

DESIGN AND TECHNOLOGY

Paper 9705/11

Written 1

General Comments

The performance of candidates displayed a full range of ability. The better answers were from those candidates who considered how many marks were available for each part of the question and produced responses which contained sufficient detail and information to give them full access to all of the marks available. Candidates are advised to read questions carefully before starting their answers, so that their responses address what is asked for in the question. Some of the responses were too short while others were too long. In some cases, candidates displayed only a limited knowledge and understanding of the subject matter required to respond correctly to the questions they had chosen to answer.

Candidates need to make sure that their answers are focused on the question being asked and that their responses are concise and display appropriate subject specific knowledge and understanding.

While the majority of candidates responded to all parts of the three questions they had chosen to answer, time management proved a problem for some. This particularly applied to **Section C**.

Some repetition was evident in candidates' answers to questions in all sections of the paper. Some drew the same thing more than once, for example a design would be drawn as a three-dimensional view and then repeated using a two-dimensional view that showed no more detail than the first drawing. Similarly, in written responses, some candidates repeated the same point two or more times using slightly different words.

Section A

The better answers in this section were those that used a sequence of three or four annotated sketches to describe clearly, step by step, how the appropriate tools, equipment and processes could be used safely to achieve the required results. Rather than just drawing or listing the tools, candidates also need to show and describe their use. The quality of sketching was generally good. Lots of continuous text should be avoided when answering questions in this section of the paper.

Question 1

This was the most popular question in this section of the paper.

Part **(a)** of the question was generally answered very well. The majority of candidates named a suitable sheet material for making part **A** of the shovel. The most common correct answers were aluminium, stainless steel and mild steel. In a few cases, inappropriate materials such as MDF were suggested.

Suitable reasons for choice included the material could resist heat and, in the case of stainless steel or aluminium, would be reasonably easy to clean. General reasons such as 'the material is readily available' or 'the material is easy to work' are not appropriate and do not gain credit. Candidates can improve by making sure that the reasons they give relate to the specific situation given in the question.

Part **(b)(i)** required candidates to use notes and sketches to describe how a template could be made and used to help mark out the shape required to make part **A**. Most candidates understood what a template was and were able to describe at least some of the stages required to make and use it. Others described only how to make the template or how to use it rather than both processes.

In part **(b)(ii)** almost all candidates showed some understanding about how part **A** could be cut out using a saw or tin snips and went on to describe how files and abrasive paper could be used to smooth the edges of the material. Others suggested methods that were not totally appropriate. For example, some candidates suggested the use on an angle grinder. This would not be the safest or most accurate method of carrying

out the process. Some inappropriate terminology was seen, for example hacksaws called coping saws and files called chisels. Candidates need to make sure that they select tools and equipment which are appropriate for the process they are describing and the material that is being used.

Some good answers were seen to part **(b)(iii)**, particularly where candidates had identified riveting as being a suitable method for joining parts **A** and **B** together. Welding was another appropriate method that was frequently suggested. Weaker answers did not describe the actual process in sufficient detail, and in a few cases, candidates just named a method.

Question 2

The majority of candidates answered part **(a)** well. Acrylic was the most popular correct answer to part **(i)** and pine to part **(ii)**.

Part **(b)(i)** required candidates to use notes and sketches to describe how a jig could be made and used to help bend the sheet plastic. A good number of candidates understood what a jig was and were able to describe at least some of the stages required to make and use it. Others described only how to make the jig or how to use it rather than both processes.

The better answers to part **(b)(ii)** were those where candidates had identified the use of a plough plane or a router as being the best way to make the grooves in the frame. Inappropriate methods such as the use of circular saws and chiselling out the grooves were often given. Candidates need to make sure that they select tools and equipment which are appropriate for the process they are describing and the material that is being used.

Some very good answers were seen to part **(b)(iii)** with the vast majority of candidates suggesting an appropriate way of joining parts **A** and **B** together. The most common answers were using a mortise and tenon joint or screws. The better answers described stage by stage how the joining process they had identified would be carried out. They gave details about how appropriate tools and equipment would be used and the safety precautions that had to be undertaken at each stage. Weaker answers did not describe the actual process in sufficient detail, and in a few cases, candidates just named a method.

Question 3

Some very good answers were seen to part **(a)**. Many candidates sketched, or drew, to an appropriate scale the development (net) which would make the folder. Correct answers showed the bottom and back, the two sides, the front, the top and the fold over flap and at least two glue tabs.

The better answers to part **(b)** correctly suggested that a flexible plastic such as polystyrene could be used to make the handle. Acrylic was frequently suggested, but this is a brittle material and not totally suitable for this situation.

In part **(b)(i)** candidates had to describe how the handle could be cut out. Appropriate responses described how tools and equipment such as a craft knife or a scroll saw could be used to carry out the cutting process. Some of the tools that were often suggested, such as hacksaws, would not be totally suitable for cutting 1 mm thick plastic.

A good number of candidates correctly identified in **(b)(ii)** that slots would need to be cut in the top of the folder to accommodate the handle and to allow it to fold flat when not in use. Better answers went on to describe how the slots would be made.

A good range of appropriate methods that would keep the folder securely closed were seen. These included the use of slots and tabs, magnets and Velcro. The better answers went on to describe, stage by stage, the process of making the slots and tabs or attaching the magnets or Velcro. Weaker answers did not describe the actual process in sufficient detail, and in a few cases, candidates just named a method.

Section B

The questions in this section of the paper require candidates to analyse situations and products, identify problems, resolve problems and discuss issues related to the design, manufacture, use and disposals of products.

Parts **(a)**, **(b)** and **(c)** of the questions in this section of the paper were generally well answered by the majority of candidates. While more candidates made use of the structure and mark allocation given in part **(d)** than in previous years some answers have insufficient levels of 'discussion'.

In part **(d)** candidates need to identify clearly relevant issues, discuss why they are important and be able to support their arguments and reasoning using appropriate examples and evidence. It is important that these issues are specific to the given situations and requirements of the question.

Repetition was seen in some candidates' answers particularly in part **(d)** of the questions, where the same information was often given using slightly different words.

In a few cases, candidates did not attempt to complete part **(d)** of the question that they had chosen to answer in this section of the paper.

