

# DESIGN AND TECHNOLOGY

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Paper 9705/01

Written

## General Comments

The performance of candidates was very mixed and ranged from poor to the very good. It was evident that in some cases candidates had only a limited knowledge and understanding of the subject matter that they had chosen to answer. This was particularly true with some production processes and manufacturing techniques.

The questions on the examination paper required candidates to respond in a variety of different ways, for example, using short sentences, detailed explanations and annotated sketches. It was important that whichever method was used candidates made their answers as clear as possible and related their responses to the number of marks available. Candidates must look carefully at the number of marks available and structure their answers in such a way that the content reflects that mark.

Some candidates spent too much time on questions which carried a low mark while others produced superficial responses to questions which had higher marks. A good number of answers needed to be more focused in a way that responded fully to the question being asked.

Candidates should read through each question carefully before they start their answer. They must make sure they are clear what the question is asking them to do. Some candidates lost marks because they misread or misunderstood important words in the questions.

When answering questions it is important that candidates make sure that they apply their subject specific knowledge and understanding rather than general knowledge.

In **Section B** a good number of candidates used too much continuous text in their answers to the questions. In a few cases candidates did not produce any sketches at all.

Instructions on the front of the examination paper draw attention to the statement 'discuss' within a question. While in some cases discussion was well presented in **Section C** with clear supporting arguments made, in a good many cases there was evidence to suggest that candidates had not taken sufficient notice of this instruction.

A few candidates failed to answer the required number of questions. A higher number missed out parts of questions.

## **Section A**

### **Question 1**

In the first part of the question candidates often failed to link their answers to ergonomic requirements that the user of the mobile phone would consider important. While a fair number mentioned the size and shape of the phone far fewer linked these to the size of people's hands and fingers. Answers needed to explain how the ergonomic requirements identified by the candidate would make the phone easier and more comfortable to use.

In part (b) most candidates displayed at least some understanding of what aesthetic requirements users of the phone would consider important. Some, however, gave answers that were more concerned with the function of the phone rather than its appearance. Appropriate answers needed to explain aspects such as style, fashion, shape, texture and colour.

## Question 2

In part **(a)** the vast majority of candidates gave at least one appropriate reason why point of sale stands are sent to shops in a flat pack form rather than assembled. Appropriate answers included the fact that they take less space, it saved the manufacturer money as they did not have to assemble them and they were less likely to get damaged when being transported. Some excellent answers were seen to part **(b)** with many candidates showing at least a reasonable understanding of what the display stand would look like when assembled. The quality of sketching was generally good. The two most common errors were to miss out the small semi circular pieces that prevent the phone sliding off the stand and failing to show that the back support was not as wide as the part which held the phone.

## Question 3

This question was not answered by a good number of candidates. When it was answered responses were frequently of a poor quality with many candidates presenting answers which related to turning wood rather than metal. A good number of candidates spent a long time explaining how a piece of wood would be prepared ready for turning. Correct answers needed to explain how the metal would be held in a four jaw chuck.

## Question 4

This question was well answered by the majority of candidates. Some did not fully read the question and only explained why the given procedures were not appropriate, failing to go to explain a safer or more appropriate method.

## Question 5

In part **(a)** the majority of candidates correctly identified at least some of the three different energy sources that were required and were able to state which products used the energy sources they had identified. The most common answers were that the cooker used gas, mains electricity was used for the kettle or light bulb and the clock could be battery powered.

Part **(b)** was well answered by many candidates who suggested that materials such as laminated chipboard, granite or stainless steel could be used for a kitchen worktop because they could be easily cleaned and were hard-wearing hygienic surfaces.

## Section B

### Question 6

While in part **(a)** many candidates named a suitable material such as PVC, polythene or ABS which could have been used for the seat a number suggested that acrylic could be used. In this situation acrylic would not be appropriate as it is a brittle material. Some candidates gave too simplistic answers such as 'cheap' and 'readily available' when it came to reasons for their choice. Appropriate reasons included the material was weatherproof, resistant to wear and came ready coloured.

In part **(b)** a good proportion of candidates demonstrated at least some understanding of the blow moulding process. Some confused it with either vacuum forming or injection moulding. The better answers used a sequence of three or four annotated sketches to clearly explain the process. The use of lots of continuous text should be avoided when answering questions of this type.

