

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 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. Centres are also reminded to arrange scripts in the candidate number order as set out on the attendance register when they are packed and sent to CIE for marking.

There was a reasonable balance of responses across the three design based questions although **Question 2** was probably the least popular. The Examiners were pleased to see that more candidates attempted the Systems and Control based question than in previous years. 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 that would be appropriate to some degree. Many solutions were based on carcass constructions, as might be expected, but there was also a good range of other approaches with a range of materials included.

- (a) The majority of candidates responded well to this introductory part of the question and suggested additional points about the function of the device such as: tools must be accessible; lightweight; easy to move; comfortable to carry; easy to store; protect tools; etc.
- (b) Candidates were generally able to draw two ways in which handles could be included in carrying devices and these included: holes; slots; ledges; rope; straps; additional fixtures; 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 Examiners were 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 present fewer than three **different** design ideas then the maximum mark available is 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 are 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 have obviously been encouraged to produce a table so that each design idea can 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 least successfully, although 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 Examiners are always looking for responses that indicate that the candidate knows how products are constructed and assembled.
- (f) The majority of 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 Examiners 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. Unfortunately, many candidates were far too general in their response and did not link the methods suggested to their chosen product. A simple step by step approach should be able to 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 product as the requirement was that it should be light in weight and foldable, for distribution to schools. Unfortunately, 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 points for the collection unit such as: stable when opened; attract attention; easy to transport; hygienic in use; easy to clean; appealing to candidates; emphasis on recycling; etc.
- (b) Many candidates overlooked the need for flexibility in the joints to be used on card products but appropriate responses included: scored card; use of tape; plastic hinges; slots/tabs; stationary rivets; etc.
- (c) The Examiners were 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 present fewer than three **different** design ideas then the maximum mark available is 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 are awarded for the quality of communication skills and a further 6 marks for the suitability of designs.
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- (g) As the last part of this design process, the Examiner expected candidates to be able to look ahead to how they might construct a prototype of their designed product using the facilities available in their school graphics room. Unfortunately, many candidates were far too general in their response and did not link the methods suggested to their chosen product. 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. Although design solutions for the clothes drying device were not always that sophisticated and, indeed, did not need to be, candidates did show that they were aware of the inherent problems and produced some reasonably practical solutions. Unfortunately, some candidates overlooked the need for a free-standing solution and simply extended the use of a branch.

- (a) Additional points about the function of the clothes dryer included: easy to transport; easy to erect; stable in use; use of non corrosive materials; appropriate height; does not damage clothes; withstand strong winds; etc.
- (b) Some candidates included permanent joining methods but most were able to draw two temporary joining methods and those considered appropriate included: bolts/nuts; screws; slot-in; push together; KD fittings; use of elastic; etc.
- (c) The Examiners were 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 present fewer than three **different** design ideas then the maximum mark available is 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 are awarded for the quality of communication skills and a further 6 marks for the suitability of designs.
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DESIGN AND TECHNOLOGY

Paper 0445/02
Graphic Products

General Comments

This was the second June Examination paper in the new A3 format. 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. Some candidates answered B4 *and* B5.

Question 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 flow charts and pictograms. Many candidates inadvertently added words to the design of their pictogram. The drawing of regular polygons to given sizes is also an area for improvement. 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.

Centres are reminded not to secure the papers together with string, staples or the use of a treasury tag. Candidate's sheets should be placed in the folder provided for despatch as instructed on the front cover.

Comments on specific questions

Question A1

Music shop sign 'SOUNDS ON

This question was attempted by all candidates giving them the opportunity to show their expertise at lettering. The letter 'S' proved to be difficult for candidates who did not 'crate' the available space. A large number of candidates omitted the 'S'. One mark was awarded for each correctly shaped letter and one mark each for spacing and height alignment. A large number of candidates drew the semi-circle within the 250 x 50 border.

Question A2

Disco Light Box

Of those who attempted this compulsory question on the paper, many scored high marks. Many candidates drew the hexagon, diamond and triangle correctly. The diamond 50 x 60 diagonals and the hexagon of 30 side proved challenging for a number of candidates. Two marks were awarded for each correctly drawn shape.