Question 4

A good number of answers to part **(a)** correctly showed how the tab on the bottom of the information board could be inserted into the slot in the back of the container. Some responses suggested inappropriate methods such as the use of glue, screws or staples. Candidates could improve their performance by studying the given information more carefully.

In part **(b)** the majority of candidates were able to describe at least one problem with the design of the container. Problems needed to be distinctly different and to relate to factors such as bags falling or blowing out of the container and the container being low down on the ground. It is important that candidates do not just 'identify' problems; they should go on to describe 'why' it is a problem. For example: 'Bags could easily fall out of the container because'. Some candidates described the same problem twice using slightly different words.

The better answers to part **(c)** made full and effective use of sketches to aid their explanations of how the problems could be overcome. Brief answers such as 'You would add a top' were sometimes seen. In order to gain high marks answers such as this needed to go on to explain how the top could be added or why this would overcome the problem.

Part **(d)** required candidates to 'Discuss how and why manufactures and retailers are reducing the amount of packaging they use'. In part **(i)** the better answers had analysed the given situation and identified issues such as reducing costs, creating less waste, conserving resources and materials. These answers went on in part **(ii)** to explain why these issues were relevant and to discuss how and why manufactures and retailers are reducing the amount of packaging they use. In order to gain high marks statements need to be justified and/or explained by making more use of words like 'because'. For example: 'Manufactures and retailers can reduce costs by using less packaging; this is relevant because'. 'Examples of how they do this are

A number of candidates focused their responses to part **(d)** on the use of carrier bags and the problems they could cause.

Question 5

Part **(a)** was answered very well by a good number of the candidates who chose to answer this question. They showed a clear understand of what the male and female formers required to make the tray would look like.

In part **(b)** most candidates described at least one problem with the design of the tray. These needed to relate to the tray being hard to pick up and things being able to slide off the ends. Candidates need to understand that in order to gain both of the marks available they need to identify and explain the problem. For example: 'It would be difficult to pick the tray up because the two cut-outs are on the bottom making it hard to get your hands in'.

The better answers to part **(c)** made good use of sketches to show how the design would be changed by adding ends to the tray and changing the position of the hand holes to make it more accessible. Candidates can improve the number of marks they gain by showing an appropriate change to the given design and explaining how it overcomes the problem.

In part **(d)** candidates were asked to discuss the merits of using formers and jigs when batch producing products. Candidates who had made use of the structure and mark allocation given in the question generally produced good responses. Answers needed to show that a candidate had analysed the given situation and identified issues such as reduced production costs and uniformity of the final products. Discussion then had to take place to explain why these issues were important which then had to lead onto justified conclusions being made about the merits of using formers and jigs. Some candidates restricted their responses to the manufacture of the tray rather than the broader use of formers and jigs in manufacturing.

Question 6

This proved to be by far the most popular question in this section of the paper.

Part **(a)** was answered very well by the vast majority of candidates who clearly identified that the feature shown at X was a rubber or plastic 'foot'. The foot protected surfaces and people from the sharp edges of the aluminium and also prevented the ladder slipping on smooth surfaces.

In part **(b)** the majority of candidates were able to describe at least one problem with the design of the folding wooden platform steps. These needed to relate to a lack of stability, the steps easily collapsing and nothing holding the back legs together. As with other questions in this section candidates need to understand that in order to gain both of the available marks they have to 'describe' the problem rather than just 'state' what the problem is. For example statements such as 'The steps are not stable' need to be followed by a description of why they were not stable, for example 'because the back legs are not joined together'. Some candidates incorrectly tried to suggest that design B needed to include some of the features included in the other two designs, for example adding the rubber feet shown in design C.

Some excellent answers were seen to part **(c)** with many candidates using high quality sketches to show appropriate ways in which the design would need to be improved. These included the use of metal stays or rope to join the front and rear sets of legs together. This improved both the stability of the steps and aided the required folding aspect of the design. Additional pieces were frequently added to join the two rear legs together.

Part **(d)** required candidates to 'Discuss what a designer would need to consider when selecting materials for a step ladder in order to ensure that they were suitable for the purpose'. The better answers came from candidates that had focused their responses around this requirement while also making use of the structure and mark allocations given in the question. In part **(i)** candidates needed to identify relevant issues such as the strength and durability of the material and its weight. Candidates needed to explain and justify why the issues were relevant in part **(ii)**. For example: 'The material would need to be light weight so that a person could easily carry the steps'. In part **(iii)** candidates need to understand that they should use specific examples and/or evidence to support their arguments and/or conclusions. An example of this could be 'Aluminium is a material that is often used in the manufacture of step ladders. It is particularly suitable for this purpose because.....'

Candidates should understand that part **(iii)** must be based around, and make reference to, the issues identified and justified in parts **(i)** and **(ii)**.

A few candidates limited their response to a description of the three step ladder designs. This restricted the number of marks available to them.

Section C

Some excellent design work and presentation drawings were seen in this section of the paper.

The better answers showed the use of quick free flowing sketches to produce around three distinctly different ideas for all or part of the product that was being designed in each part of the question. Candidates should note that it is not necessary to spend a long time producing very neat drawings of their initial ideas.

Some of the weaker responses presented only one idea or produced several drawings that gave the same information but in a different form, for example both a 2D view and a 3D view showing exactly the same design idea.

The better evaluations were those that used concise notes to identify clearly the strengths and weaknesses of designs. They included justified choices including which design or parts of a design to carry forward to the development stage.

Candidates need to understand that ideas need to be evaluated in a meaningful way. For example it is questionable how ideas can be evaluated by an 'expert' in an examination situation but this was seen in a number of papers. Evaluation tables with 'star' or 'number' ratings were much in evidence. While these can be used to good effect, their value lies in the use of headings appropriate to an examination situation and an indication about what the stars or numbers mean. It must be more than 'excellent, good or poor'. Some candidates did not attempt to evaluate their ideas. Development should be seen as more than re-drawing one of the initial ideas better. It should bring together, and possibly improve, the best parts of a candidate's earlier design thinking into a proposed solution. Candidates need to understand that they do not have to develop each one of their initial ideas. As part of the development process, basic details about materials, joining methods and important sizes should be given. Candidates are not required to explain stage by stage how their chosen design would be made.