Candidates' answers to **(c)(i)** needed to explain that destructive testing involves repeatedly testing a product until it breaks. While most candidates displayed some understanding of testing materials a good number failed to explain that the aim of this type of testing was to determine the maximum force/weight that the product could withstand before it broke.

In part **(c)(ii)** a good number of candidates failed to fully explain that the modification would stop the seat cracking because it spread the weight over a much larger area than on the original design where it was concentrated on just the four nuts.

Part **(d)(i)** of the question was poorly answered by many candidates with a good number suggesting the inappropriate use of both tools and processes for marking out and shaping the metal. Some candidates spent too long trying to explain how templates could be made and used in the marking out process. A number suggested that an angle grinder could be used to shape the metal. This would not be the safest or most accurate way to achieve a radius on the corners.

In part **(d)(ii)** only a limited number displayed any real understanding about how the threaded holes would be made in the metal plate. Many failed to explain the need to drill a hole and how taps would be used to cut the thread.

For questions of this type candidates need to use a sequence of three or four annotated sketches to explain how the appropriate tools, equipment and processes are used to achieve the required results. It is not sufficient to just draw or list the tools, they must be shown in use.

### Question 7

In part **(a)** most candidates named a suitable wood for making the folding chair and were able to explain at least one appropriate reason for their choice. The wood's suitability had to relate to factors such as its ability to resist adverse weather conditions rather than commonly seen answers such as 'it is cheap' or 'it is readily available'.

The vast majority of candidates answered part **(b)(i)** of the question very well. Most identified either a mortise and tenon joint or a dowel joint as being suitable for using at point A. A few candidates misunderstood the given information and took the wood as being circular in cross section rather than rectangular. Sketching was generally of a good standard.

While in part **(b)(ii)** some candidates clearly communicated how the joint they had identified in part **(i)** would be made many did little more than draw tools and make simplistic statements such as 'you would use a saw'. In their responses to questions of this type candidates should use a series of annotated sketches to describe clearly stage by stage how the required joint would be made. It is not sufficient to just list and/or draw the tools etc. The candidate must explain how the tools would be used.

Part **(c)** of the question was generally well answered with many candidates describing how a nut and bolt or a rivet could be used at pivot points B and C. The quality of sketching was good and a number of excellent exploded views were seen. A number of candidates produced several drawings that gave the same information but in a different form. For example drawing both a 2D and 3D view showing how the two parts could be joined. In most of these situations full marks were awarded for just one of the drawings.

Some excellent answers were seen to part **(d)** which clearly communicated how several notches could be cut in one piece allowing the other piece to slot in order to make the chair adjustable. A number of other more complex adjustable systems were seen. These gained credit if the proposed design was a workable solution.

### Question 8

This was the least popular question in this section. The responses to part **(a)** were very mixed. Some candidates demonstrated that they clearly understood what corrugated cardboard was like by drawing two flat outer boards and the corrugated inner section. Others failed to answer this part of the question or showed the material as a solid section. Part **(b)** of the question had three marks available. While a good number of candidates stated that corrugated cardboard was stronger than card and gained one mark few went on to explain why it was stronger and failed to gain access to the other two available marks.

A number of candidates failed to answer part **(c)** of the question and few correct answers such as screenprinting were seen.

The answers to part **(d)** were very mixed with some candidates clearly showing what the required developments (nets) would be like while others just drew a single surface frequently without any fold lines. In part **(i)** the correct development (net) needed to consist of the outside shape, two fold lines and two slots for the wedges. In part **(ii)** the correct development (net) needed to consist of the outside shape, four fold lines and four slots for part **A** to slot in.

For their answers to part **(e)** some candidates did little more than copy (or in a few cases trace) the given view of the assembled chair. A number incorrectly introduced additional pieces of corrugated card into their drawings. The better responses were those that used three or four 3D annotated sketches that showed how the two main pieces were folded and slotted together. Including at least one exploded view further enhanced the explanation.

## **Section C**

### **Question 9**

While in part **(a)** many candidates correctly stated that the feature at X made it easier to remove the cassette tape and gained one mark, fewer explained why it was easier to remove and therefore failed to gain access to the second available mark.