Question A3

Mobile Phone display stand

Unfortunately not all candidates attempted this compulsory question losing the 10 marks available. Some candidates drew a pictorial view instead of a side view.

- (a) Many candidates drew the distance support to the correct size but not all drew it at 90° to the panel.
- (b) Many candidates drew the display card to the correct size. A small number of candidates did not draw the card in a central position or parallel to the panel.
- (c) Most candidates drew the pocket the correct size and in the correct position.
- (d) The additional card should have been inserted as a diagonal in the distance support from top left to bottom right.
- (e) Most candidates drew the strut aligned with the panel and top.

Question B4

Card CD case

This question was derived from an actual 'Graphic Product' and was by far the most popular of the two choice questions.

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.

- (a) Many candidates failed to make their development wide enough to take the Ø120 CD. This affected marks for the width and overall length. Many candidates did not make the semi-octagonal end regular and this would have led them to the correct width. Most candidates drew the hexagonal cut-out in the correct orientation but only a few managed to draw the half hexagon 60 x 60 x 120°.

Many candidates drew the correct number and size of glue flaps and positioned them correctly on the hexagon end.

Whilst the convention for fold lines was given, many candidates chose to ignore this by drawing their own style of line for the folds.
- (b) Many candidates produced a sketch showing some way of keeping the lid closed. Marks were lost by candidates who sketched a method of closure that required adhesive. A small lip on the lid that fitted into a slit in the hexagon part of the case scored the most marks.

Question B5

Packaging for an 'MP3 Player'

This question was attempted by a small number of candidates.

- (a) A number of candidates managed to get the given instructions into the correct order. Very few candidates managed to get the Y (Yes) and N (No) line from the decision box correct with the N (No) loop correctly drawn.

Most candidates who attempted this question, put the correct stages into the three activity boxes. A small number of candidates failed to put 'close box' into a 'stop' symbol.
- (b) Many candidates did not know that the sides of a vacuum formed product have 'draft' to allow the product to be removed from the male mould. The draft angle is built into the design of the male mould (or plug / frog).
- (c) Many candidates inadvertently added words to the design of their pictogram. The drawing of information giving pictograms is an area of the syllabus that needs to be improved. Many candidates appeared to draw road signs incorporating a battery but no symbol or item to represent charging or the maximum time duration. Similar drawings were made for the safe disposal of the batteries without burning.

DESIGN AND TECHNOLOGY

Paper 0445/03
Resistant Materials

General comments

Section A

This section test candidates' knowledge and understanding of materials, tools and equipment and processes involved in working with resistant materials: wood, metal and plastic. Generally, candidates answered wood-based questions better than those concerned with metal or plastic. It was disappointing that candidates were unable to provide correct answers to numerous questions from areas of the syllabus that are basic to the materials being studied.

Section B

Question 13 was the most popular question answered by the majority of candidates while Question 12 was attempted by only a small minority of candidates. Candidates generally showed a better understanding of wood based techniques in **Question 13** than those who answered the questions with a plastics or metal bias. Candidates should understand that in those questions requiring design-type answers with larger mark allocations, clear sketches and accurate written notes are essential to gain maximum marks.

Comments on specific questions

Section A

Question 1

- (a) Only a few candidates named a marking gauge as the tool to draw a parallel line while some confused wood with metal and named odd leg calipers.
- (b) Very few candidates named a plane as the tool to remove the waste wood. There were many saws and files named.
- (c) The majority of answers named a try square. This was incorrect as the question specifically asked for checking for flatness and a straight edge or rule would be most appropriate.

Question 2

The purpose of PTFE is to make the saucepan non-stick. Products that are galvanised include bins, gates, screws, nails and bolts. An appropriate finish for copper jewellery is to apply lacquer or enamel. Generally answers were very poor with only very few scoring maximum marks.

Question 3

Many candidates named correctly a solvent such as Tensol to join the acrylic rod to an acrylic base. There were numerous incorrect answers naming wood adhesives such as PVA.