In part (e) candidates were required to produce a rendered pictorial drawing of the complete product that they had designed. Candidates can produce this drawing with the aid of drawing equipment or as a high-quality freehand sketch. Candidates should understand that rendering involves more than 'colouring in'. It should use colour, tonal shading and texture to enhance the three-dimensional appearance of a drawing and to represent the material from which the product is made. Some inappropriate multi-coloured 'colouring in' was seen.

Time management was an issue for some candidates, leaving them insufficient time to complete part (e).

Question 7

This proved to be by far the most popular question in this section of the paper.

A number of excellent designs were seen in part (a) which showed how the sides of the desk could be continued to form part of a seat and back rest. The better solutions were those where candidates had continued the sides to form a side frame to which a seat and back rest could be attached. Some ideas were too complex some of which would have been difficult and expensive to produce. An example of this was where candidates had designed an upholstered chair which was then attempted to attach to the desk.

Part (b) required a design that allowed the top of the desk to be adjusted and fixed at different angles. Some excellent solutions were seen to this problem. The better designs included both hinge mechanisms and locking devices, features that were frequently missing from some of the weaker responses. Over complex solutions were again in evidence some of which would not have been safe for children to use.

In part (c) candidates were required to design a drawer to go under the desk. The vast majority of candidates produced appropriate ideas for the sides and base of a drawer but sometimes did not include details about where the drawer would go and/or how the runners on which the drawer would slide in and out could be attached to the desk. The positioning of some of the proposed solutions would have interfered with the use of the design the candidate had produced in part (d).

The better designs produced in part (d) were those where the candidate had considered the type of equipment that the detachable storage tray would need to hold as well as the outer shape of the tray. Effective ways of attaching the tray to the desk while still allowing it to be easily removed were much in evidence. These included various types of hook and the use of wing nuts. However the attachment and/or positioning of the tray were sometimes not fully taken into account. Some fixing methods required the use of additional equipment such as a screwdriver or spanner making the attachment or removal of the tray more difficult. Trays were sometimes shown in positions where they were not easy to access or where equipment would have fallen out of them when the desk top was tilted.

A good number of excellent drawings were seen in part (e). The better responses had drawings that clearly showed all of the features designed by the candidate in the earlier parts of the question. Rendering had often been used to good effect. In some cases rendering had not been attempted.

Some of the weaker answers did not show all of the required features. A number of 'multi coloured' drawings were seen, where a different colour had been used for each part of the desk. A few candidates had not followed the drawing given on the question sheet.

Question 8

In part **(a)** of the question candidates were required to design a holder to support the CD case. The better answers were those from candidates who produced designs, made from card, that would support the CD case, go into the slots, shown in the given drawing, and lock in place. The weaker responses only met some of these requirements. The most common errors were the use of materials other than card, not making use of the given slots and permanently attaching the holder to the display stand.

Good answers were seen to part **(b)** of the question. These showed the use of a rotating disc or a container attached to the back of the board which held numbered cards that could be changed. Both of these methods, or variations of them, would allow the numbers to be seen through the hole in the stand and to be easily changed.

The majority of answers to part **(c)** showed some form of support for the stand. The better designs showed how the support would be attached to the stand, how the stand would lock in place and how the support would allow the stand to slope back slightly in order to prevent it falling over.

The weaker responses did not include all of these features. Very few designs included an effective locking system.

In part **(d)** almost all candidates showed some ideas for the lettering. The quality of the ideas was very varied with a good number of inappropriate lettering styles being seen. The better responses showed ideas for all of the lettering and where it would be positioned on the display stand.

The weaker responses often showed design for only a few letters and gave little or no consideration for how it would be laid out on the display board.

Only a limited number of good answers were seen to part **(e)** of the question. While most candidates produced a pictorial drawing of their completed design fewer produced the required exploded pictorial view.

The better answers showed all of the features that the candidate had designed in the earlier parts of the question. Colour was used with varying degrees of success.

Some of the weaker answers did not show all of required features. A number of 'multi coloured' drawings were seen, where a different colour had been used for each part of the display stand. Lettering was often not drawn at the same angle as the rest of the pictorial view. Some candidates did not make use of colour/rendering on their drawings.

Question 9

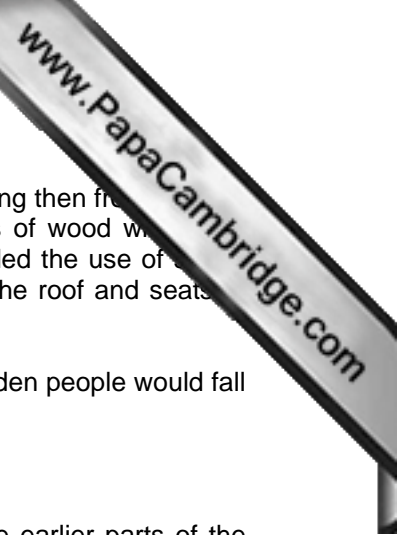
In part **(a)** most candidates understood that some form of bevel gear was required to make the roundabout rotate when the shaft was turned and produced ideas based around this type of mechanism. The better answers included ways in which the mechanism could be simplified making it more suitable for use in a toy and easier to manufacture.

Weaker responses often showed over complex designs that would not work fully.

There were some good answers to part **(b)** which showed various types of handles which could be used to rotate the shaft. The better responses showed how the shaft could be prevented from being pulled out of the base by using various components such as pegs, washers and clips. The handles had been ergonomically designed or covered in a material such as rubber in order to make them more comfortable for a child to use.

Weaker responses often only addressed the 'handle' aspect of the design and did not show how the shaft would be prevented from being pulled out of the base.

Part **(c)** saw some good ideas produced for the cylindrical base with see-through sides. The majority of the better designs showed how materials such as transparent acrylic could be used for the side of the cylinder and MDF for the top and bottom.



Most candidates made at least some attempt to design seats and a method of suspending them from the roof of the roundabout. The better seat designs were frequently based on simple blocks of wood with holes drilled in them for the wooden person to fit in. Successful suspension methods included the use of wire, rods or fishing line to attach the parts together. Holes or slots were shown to the roof and seats were shown to allow the seats to swing out when the roundabout rotated.

Weaker solutions often showed over complex designs for the seats from which the wooden people would fall as the roundabout rotated.

There were some good drawings seen in part (e).