In part **(b)** the majority of candidates correctly identified the bar code and went on to explain that it identified the product for pricing and stocktaking. While many candidates linked the second symbol to recycling, fewer candidates gained both marks by explaining that the product contained 40% of recycled materials.

Very few correct answers were seen to part **(c)**. Many candidates thought that ultraviolet lacquer would prevent the tape from being damaged by ultraviolet rays from the sun. Correct answers needed to explain that the application of the lacquer protected the card by giving it a very smooth, high gloss finish.

Candidates were given in part **(e)** criteria against which to discuss the advantages and disadvantages of the four methods of packaging. A good number of candidates just listed the advantages and disadvantages often in very simplistic terms such as 'this design is not very durable'. Only a limited number of candidates offered any real discussion or used any evidence to support their conclusions.

### **Question 10**

This was the least popular question in this section.

Most candidates correctly answered part **(a)** by naming injection moulding as the industrial process that would be used to manufacture design A. Part **(b)** was very poorly answered with very few candidates correctly explaining that a modular system consisted of a number of similar units which could be joined together to form a large storage unit.

In part **(c)** many candidates related their answers to inappropriate issues such as rounding the corners. Answers needed to focus on the fact that in order to market the product as a 'stackable unit' the manufacturer would need to make sure the design included a way of fixing the individual units together so that they were stable.

Some candidates misread the information given in part **(d)** and thought that each drawer had to hold 120 CDs. Most candidates did, however, get at least some of the sizes correct and were able to explain how they had determined the dimensions.

In part **(e)(i)** the majority were able to display at least some understanding of the term 'mahogany effect'. They explained with varying degrees of detail how veneers, laminates and stains could be used to create the appearance of mahogany using cheaper materials such as MDF.

While in part **(e)(ii)** a good number of candidates were able to identify advantages and disadvantages to the manufacturer of using the two types of material, few offered any real level of discussion or used evidence to support their statements.

### **Question 11**

Part **(a)** was well answered with the vast majority of candidates correctly explaining that a surface finish should be applied to mild steel to prevent it rusting and to improve its appearance.

In part **(b)(i)** a good number of candidates failed to fully explain that 'plastic coating' was the process of applying powdered plastic to hot metal in a fluidising tank.

Parts **(b)(ii)** and **(b)(iii)** were generally very well answered with galvanising and varnish being among the most popular correct answers. Candidates were given in part **(c)** criteria against which to discuss the advantages and disadvantages of using paint or plastic coating on the metal frame. Many candidates gained a few marks for correctly identifying appropriate advantages and disadvantages but many failed to offer any real level of discussion of the issues they had raised or used evidence to support their statements.

In part **(d)(i)** a reasonable number of candidates showed some understanding of the term by explaining that 'knock down fittings' were temporary joints frequently used in the manufacture of flat pack furniture. The most common correct answer given as an advantage in (d)(ii) was that the product could be dismantled for easy storage or transportation. Fewer candidates gave an appropriate disadvantage such as the fitting could become loose or damaged if it was assembled and disassembled a large number of times.

Part **(c)** was frequently well answered with the majority of candidates explaining at least one appropriate reason for using the inserts. The most common answers were that the insert would make the hurdle safer to use and prevent water or other items getting inside the tube.

# DESIGN AND TECHNOLOGY

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**Paper 9705/02**  
**Coursework Project 1**

## General comments

A wide variety of design problems was taken on by candidates and it was obvious that many had developed a keen interest in the area being studied. In addition to the usual range of household items and furniture, interesting outcomes included: coin sorter; river bridge; point of sale display; graduation outfit; outdoor entertainment area; car sound system; portable goal; cornice mould; banknote counter; school lockers; gas bottle carrier; well water collector; tree stand water purification system; golf cart; sailboard car rack; animal tracking chair and models of interesting buildings.

The Moderator would like to thank Centres for encouraging their candidates to present design folders neatly and in such an order that the design process can be followed. It is also helpful when the photographic evidence of either the model or final product is included at the appropriate part of the design folder.

## Comments on Individual Assessment Criteria

### **1. Identification of a Need or Opportunity leading to a Design Brief**

Most candidates are now considering both the situation and user, leading to the production of a clear design brief such that the reader is in no doubt as to the design problem being pursued.