Question 4

Only a very small minority of candidates understood what was meant by a contact or impact adhesive. The benefit of using such an adhesive is that the joint dries on contact, therefore there is no need for prolonged clamping and waiting time for the adhesive to set.

Question 5

Only a few candidates read the micrometer correctly. There were marks available for partially correct answers. The overall responses were very poor.

Question 6

Only a small minority of candidates managed to draw a corner bridle joint. This joint is one of a number that candidates should know about as part of frame construction.

Question 7

Many candidates knew that a wing nut could be tightened or loosened by hand, while fewer candidates were confident about the advantage of a hexagonal nut. The best answers stated that it would be harder to remove or that it could be tightened more using a spanner.

Question 8

The majority of candidates gave correct answers to parts **(a)** and **(b)**. Most realised that spray painting provided a more even, uniform finish and that it was necessary to wear a mask or make sure that spraying was conducted in a well ventilated room.

Question 9

Only a minority of candidates named a bevel-edge chisel. Many answers referred to a triangular chisel or even file.

Question 10

This question tested the candidates' knowledge of plastics processes and materials. Very few candidates achieved maximum marks for this question. This part of the syllabus is an essential basis to the knowledge and understanding required by candidates of plastics. Therefore it was disappointing that so many candidates were unable to name a process or specific plastics material.

Section B

Question 11

- (a)** There were many vague, incorrect answers referring to cost or ease of working while the best answers about self-finishing and range of colours were missed by the majority of candidates.
- (b)** Many candidates knew that using a template meant that the shape could be marked out quicker and repetitively more accurately.
- (c)(i)&(ii)** Many candidates showed good understanding of a drilling jig with many providing details about the location of the shelf inside the jig, the position of the holes to be drilled and a sensible safety feature of the jig they designed.
- (d)(i)** Many candidates drew the tessellated shape of the CD shelf onto the length of acrylic but only a minority showed the shape with some waste between each shape to enable the pieces to be cut accurately to size.
 - (ii)** The vast majority of candidates knew that if a scribe was used to mark out the acrylic it would make a permanent scratch into the surface while a felt-tip could be erased.
 - (iii)** This was answered well by the majority of candidates. The question required candidates to name a saw used to cut the acrylic and a method of holding the acrylic. Sometimes an appropriate saw was named but with an inappropriate method of holding or vice versa.
 - (iv)** Many candidates described some of the stages in finishing the edges of the acrylic. Candidates were not required to put the stages into the correct order. Most described either the use of draw filing, scraping, wet and dry paper and buffing on the polishing wheel. Unfortunately, some referred incorrectly to the use of glasspaper.

- (e) This question was answered poorly by the vast majority of candidates. What was required was a method by which each shelf could be spaced apart from the shelves above and below. Most candidates simply showed the CDs positioned between two shelves.

Question 12

- (a) Most candidates understood that the mild steel was heavy enough to prevent the base from moving, while the aluminium wind flap was light enough to be blown by the wind.
- (b)(i) Many candidates understood that annealing softened the metal; the clue was in the question stating “before it was bent to shape.” The majority of candidates were unable to make any reference to changing the structure of the metal and only achieved one mark.
- (ii) Most candidates knew that the metal would be heated but were less knowledgeable about to what temperature or what happened after it was heated.
- (iii) For maximum marks candidates had to provide notes and sketches showing some sort of former, bench or anvil over which the metal rod could be bent and the method of force, i.e. hammer or mallet used. Most candidates gained some of the marks available.
- (c)(i)&(ii) The majority of candidates did not know how to produce a screw thread on the end of the rod or in a hole. Only a minority were able to name a tap and a die and of those who knew this, very few described the cutting action of the tap and die on the metal. These are operations that candidates should know about and are basic to metalworking techniques.
- (d) Most candidates showed a method of retaining the wind flap on the support arm using nuts on a threaded arm, a split pin, or by mushrooming the end of the rod over.
- (e)(i) Most candidates thought that the shape could be removed by means of a hacksaw. Since the shape was curved and hacksaws cut in straight lines this was not a practical method. Very few named an abra file or tin snips to achieve this.
- (ii) The tool used to produce a smooth edge was a half round file. Many candidates stated “file” without a specific name and did not receive the mark. It is important that candidates provide specific names of tools wherever possible.
- (f) The best way of attaching the measuring scale to the support arm was by means of nuts and bolts. A minority of candidates showed a u-shaped bracket with nuts and bolts used to attach it. For maximum marks some candidates noted that it would be important that the nuts or bolts did not protrude on the scale side which would stop the flap from moving. Answers stating soldering or welding received no marks.