The better answers showed all of the features that the candidate had designed in the earlier parts of the question. Colour had been used with varying degrees of success.

Some of the weaker answers did not show all of required features. Some candidates did not make use of colour/rendering on their drawing.

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Section A

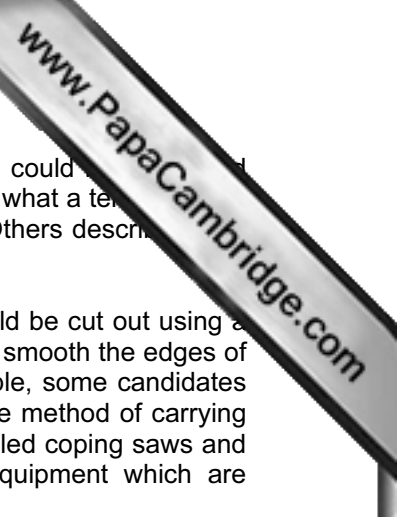
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Suitable reasons for choice included the material could resist heat and, in the case of stainless steel or aluminium, would be reasonably easy to clean. General reasons such as 'the material is readily available' or 'the material is easy to work' are not appropriate and do not gain credit. Candidates can improve by making sure that the reasons they give relate to the specific situation given in the question.



Part **(b)(i)** required candidates to use notes and sketches to describe how a template could be made and used to help mark out the shape required to make part **A**. Most candidates understood what a template was and were able to describe at least some of the stages required to make and use it. Others described only how to make the template or how to use it rather than both processes.

In part **(b)(ii)** almost all candidates showed some understanding about how part **A** could be cut out using a hand saw or tin snips and went on to describe how files and abrasive paper could be used to smooth the edges of the material. Others suggested methods that were not totally appropriate. For example, some candidates suggested the use of an angle grinder. This would not be the safest or most accurate method of carrying out the process. Some inappropriate terminology was seen, for example hacksaws called coping saws and files called chisels. Candidates need to make sure that they select tools and equipment which are appropriate for the process they are describing and the material that is being used.

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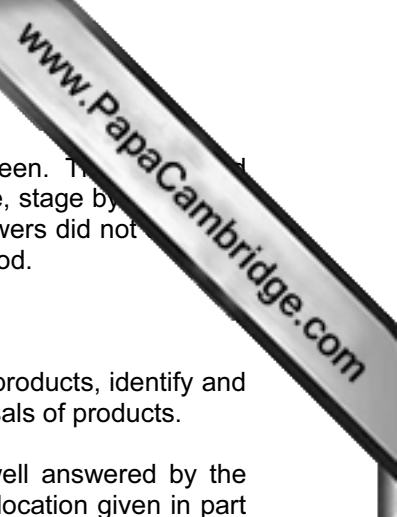
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This proved to be by far the most popular question in this section of the paper.

Part (a) was answered very well by the vast majority of candidates who clearly identified that the feature shown at X was a rubber or plastic 'foot'. The foot protected surfaces and people from the sharp edges of the aluminium and also prevented the ladder slipping on smooth surfaces.

In part (b) the majority of candidates were able to describe at least one problem with the design of the folding wooden platform steps. These needed to relate to a lack of stability, the steps easily collapsing and nothing holding the back legs together. As with other questions in this section candidates need to understand that in order to gain both of the available marks they have to 'describe' the problem rather than just 'state' what the problem is. For example statements such as 'The steps are not stable' need to be followed by a description of why they were not stable, for example 'because the back legs are not joined together'. Some candidates incorrectly tried to suggest that design B needed to include some of the features included in the other two designs, for example adding the rubber feet shown in design C.

Some excellent answers were seen to part (c) with many candidates using high quality sketches to show appropriate ways in which the design would need to be improved. These included the use of metal stays or rope to join the front and rear sets of legs together. This improved both the stability of the steps and aided the required folding aspect of the design. Additional pieces were frequently added to join the two rear legs together.

Part (d) required candidates to 'Discuss what a designer would need to consider when selecting materials for a step ladder in order to ensure that they were suitable for the purpose'. The better answers came from candidates that had focused their responses around this requirement while also making use of the structure and mark allocations given in the question. In part (i) candidates needed to identify relevant issues such as the strength and durability of the material and its weight. Candidates needed to explain and justify why the issues were relevant in part (ii). For example: 'The material would need to be light weight so that a person could easily carry the steps'. In part (iii) candidates need to understand that they should use specific examples and/or evidence to support their arguments and/or conclusions. An example of this could be 'Aluminium is a material that is often used in the manufacture of step ladders. It is particularly suitable for this purpose because.....'

Candidates should understand that part (iii) must be based around, and make reference to, the issues identified and justified in parts (i) and (ii).

A few candidates limited their response to a description of the three step ladder designs. This reduced the number of marks available to them.

Section C

Some excellent design work and presentation drawings were seen in this section of the paper.

The better answers showed the use of quick free flowing sketches to produce around three distinctly different ideas for all or part of the product that was being designed in each part of the question. Candidates should note that it is not necessary to spend a long time producing very neat drawings of their initial ideas.

Some of the weaker responses presented only one idea or produced several drawings that gave the same information but in a different form, for example both a 2D view and a 3D view showing exactly the same design idea.

The better evaluations were those that used concise notes to identify clearly the strengths and weaknesses of designs. They included justified choices including which design or parts of a design to carry forward to the development stage.

Candidates need to understand that ideas need to be evaluated in a meaningful way. For example it is questionable how ideas can be evaluated by an 'expert' in an examination situation but this was seen in a number of papers. Evaluation tables with 'star' or 'number' ratings were much in evidence. While these can be used to good effect, their value lies in the use of headings appropriate to an examination situation and an indication about what the stars or numbers mean. It must be more than 'excellent, good or poor'. Some candidates did not attempt to evaluate their ideas. Development should be seen as more than re-drawing one of the initial ideas better. It should bring together, and possibly improve, the best parts of a candidate's earlier design thinking into a proposed solution. Candidates need to understand that they do not have to develop each one of their initial ideas. As part of the development process, basic details about materials, joining methods and important sizes should be given. Candidates are not required to explain stage by stage how their chosen design would be made.

