evidence indicated that many artefacts had been produced to a high standard and put to good use. It was pleasing to see that candidates had gained much satisfaction from the production of the solution. Unfortunately, a few Centres still fail to meet CIE's requirements regarding photographs of made artefacts. The photographs should include an overall view of the finished article together with detailed views of evidence that supports the marks awarded.

Testing and Evaluation

Responses to this assessment objective were often a little disappointing. Candidates should be encouraged to compare the final product with the specification, carry out user testing and then suggest proposals for further development. Self evaluation is of little relevance. The weakest part of this objective was often the user testing. If the candidates have identified the users in objective 1, then testing the product with this group will follow quite naturally in the testing and evaluation section.