Question 13

- (a) The best answers referred to plastic being more colourful than wood, ready coloured, no need to apply a finish and that it was a more child-friendly material.
- (b) Very few candidates really understood why a two-piece construction would be easier to produce and that it would be more accurate. Some excellent answers did state that there would be no need for routing or milling but many answers referred to the construction being stronger.
- (c) There were many excellent answers describing how the space for the teddy bear parts would be cut out. Unfortunately, many candidates did not read the question carefully enough and described how the teddy bear shapes, **not the space**, would be cut out. Many candidates recognised the need to drill a hole, take out a saw blade and insert it, cut the shape, then finish it by filing. Some candidates chose a jig saw to cut out the shape. A jig saw would be too large to cut fairly intricate shapes. Most candidates provided a sound safety precaution to accompany their process.

- (d)(i)** The adhesive would be applied using a brush or stick.
- (ii)** Most candidates knew that the boards would be clamped using G cramps or weights.
- (iii)** While many candidates knew that the adhesive would take between one to three hours to dry there were answers ranging from 5 minutes to several days. Candidates using different adhesives should understand the properties of these including their drying times.
- (e)(i)** There were many excellent answers showing the tray supported on wooden strips or cut out rebates. For maximum marks candidates were required to show clear sketches and detailed notes.
- (ii)** The most popular joints for the box were lap, finger (or comb), mitre and dovetail. Many candidates provided good quality drawings and achieved maximum three marks.
- (iii)** Sometimes the joint named did not match the one drawn, but generally most candidates did name the joint correctly.
- (iv)** Many candidates named correct basic marking out tools including pencil, ruler and try square.
- (v)** The tools used to cut out the joint were not always correct; for example if the joint drawn and named was a lap joint then it was inappropriate to name a coping saw to cut it out.

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 indicative of good responses. There was evidence too of good preparation of candidates for this paper in the way in which questions were selected and approached. One area of very good practice was in electronics where there was clear evidence of good teaching, preparation and practical application of knowledge. Only a small number of candidates attempted the mechanisms question and responses were often the weakest of the three optional question. However there were some candidates who showed good levels of knowledge and understanding. Candidates' knowledge and understanding of structures was more satisfactory.

Comments on specific questions

Section A

1

Most candidates correctly identified tension force acting on a tie.

2

Most candidates identified the LDR and were able to specify an appropriate application for the LDR.

3

The use of eccentric cams was well understood in terms of the changes in motion.

4

Most candidates correctly sketched a transistor, though labelling was not always accurate.

5

The second order lever was fairly easily identified and this enabled many candidates to correctly label the diagram of the lever.

6

Most candidates correctly identified kinetic energy.

7

(a) One energy loss was often correctly identified, e.g. heat energy lost through friction, but the question required two losses.

(b)(i) Again only one suitable answer was given instead of two, usually the use of lubrication to lessen losses due to friction.

(ii) Candidates seemed to have difficulty in coming up with ideas and so quite a few did not produce a sketch of one method for improving the energy efficiency of the vehicle. This might have been replacing the rubber band drive system with something that would not slip, but there are other possibilities.

8

Most candidates correctly identified the value of 100k Ω .

9

Most candidates correctly identified an appropriate application for logic systems in everyday life, such as an alarm system or a washing machine

10

Few candidates explained the need for a factor of safety when designing a structure.