In part (e) candidates were required to produce a rendered pictorial drawing of the complete product that they had designed. Candidates can produce this drawing with the aid of drawing equipment or as a high-quality freehand sketch. Candidates should understand that rendering involves more than 'colouring in'. It should use colour, tonal shading and texture to enhance the three-dimensional appearance of a drawing and to represent the material from which the product is made. Some inappropriate multi-coloured 'colouring in' was seen.

Time management was an issue for some candidates, leaving them insufficient time to complete part (e).

Question 7

This proved to be by far the most popular question in this section of the paper.

A number of excellent designs were seen in part (a) which showed how the sides of the desk could be continued to form part of a seat and back rest. The better solutions were those where candidates had continued the sides to form a side frame to which a seat and back rest could be attached. Some ideas were too complex some of which would have been difficult and expensive to produce. An example of this was where candidates had designed an upholstered chair which was then attempted to attach to the desk.

Part (b) required a design that allowed the top of the desk to be adjusted and fixed at different angles. Some excellent solutions were seen to this problem. The better designs included both hinge mechanisms and locking devices, features that were frequently missing from some of the weaker responses. Over complex solutions were again in evidence some of which would not have been safe for children to use.

In part **(c)** candidates were required to design a drawer to go under the desk. The vast majority of candidates produced appropriate ideas for the sides and base of a drawer but sometimes did not provide details about where the drawer would go and/or how the runners on which the drawer would slide in the desk could be attached to the desk. The positioning of some of the proposed solutions would have interfered with the use of the design the candidate had produced in part **(d)**.

The better designs produced in part **(d)** were those where the candidate had considered the type of equipment that the detachable storage tray would need to hold as well as the outer shape of the tray. Effective ways of attaching the tray to the desk while still allowing it to be easily removed were much in evidence. These included various types of hook and the use of wing nuts. However the attachment and/or positioning of the tray were sometimes not fully taken into account. Some fixing methods required the use of additional equipment such as a screwdriver or spanner making the attachment or removal of the tray more difficult. Trays were sometimes shown in positions where they were not easy to access or where equipment would have fallen out of them when the desk top was tilted.

A good number of excellent drawings were seen in part **(e)**. The better responses had drawings that clearly showed all of the features designed by the candidate in the earlier parts of the question. Rendering had often been used to good effect. In some cases rendering had not been attempted.

Some of the weaker answers did not show all of the required features. A number of 'multi coloured' drawings were seen, where a different colour had been used for each part of the desk. A few candidates had traced the drawing given on the question sheet.

Question 8

In part **(a)** of the question candidates were required to design a holder to support the CD case. The better answers were those from candidates who produced designs, made from card, that would support the CD case, go into the slots, shown in the given drawing, and lock in place. The weaker responses only met some of these requirements. The most common errors were the use of materials other than card, not making use of the given slots and permanently attaching the holder to the display stand.

Good answers were seen to part **(b)** of the question. These showed the use of a rotating disc or a container attached to the back of the board which held numbered cards that could be changed. Both of these methods, or variations of them, would allow the numbers to be seen through the hole in the stand and to be easily changed.

The majority of answers to part **(c)** showed some form of support for the stand. The better designs showed how the support would be attached to the stand, how the stand would lock in place and how the support would allow the stand to slope back slightly in order to prevent it falling over.

The weaker responses did not include all of these features. Very few designs included an effective locking system.

In part **(d)** almost all candidates showed some ideas for the lettering. The quality of the ideas was very varied with a good number of inappropriate lettering styles being seen. The better responses showed ideas for all of the lettering and where it would be positioned on the display stand.

The weaker responses often showed design for only a few letters and gave little or no consideration for how it would be laid out on the display board.

Only a limited number of good answers were seen to part **(e)** of the question. While most candidates produced a pictorial drawing of their completed design fewer produced the required exploded pictorial view.

The better answers showed all of the features that the candidate had designed in the earlier parts of the question. Colour was used with varying degrees of success.

Some of the weaker answers did not show all of required features. A number of 'multi coloured' drawings were seen, where a different colour had been used for each part of the display stand. Lettering was often not drawn at the same angle as the rest of the pictorial view. Some candidates did not make use of colour/rendering on their drawings.

Question 9

In part **(a)** most candidates understood that some form of bevel gear was required to make the roundabout rotate when the shaft was turned and produced ideas based around this type of mechanism. The better answers included ways in which the mechanism could be simplified making it more suitable for use in a school and easier to manufacture.

Weaker responses often showed over complex designs that would not work fully.

There were some good answers to part **(b)** which showed various types of handles which could be used to rotate the shaft. The better responses showed how the shaft could be prevented from being pulled out of the base by using various components such as pegs, washers and clips. The handles had been ergonomically designed or covered in a material such as rubber in order to make them more comfortable for a child to use.

Weaker responses often only addressed the 'handle' aspect of the design and did not show how the shaft would be prevented from being pulled out of the base.

Part **(c)** saw some good ideas produced for the cylindrical base with see-through sides. The majority of the better designs showed how materials such as transparent acrylic could be used for the side of the cylinder and MDF for the top and bottom.

Most candidates made at least some attempt to design seats and a method of suspending them from the roof of the roundabout. The better seat designs were frequently based on simple blocks of wood with holes drilled in them for the wooden person to fit in. Successful suspension methods included the use of string, wire, rods or fishing line to attach the parts together. Holes or slots were shown to the roof and seats to allow the seats to swing out when the roundabout rotated.

Weaker solutions often showed over complex designs for the seats from which the wooden people would fall as the roundabout rotated.

There were some good drawings seen in part **(e)**.

The better answers showed all of the features that the candidate had designed in the earlier parts of the question. Colour had been used with varying degrees of success.

Some of the weaker answers did not show all of required features. Some candidates did not make use of colour/rendering on their drawing.

DESIGN AND TECHNOLOGY

Paper 9705/13

Written 1

General Comments

The performance of candidates displayed a full range of ability. The better answers were from those candidates who had looked at how many marks were available for each part of a question and produced responses which contained sufficient detail and information to give them full access to all of the marks available. Candidates are advised to read questions carefully before starting their answers, so that their responses address what is asked for in the question. In some cases, candidates displayed only a limited knowledge and understanding of the subject matter required to respond correctly to the questions they had chosen to answer.

Candidates need to make sure that their answers are focused on the question being asked and that their responses are concise and display appropriate subject specific knowledge and understanding.