### **2. Analysis of and Research into the Design Brief which results in a Specification**

Unfortunately, some Centres continue to allow their candidates to include vast amounts of information on materials, constructions, finishes and fittings, in this section, before any design ideas have been considered. Inclusion of this type of material together with, for example, historical records of the area being studied cannot be awarded marks.

This section should give a clear indication that the candidate has made a full analysis of the design brief, leading to research into possible areas that might have an impact on the final product. Candidates are now considering existing products in a meaningful way and commenting on possible links to their own design problem. In general terms, if a candidate has not been able to comment on the material being included and linking it to the problem, then it is likely to be of little relevance and, as such, cannot be marked positively.

All data and information gathered should then be the basis for the development of a clear product Specification that links precisely to the problem being solved.

### **3. Generation and Appraisal of Design Ideas**

Many candidates for this examination are beginning to show a high degree of flair in the creation of ideas and this is to be applauded. However, others present a range of drawings but do not link these to the Specification or even comment on possible suitability for the problem being considered.

It is important that a wide range of different ideas is presented and considered with some form of written appraisal alongside each. Where ideas have touched on aspects of the Specification then these should be highlighted in some way.

Candidates should avoid presenting a selection of ideas all based on a single concept as this approach cannot be awarded high marks at this level of examination.

Many candidates should be congratulated on the range and high standard of communication techniques used in the presentation of design proposals. Where care is taken in this respect then it is easy to see how a candidate's thought process is developing.

#### **4. Modelling of Ideas**

Modelling should be seen as one stage of the consideration, testing and evaluation of design ideas so that a final design can be presented and subsequently developed. Some candidates produce high quality and meaningful models that form part of this process whereas others simply produce a mock up of the chosen design idea which is often close to the final product made as part of Project 2.

The Moderator would like to see more candidates modelling different aspects of their design ideas and using these to test for, perhaps, suitability and practicality in the production of a solution to their design problem. In this way the modelling stage would become more meaningful and play a real part in the design process.

There was some evidence of construction kits being used and this should be encouraged so long as the kit is appropriate to the idea(s) being considered.

# DESIGN AND TECHNOLOGY

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Paper 9705/03

Written

## General comments

The numbers of candidates taking this examination continued to grow this year. Centres are to be congratulated on their preparation of candidates for the written paper and the administration of scripts.

The vast majority of candidates followed the rubric correctly and made full use of the time available.

Some candidates however do not use their time effectively and lose marks by:

- spending far too long on *Section A* questions, leaving insufficient time to fully complete *Section B*;
- rushing *Section A*, giving very brief answers and accessing relatively low marks, to fully complete *Section B*;
- spending far too long on certain parts of *Section B*, e.g. some candidates complete two full pages of analysis and specification for a total of 10 marks.

Candidates are advised to spend 20 – 25 minutes on each question in *Section A* and at least 100 minutes on *Section B*.

The quality of sketching is mostly impressive and candidates are very well prepared to describe the stages of particular processes.

Candidates are reminded of the importance of reading each question carefully. A significant number missed the information given in the first line of **Question 2** and referred only to the design of a coffee table or a garden gate and did not include details of the selection of an appropriate surface finish.

In *Section A*, Part **A** was the most popular option with **Question 1** the most popular and even attempts at **Questions 2** and **3**. There was an even spread of responses in Part **C**.

Only a few candidates attempted questions in Part **B**.

In *Section B*, **Question 10** was the most popular and a large number attempted **Question 12**. Very few candidates attempted **Question 11**.

It would be helpful if this report is read in conjunction with a question paper and mark scheme.

## Comments on specific questions

*Section A*

*Part A – Product Design*

### **Question 1**

The most popular question, generally answered well. Many candidates stated acrylic as a suitable material for the holder because a high quality finish can be easily obtained and it is easy to form the required shape.

Many referred to its availability in a range of colours and the advantages of using a transparent material. Aluminium and pine were also popular choices although some candidates did not consider the thickness of the material when joining parts.



Candidates are reminded that a maximum of four well annotated sketches would be acceptable when answering this type of question.

Some candidates described processes such as injection moulding, which were not appropriate for a prototype holder.

Injection moulding using polypropylene or ABS was the most popular response for the manufacture of 10 000 holders for part (c). Many candidates described the process well but did not include features of the mould or possible design changes to access full marks.