Section B

11

- (a) The operation of the circuit was generally well explained, though some candidates missed out important points such as the effect of current flowing through the RC circuit..
- (b) Most candidates correctly identified the use of the resistor as a current limiting device to protect the LCD.
- (c) Fewer candidates were able to explain the effects of repositioning the LED so that it would be normally 'ON' until the switch was depressed when it would then go 'OFF' after the specified time delay produced by the RC circuit.
- (d) Electrolytic capacitors were well understood in that they will not work if they are not connected according to their polarity.
- (e) Few candidates were able to calculate the correct value of time delay. The first step was often known, but errors with the number of zeros were frequent.
- (f) Most candidates correctly identified the PTM switch.
- (g) This was well answered by virtually all the candidates.
- (h) Most candidates correctly identified the 'OR' circuit and correctly sketched the 'OR' symbol. "Parallel" connection was also well known in part (iii) and the truth table for the 'OR' gate was successfully completed.

12

- (a) Surprisingly few candidates correctly explained the relationship between effort distance and load distance from the pivot to make operation easier.
- (b) Very few candidates were able to calculate the force exerted by the pressure plate. The correct formula was not known by many and often incorrectly applied by others
- (c) (i) "Shear" force was rarely identified as acting on pin A.
 - (ii) Few candidates identified the linkage pins as being subjected to shear force.
 - (iii) Sketches and labels of the result of a shear force acting on a member were poor.
- (d) Most candidates correctly identified the lengthening of the handle but few identified the reduction of the distance of A to B as an alternative method.
- (e) The second order lever system was identified by most candidates.
- (f) Most candidates correctly identified the need for bearings to reduce friction and thus improve the efficient running of the system, but candidates were unable to correctly sketch a plain bearing.
- (g) Few candidates were able to identify the "Ball Bearing" and few were able to specify an appropriate application for a roller bearing, which are used where there is heavy loading.
- (h) The need for lubrication to reduce friction, wear and improve smooth running of mechanical transmissions was well understood and candidates usually correctly identified at least one example of a lubricant and its application.

13

- (a)** Most candidates correctly identified ways of stabilising the structures shown.
- (b)** Few candidates were able to explain the difference between static and dynamic loading on structures. As dynamic loads move structures need to be designed to cope with the changes in forces acting.
- (c)** It was hoped that the clue of dynamic loading in **(b)** would steer candidates towards an answer, but few were able to explain the need for a factor of safety when designing a bridge.
- (d)** Most candidates correctly sketched the gusset plate and were able to identify an appropriate application for it, as well as correctly identified the use of nuts and bolts as temporary fixings. Fewer candidates identified the use of "Sleeving".
- (e)** This proved a straightforward question for virtually all candidates, though part **(ii)** was a little more challenging requiring candidates to explain why alternating the grain directions between each layer of veneer helps to make the plywood more rigid and stable.
- (f) (i)** Most candidates correctly sketched the effects of loading within the lintel.
 - (ii)** Well drawn and labelled sketches showing the use of reinforcing rods to improve the load bearing capabilities of a concrete lintel were frequently seen.
 - (iii)** Few candidates were able to show the use of a strain gauge to measure deflection in a loaded lintel.

DESIGN AND TECHNOLOGY

Paper 0445/05
School Based Assessment

General comments

A wide range of coursework projects was presented by candidates and, as is usually the case, the choice of topic had emerged from a real problem in the candidate's home, school or local community. In addition to the anticipated range of household items and furniture, interesting and unusual outcomes included: solar cooker; beach house model; skate park; child's flight activity pack; numbers game; geography teaching aid; computer mouse; self cooling house; hurricane proof house; model glider; mobile display unit and some interesting kitchen designs.

It is important that Centres support and guide candidates in the selection of their design problems so that they take on tasks that are both manageable and provide the opportunity for them to respond to all parts of the assessment scheme. This is even more important when the final outcome is likely to be a model.

The Moderator would like to thank the majority of Centres who sent the required size of sample and provided assessment documentation clearly set out in line with CIE's requirements.

Comments on specific assessment headings

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

Most candidates were able to state clearly a need or opportunity and to consider briefly aspects of the design problem, context or situation that might affect the intended use of a product. This was then followed by a Design Brief stating precisely what the candidate intended to do. It is important that reference is made to the intended user(s) at this stage of the design process.