While the majority of candidates responded to all parts of the three questions they had chosen to answer, time management proved a problem for some. This particularly applied to **Section C**.

Some repetition was evident in candidates' answers to questions in all sections of the paper. Some drew the same thing more than once, for example a design would be drawn as a three-dimensional view and then repeated using a two-dimensional view that showed no more detail than the first drawing. Similarly, in written responses, some candidates repeated the same point two or more times using slightly different words.

Section A

The better answers in this section were those that used a sequence of three or four annotated sketches to clearly describe, step by step, how the appropriate tools, equipment and processes could be used safely to achieve the required results. As well as drawing or listing the tools, candidates also need to show and describe their use. The quality of sketching was very mixed.

In some of the weaker responses a number of poorly produced very small sketches were seen. Lots of continuous text should be avoided when answering questions in this section of the paper.

Question 1

Part **(a)** was generally well answered. The majority of candidates named a suitable sheet material for making the figure. Common correct answers included acrylic and aluminium.

Suitable reasons for choice of material included the fact that the material did not require a surface finish and, in the case of acrylic the material was ready coloured. General reasons such as 'the material is readily available' or 'the material is easy to work' are not appropriate and do not gain credit. Candidates can improve by making sure that the reasons they give relate to the specific situation given in the question.

In part **(b)(i)** candidates were required to use notes and sketches to describe how the figure could be cut out to the required shape and the edges of the sheet material smoothed. This part of the question was answered reasonably well. Most candidates showed some understanding about how the figure could be cut out using a saw and went on to describe, with varying degrees of success, how files and abrasive paper could be used to smooth the edges of the material. The use of a laser cutter was suggested by a number of candidates. While this is an acceptable method of both cutting out the shape and finishing the edges of the materials, candidates need to understand that the process of setting up and using this piece of equipment needs to be described stage by stage.

Some reasonable answers were seen to part **(b)(ii)**. The better responses showed how some form of nut or screw could be made and used to attach the balancing bar to the figure so that it could be easily removed. A few permanent fixing methods were suggested.

A number of good answers were seen to part **(b)(iii)**. These described at least some of the stages of drilling a hole and using a tap to make the thread in the balancing bar.

Candidates could improve their performance by producing better quality, more detailed sketches, using less continuous text and describing processes more fully including details about the tools and equipment used and the safety precautions that have to be undertaken at each stage.

Question 2

Part **(a)** of the question was frequently answered well. A good number of candidates were able to explain what veneered MDF looked like. They produced an annotated sketch showing that the material was made from compressed particles of wood with a thin layer of real wood glued on to outside of it.

In part **(b)(i)** most candidates were able to describe how a saw could be used to cut part of the joint shown at A in the given drawing. Fewer went on to describe how a chisel would need to be used to remove waste wood and 'clean up' the joint.

A good number of candidates described how the metal plate could be cut out and the holes drilled. Fewer described how the holes would be countersunk or how the metal plate could be fixed to the wooden frame and the table top.

Candidates could improve their performance by producing better quality, more detailed sketches, using less continuous text and describing processes more fully including details about the tools and equipment used and the safety precautions that have to be undertaken at each stage.

Question 3

In part **(a)** most candidates used a suitable scale for their drawing. Correct answers were those that showed a development (net) for the card box consisting of the base, the back, two sides, the front (including the semi-circular cut) the two side flaps, the top and fold over flap and four glue tabs. While most candidates produced answers that included some of these parts few fully correct solutions were seen. Common errors were not including the semi-circle on the front, showing too many or too few glue tabs and drawing the front incorrectly, it was sometimes shown as a rectangle.

In their answer to part **(b)** a good number of candidates identified a suitable plastic such as polystyrene that could be used for vacuum forming the insert.

Suitable reasons for choice included the fact that the chosen material was a thermoplastic and therefore suitable for vacuum forming or that the material was ready coloured and required no further finish.

The initial part of **(c)(i)** was frequently well answered. This showed how a nine rectangular blocks could be fixed to a base board to give the basic shape required to make the former. Fewer candidates went on to describe how the sides of the blocks would need to be sloped and the edges and corners rounded so that the former could be easily removed from the plastic when it had been vacuum formed.

In part **(c)(ii)** most candidates were able to describe at least some of the stages in the vacuum forming process. These stages needed to describe how the sheet of plastic would be fixed in the vacuum forming machine, how the sheet would be heated, how the air would be sucked out and the plastic pulled over the former and how the former would be removed from the plastic. The best answers described all of the required stages.

Candidates could improve their performance by producing better quality, more detailed sketches, using less continuous text and describing processes more fully including details about the tools and equipment used and the safety precautions that have to be undertaken at each stage.

Section B

The questions in this section of the paper require candidates to analyse situations and products, identify problems, resolve problems and discuss issues related to the design, manufacture, use and disposals of products.

Parts **(a)**, **(b)** and **(c)** of the questions in this section of the paper were generally reasonably well answered by the majority of candidates. While more candidates made use of the structure and mark allocation given in part **(d)** than in previous years, many answers have insufficient levels of 'discussion'.

In part **(d)** candidates need to identify clearly relevant issues, discuss why they are important and be able to support their arguments and reasoning using appropriate examples and evidence. It is important that these issues are specific to the given situations and requirements of the question.

Repetition was seen in some candidates' answers particularly in part **(d)** of the questions, where the same information was often given using slightly different words.

In a few cases, candidates did not attempt to complete part **(d)** of the question that they had chosen to answer in this section of the paper.

Question 4

Part **(a)** was generally well answered. The majority of candidates showed a good understanding of the difference between a stencil and a template by explaining that a stencil is a sheet of thin material with hole/s cut in it. You could draw round the hole or apply ink or paint through the hole. A template is a shape cut from thin material which can be drawn round.

In part **(b)** the majority of candidates were able to describe at least one problem with the design of the stencil. Problems needed to be distinctly different and relate to factors such as the centres of the O and R falling out, paper not being a suitable material and the letters being very close to the edge of the stencil. The better responses did not just identify a problem but went on to explain the problem. For example: 'The centre parts of the O and the R would fall out because they were not attached to the main stencil. This would result in the design that was printed not being correct'. Some candidates described the same problem twice using slightly different words.