## Question 2

Although there were some excellent, fully detailed answers to this question, a large number of candidates did not read the question carefully and ignored the reference to '*an appropriate surface finish*'.

The best answers included details such as:

- for an executive business suite coffee table – high quality material e.g. named hardwood, requiring polyurethane varnish to protect from coffee spills, in keeping with high quality interior décor;
- for an ornamental mild steel garden gate – details of outdoor conditions, colour implications and protective nature of finishes requiring a primer and/or appropriate paint such as Hammerite

Many candidates gave very brief responses to this question and did not access the full range of marks. It is important that 20 – 25 minutes are spent on presenting a fully detailed response.

## Question 3

This was a popular question, generally very well answered. Most candidates attempted to describe the processes of rotationally moulding the traffic cone and press forming the steel tray. The turned base using a face plate was the least popular.

Many candidates correctly described the process of rotational moulding, including details of inserting a measured amount of plastic powder into a split mould, the mould being turned bi-axially and heated to provide a hollow object with an even thickness of plastic.

Relatively few candidates described the turning process using a faceplate. Many described a turning between Centres method. Very few gave details of the specific wood turning tools such as gouges to shape the material.

The majority described the process of press forming using detailed sketches to show the male and female moulds, the holding and positioning of the stainless steel and the huge force required to form the shape.

Part (b) was not answered particularly well. Many candidates did not explain why the process is particularly suitable for the chosen item.

### *Part B – Practical Technology*

## Question 4

Only a few candidates attempted this question. Of those who did attempt, most were able to complete part (a), giving examples to describe each of the three classes of lever.

Most were able to explain energy efficiency for part (b) but a significant number did not use an example.

Part (c) was generally well answered.

## Question 5

This was the most popular question in Part B. Most candidates answered part (a) well although a large number wasted time by repeating the given example of aluminium.

Some candidates correctly referred to shape memory alloys, thermo-chromic plastics, medium density fibreboard and glass reinforced plastics using polyester resin as examples of new materials and explained their affect on the design of products.

### Question 6

There were very few attempts at this question. Most candidates who did attempt this question had a clear understanding of the concepts involved and their responses were fully detailed, achieving high marks.

#### *Part C – Graphic Products*

### Question 7

This was a popular question. Many responses were of a very high quality. Although most candidates had a clear understanding of how to produce a two-point perspective presentation drawing, a significant number presented pictorial sketches.

Rendering was excellent in some cases but a significant number did not render any part of their drawing.

### Question 8

Most candidates produced an accurate, detailed development of the wastepaper bin. Very few candidates completed the true shape of the lid.

Some candidates produced detailed drawings of a mechanism to open the lid when a pedal was depressed. Too many candidates did not consider the positioning of pivot points to produce sufficient movement to open the lid wide enough for use.

### Question 9

Most candidates completed the two orthographic views. Most used the correct scale and included full dimensions. A significant number missed the M12 threaded hole in View A.

Although most candidates had a good understanding of sectional and exploded drawings, a significant number either missed this part altogether or produced very brief answers.

#### *Section B*

This Section was answered well by the vast majority of candidates. Some candidates devoted too much time on this Section and did not do themselves justice on the questions in *Section A*.

A significant number of candidates did not complete a proposed solution and evaluation.

All candidates prepared their answers on A3 paper as instructed although some candidates presented their analysis, specification and evaluation in their A4 answer booklet.

All work for *Section B* must be on A3 sheets.

It is obvious that candidates were given clear guidance on how to approach the design question. Some responses were of an exceptionally high quality, indicating that candidates had been well prepared, allocating appropriate time to each section and using all of the time available.

Many candidates repeated the given problem in the analysis and specification and did not look at the wider issues involved. Some produced a full page of analysis and a full page of specification points. This is unnecessary for only 10 marks in total.

The best responses indicated at least 5 detailed points of analysis **relating to the given problem**, other than the main issues already given in the question. Too many generic, analysis outlines are produced. In a number of cases it was impossible to identify the question answered by looking at the analysis or specification

A number of candidates produce single words or generic statements e.g. 'environmentally friendly', for their analysis without any further qualification, and do not access marks.

A number of candidates produce a brief, which is not necessary.

Most candidates were able to produce a list of at least 5 **justified** specification points.