Research into the Design Brief resulting in a Specification

The degree to which candidates researched the design **brief** varied enormously. Candidates should be encouraged to complete adequate and relevant research in order to create a suitable knowledge base prior to the formulation of the specification. 'Cut and paste' extracts and drawings of other existing artefacts should always be accompanied by notes that comment, in some way, on the item being shown. Comments and annotations can be either on the suitability of the item in the context of the design brief or on any other feature that may be useful in the subsequent creation and development of ideas.

Unfortunately, as has been pointed out many times before, many Centres are still allowing their candidates to include information on materials, components and constructions taken directly from textbooks. Information of this type is totally irrelevant at this stage of a design process, and cannot be awarded marks, but should be considered at the development stage when ideas have been explored.

It is accepted that many product outcomes will be in the form of models. This may be because a full size artefact would be beyond the facilities at the Centre or the time constraints of the course being followed. Candidates following the Graphic Products option within the syllabus will often produce models as a natural outcome of the subject content. This is perfectly acceptable, and expected, but it is important that candidates make this absolutely clear in their design brief so that all subsequent work, especially the specification, design development and evaluation, focuses on a model.

Good specifications made no attempt to solve the problem by simply listing materials, constructions and the like, but emerged from research of the problem and stated clearly the specific design requirements for the final outcome. At this stage the design should still be very open so that all possibilities and ideas can be considered.

Generation and Exploration of Design Ideas

This section of the design folder is awarded the highest number of marks and in many ways is the most important. It is the stage at which candidates can go off in almost any direction from the specification and explore a variety of avenues for solving the design problem.

The Moderator would expect successful candidates to include a few surprises in their design thinking. It is the opportunity for candidates to show evidence of their ability 'to think with a pencil' and include examples of genuine design creativity. Successful candidates included a wide range of different ideas presented by clearly annotated sketches. Unfortunately, some candidates presented a few formal drawings that showed little design flair and tended to follow a single concept.

Successful candidates not only produced a wide range of ideas but evaluated these in an ongoing way with due consideration of the requirements of the Specification.

Development of Proposed Solution

This is the section of the folder where a candidate's chosen idea or selection of ideas becomes reality. It is the point at which they need to consider alternatives and make final detailed decisions about form, materials, construction methods and finish to be used in the product realisation.

For the award of high marks, successful candidates included evidence that they had carried out some form of trialling or testing of some of the requirements being considered. This was often the testing of materials or constructions or modelling of shape or form. In all cases this should lead to reasoned decisions about form, materials and construction/production methods.

Planning for Production

Some candidates gave themselves away by writing this section of the folder in the past tense. The planning must show clear evidence that the production of the artefact has been thought about in advance. It should not be a record of what has already taken place, as was unfortunately the case with the work of some candidates, but an effective order for the sequence of operations required to manufacture the product.

Successful candidates included all information from which a skilled person could make the final artefact. This included detailed drawings and information on materials to be used.

Product Realisation

Many candidates should be congratulated on the very high standard of their practical work. Clearly, some products had been made very well and as such performed their intended purpose. There was evidence of a wide range of technologies and materials being used.

It is pleasing to see that candidates enjoy this part of the course and continue to take pride in the quality and success of their made artefacts.

Where a model forms the basis of the made product it is important that appropriate materials are used and that the same high standards are maintained. An architectural model will never convince potential customers if it is poorly made.

Testing and Evaluation

Successful candidates opened this section of the folder with evidence of consumer or user testing of their product in the intended environment. This was either in the form of photographs or a written record of what had happened. Evidence of questionnaires can play a part in this, but by themselves they often say very little. Candidates should go on to link the outcome of this testing to the original specification and make objective and qualified statements on the success of the product. This section should also include suggestions for further modifications or possible improvements to the product.

Centres are reminded that this section must be an evaluation of the final **product** as, too often, candidates referred only to issues and problems linked to the making of the artefact and/or the production of the design folder with the addition of their own subjective appraisal of the outcome. Evaluations of this type cannot be awarded marks beyond the low level of achievement.