The better answers to part **(c)** made full and effective use of sketches to aid their explanations of how the problems could be overcome. Answers needed to both show an appropriate solution and explain how to overcome the problem.

Part **(d)** required candidates to 'Discuss the merits of using stencils and templates when batch producing products'. In part **(i)** the better answers had analysed the given situation to identify issues such as uniformity of final product and speeding up the production process. In parts **(ii)** and **(iii)** discussion had to take place to explain why these issues were important. Specific examples/evidence needs to be included as support of any conclusions that are made. For example: 'Stencils are often used to make sure that printed designs are all the same. This is a relevant issue because An example of how a product can be batch produced with the aid of a stencil is

Question 5

This proved to be the most popular question in this part of the paper.

In part **(a)** most candidates selected symbol D and were able to explain that it indicated that the toy it was printed on was not suitable for use by children under the age of three.

Part **(b)** was generally well answered with a good number of candidates identifying two appropriate problems with the design of the rocking horse. Problems needed to be distinctly different and relate to factors such as there being nothing for the child to hold on to, the child could easily slide off the back and there being lots of sharp corners on the design.

Some good answers were seen to part **(c)**. These made good use of sketches to add features such as a handle and a backrest and to show how the sharp corners would need to be rounded. The better answers added clear notes to explain how the proposed changes would overcome the problems identified in **(b)**.

In part **(d)** candidates were required to 'Discuss how a designer would need to consider health and safety issues when designing a child's toy'. In part **(i)** most candidates identified one or two relevant health and safety issues. The most common were avoiding sharp edges and corners and small pieces. Very few responses mentioned the various safety standards that a child's toy would have to meet. The better answers explained in part **(ii)** why the issues identified in **(i)** were relevant. In part **(iii)** candidates need to understand that they must have to use specific examples and/or evidence to support their arguments and/or conclusions. Part **(iii)** must be based around, and make reference to, issues identified and justified in parts **(i)** and **(ii)**. For instance, a candidate could use blow moulding as an example of a process that could be used to avoid sharp corners.

Some candidates restricted their responses to the design of the rocking horse rather than the broader issues of designing toys for children.

Question 6

Part **(a)** was frequently well answered. Most candidates explained that slats were frequently used in the design of outdoor furniture because water runs off them more quickly, they use less material, they are not as heavy as large boards and they would not twist and warp as much as wider boards.

In part **(b)** most candidates described at least one problem with the design of the combined table and seat. These needed to relate to the poor stability of the design and the weak method used to join the table and seat together. As with other questions in this section candidates need to understand that in order to gain both of the available marks they have to 'describe' the problem rather than just 'state what the problem is'. For example statements such as 'The design is not stable' need to be followed by a description of why it is not stable.

Some good answers were seen to part **(c)** with a good number of candidates using sketches to show appropriate ways in which the design would need to be improved. This included adding additional supports under the seats, splaying the legs and strengthening the way that the seat was joined to the table. The better answers added clear notes to explain how the proposed changes would overcome the problems identified in **(b)**.

Part **(d)** required candidates to 'Discuss why most outdoor furniture is manufactured and sold in flat pack form rather than ready assembled. In part **(i)** most candidates identified at least some issues related to factors such as reduced production costs, easier to store, easier for customer to transport, customer can dismantle and store when not in use. The better answers went on in part **(ii)** to explain why these issues were relevant. For example: 'Flat pack furniture is cheaper to produce than ready assembled furniture (issue) because manufacturers do not have to pay somebody to assemble the furniture. (explanation of why it is relevant). In part **(iii)** candidates need to use specific examples and/or evidence to support their arguments and/or conclusions. Part **(iii)** must be based around, and make reference to, issues identified and justified in parts **(i)** and **(ii)**. For instance a candidate could use an example (based on their own experience) of how flat pack furniture is easier for a customer to transport, move, dismantle and store.

Section C

Some reasonable design work and presentation drawings were seen in this section of the paper.

The better answers showed the use of quick free-flowing sketches to produce around three distinctly different ideas for all or part of the product that was being designed in each part of the question. While candidates should annotate their sketches some candidates used far too much continuous text. It is not necessary for candidates to spend a long time producing very neat drawings of their initial ideas.

Some of the weaker responses presented only one idea or produced several drawings that gave the same information but in a different form. For example both a 2D view and a 3D view showing exactly the same design idea.

The better evaluations were those that used concise notes to identify clearly the strengths and weaknesses of designs. They included justified choices including which design or parts of a design to carry forward to the development stage.

Candidates need to understand that ideas need to be evaluated in a meaningful way. Evaluation tables with 'star' or 'number' ratings were much in evidence. While these can be used to good effect, their value lies in the use of headings appropriate to an examination situation and an indication about what the stars or numbers mean. It must be more than 'excellent, good or poor'. Some candidates did not attempt to

evaluate their ideas. Development should be seen as more than re-drawing one of the initial ideas. Candidates should bring together, and possibly improve, the best parts of a candidate's earlier design thinking into their proposed solution. Candidates need to understand that they do not have to develop each one of the ideas. As part of the development process, basic details about materials, joining methods and important dimensions should be given. Candidates are not required to explain stage by stage how their chosen design would be made.

In part **(e)** candidates were required to produce a rendered pictorial drawing of the complete product that they had designed. Candidates can produce this drawing with the aid of drawing equipment or as a high quality freehand sketch. Candidates should understand that rendering involves more than 'colouring in'. It should use colour, tonal shading and texture to enhance the three dimensional appearance of a drawing and to represent the material from which the product is made. Some inappropriate 'colouring in' was seen.

Time management was an issue for some candidates, leaving them insufficient time to complete part **(e)**.

Question 7

This proved to be the most popular question in this section of the paper.

In part **(a)** the range of initial ideas produced for steps and a safety rail were frequently good. Some of the better answers went on to produce at least some evaluative comments and give some details about materials and joining methods that could be used.

A lot of designs shown in the weaker responses included steps that were far too large for children to use. Often each step would have been between 400 mm and 600 mm high. Some of the materials and joining methods suggested were not totally suitable for the size and type of product being designed.

Part **(b)** required candidates to develop a design for a roof for the platform. The majority of candidates produced a good range of initial ideas many of which had the potential to become successful solutions. Some of the better answers went on to produce at least some evaluative comments and give some details about materials and joining methods that could be used. Some of the materials and joining methods suggested were not totally suitable for the size and type of product being designed.