Each question provides initial specification points or data. Candidates are expected to produce a list of five other points. No marks are awarded for repeating given data. Generic terms such as 'safe to use' did not gain a mark, 'the mechanism must not allow fingers to get trapped when folding.' would gain credit.

For many candidates, the annotation of the exploration of ideas related solely to construction details. Notes should make specific reference to specification points.

The standard of the development of ideas section continues to improve. Candidates use notes and sketches to develop selected features, clearly showing the reasoning behind decisions. A number of candidates spend far too long producing a lengthy step by step procedure for manufacture. Candidates are expected to make clear the constructional details of ideas leading to a single design proposal.

Many proposed solutions included overall dimensions but did not include specific details such as the thickness of materials.

Evaluations tended to be charts giving ratings of performance for specification points. Candidates must make specific reference to their final proposal and state whether the proposal is fit for purpose, referring to specification points where necessary, and suggest improvements or modifications.

A more detailed breakdown of the assessment criteria for *Section B* is given in the Mark Scheme.

#### **Question 10**

The most popular question in *Section B* with a wide range of responses, many of them excellent. Most candidates used their time well and demonstrated excellent design thinking skills and very high quality presentation. Most candidates produced realistic solutions. A small number produced very minor modifications of the same idea and did not access all of the marks available for range of ideas.

Some candidates misinterpreted the question and redesigned a chair.

#### **Question 11**

Very few candidates attempted this question. Most attempts were very detailed and gave interesting ideas for models to demonstrate mechanical principles.

#### **Question 12**

This was a popular question. Some responses were outstanding, showing a detailed understanding of the use of developments to produce a working container, the ranges of card available and appropriate printing methods. A significant number however produced outline sketches of containers and made very little reference to the requirement to make the container from one sheet of A3 card, which required evidence of appropriate nets. Many candidates included details of appropriate fixing methods but in a significant number of instances, constructional details included printing and assembly methods were lacking.

# DESIGN AND TECHNOLOGY

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<p><b>Paper 9705/04</b> <b>Coursework Project 2</b></p>
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## General comments

See the general comments under 9705/02.

## Comments on Individual Assessment Criteria

### Coursework Project 2

#### 5. Product Development

This is a very important stage of the design process where candidates should take the final design idea from Project 1 and then consider all aspects of form, materials, components, constructions, finish and production methods in detail. All information should be linked to the chosen idea and where alternatives have been considered and choices made, justification should be given.

There should also be clear evidence of testing and/or trialling of, for example, materials, shaping or constructions. Many folders simply include tables of different materials and constructions which bear no relevance to the design being developed. This approach cannot be considered for the award of marks and it is, in fact, just a waste of time and space.

In many projects it is not clear why selections have been made and there is often a big gap between the chosen design idea and the final product made. Once these decisions have been made, the final part of the development should include details of the final solution, mainly in the form of drawings, from which a skilled person could make the product.

#### 6. Product Planning

There has been a noticeable improvement in this section of design folders, and examples of 'planning' being produced after the product has been made are fewer in number. Most candidates are able to set out the sequence for the main stages of production and this is often produced in flow chart or tabular form linked to some form of time plan.

There is no requirement for candidates to include photographic evidence of all stages of manufacture as this is taking place although photographs can sometimes be included to highlight certain aspects of the manufacturing process.

#### 7. Product Realisation

Many candidates produced high quality products that could clearly be put to their intended use. These were normally constructed with continued use in mind and most were complete in all aspects of construction and finish. Candidates should be congratulated on the care and enthusiasm put into the making of their design outcomes and it is reassuring to see that many well developed practical skills are being put to good use.

Centres are reminded of the need to include clear and detailed photographic evidence of made products in line with the guidance set out in the syllabus document. Many candidates include photographs of the product in use and this is helpful to the Moderator. On no account should Centres attempt to send models or final made products to CIE for moderation purposes.

## **8. Testing and Evaluation**

Again, the Moderator is pleased to report that more candidates are carrying out meaningful testing and evaluation. This can only be achieved if the product is put to the use intended and the results compared to the original design specification. It is always helpful when candidates include photographs of the product being tested in this way.

Unfortunately some candidates still see the completion of questionnaires and the unqualified views of others as the only evidence required. However, this type of data is only of any use where the results can be compared to the intended use of the product and some form of qualified judgement made and recorded.