In part **(c)** candidates were required to design a slide. A good range of initial ideas was seen from many candidates. A good number of the designs would have been too complex and unsafe for the situation that candidates had been asked to design for. Some of the better answers went on to produce at least some evaluative comments and give some details about materials and joining methods that could be used. Some of the materials and joining methods suggested were not totally suitable for the size and type of product being designed.

Some good initial designs were seen in **(d)**. Many of the designs produced had the potential to become effective solutions to the problem of preventing children falling from the platform. In common with other parts of the question there was frequently a lack of evaluation and design development in candidates' responses. Some of the materials and joining methods suggested were not totally suitable for the size and type of product being designed.

In all parts **(a) – (d)**, candidates could improve their performance by evaluating and developing their designs more fully.

In part **(e)** the majority of candidates produced some form of pictorial drawing of the complete piece of play equipment that they had designed in the earlier parts of the question. The quality of both the drawing and rendering varied enormously. Some good drawings were seen but some were poorly produced. A good number of the drawings were not based on any recognised form of pictorial. For example candidates could have used isometric, perspective, planometric or oblique.

Question 8

In part **(a)**, candidates produced at least one design for the surface detail (windows, doors, lights etc.) to go on the development (net) required to make the tractor unit. Some of the better answers went on to produce more of a range of alternative ideas and at least some evaluative comments.

Most candidates designed some form of flatbed trailer in part **(b)**. The better answers included details about the development (net) required to make the trailer. Details were sometimes given about a method for attaching the trailer to the tractor unit. These included the use of Velcro and paper fasteners. Sometimes only a limited range of initial ideas was produced. Weaker responses frequently did not include details about how the trailer would be made and attached to the tractor unit.

In part **(c)** most candidates designed some form of cuboid shaped container to go on the trailer. The better designs included details about the development (net) required to make the container. Details were sometimes given about a method that could be used to attach the container to the trailer. Sometimes only a limited range of initial ideas was produced. Weaker responses frequently did not include details about how the container would be made, how the doors would open and how the container would be attached to the trailer.

The logos designed in part **(d)** were generally of a good standard and made effective use of colour. Most designs included the required initials of GT and made use of an appropriate symbol based for example on the world. Sometimes only a limited range of initial ideas was produced.

In all parts **(a) – (d)**, candidates could improve their performance by evaluating and developing their designs more fully.

In part **(e)** most candidates produced a pictorial view of the model of an articulated lorry that they had designed in the earlier parts of the question. Some used colour on their drawing. Most of the drawings were of a reasonable standard.

Question 9

In part **(a)**, most workable designs were based on some form of pulley system.

The better answers showed a reasonable range of ideas and went on to produce at least some evaluative comments and give some details about materials and joining methods that could be used.

Weaker responses often included designs for over-complicated mechanisms, most of which would not fully work.

Part **(b)** required candidates to develop a design for a mechanism which would make the dolphin feature go up and down. Most workable designs involved the use of some form of cam.

The better answers showed a reasonable range of ideas and went on to produce at least some evaluative comments and give some details about materials and joining methods that could be used.

Weaker responses often included designs for over complicated mechanisms, most of which would not fully work.

There were some excellent answers seen to part **(c)**. These generally involved using some form of hinge to join the tail to the body of the dolphin. This would allow the tail to swing from side to side as the dolphin moved up and down.

The better answers showed a reasonable range of ideas and went on to produce at least some evaluative comments and give some details about materials and joining methods that could be used.

Weaker responses often included designs for over complicated mechanisms, most of which would not fully work.

In part **(d)** most candidates produced an appropriate design for a stand to hold the front of the display in a vertical position and house the mechanisms, motor and battery.

The better answers showed a reasonable range of ideas and went on to produce at least some evaluative comments and give some details about materials and joining methods that could be used.

In all parts **(a) – (d)**, candidates could improve their performance by evaluating and developing their designs more fully.

In part **(e)** most candidates produced a pictorial view of the animated display that they had designed in the earlier parts of the question. Some used colour on their drawing. Most of the drawings were of a good standard.



DESIGN AND TECHNOLOGY

Paper 9705/02

Project 1

General comments

There is no single approach to the way that Centres introduce this important part of the Design and Technology course to their candidates. Some set a common theme or topic to which candidates respond in their own way, while others encourage their candidates to identify their own design problem which may be derived from hobbies, interests or life at home or in the community. Outcomes resulted from a wide variety of design problems and it was clear that many candidates had developed a keen interest in the area being studied. In addition to the usual range of household items and furniture, interesting outcomes this year included: car roof rack system, humane animal trap, vehicle lifting device, wind tunnel, cat activity centre, puppet theatre, water storage and heating system, fishing rod support and bite detector, biltong drying box, solar cooker, security lighting system, baby's bath, running shoe, back posture improver, squash training aid, golf club grip drier, tennis ball launcher, cheese slicer, wind power generator. Several projects resulted in architectural models, the appropriateness and standard of which have improved as more experience has been gained in this approach to Design and Technology.

In general, candidates presented design folders neatly and in such an order that the design process could be followed. Centres are reminded of the importance of clear photographic evidence of models made for Project 1 and the Product Realisation for Project 2.

Comments on Individual Assessment Criteria

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

The majority of candidates made it very clear how the design problem linked to both the user and the situation. This was then supported by a precise design brief leaving the reader in no doubt as to the design route being followed.

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

Most candidates considered a wide range of existing products and commented on these in relation to their own design brief. It is important that there is a thorough analysis of the actual design problem being undertaken so as to give direction to the identification and collection of relevant data. This is a very important aspect of this stage of a design process as it provides information on which an accurate and meaningful Specification can be formulated.

Fewer candidates than in previous years included irrelevant information on materials, constructions, finishes and fittings, before any design ideas had been considered. Centres are reminded that the inclusion of this type of information together with, for example, historical records of the area being studied cannot be awarded any marks.

Specifications were generally well formulated and included many specific requirements of the product to be designed.

3. Generation and Appraisal of Design Ideas

Many candidates showed a high degree of flair in the creation of ideas. A few candidates presented a range of drawings not linked to the Specification or even commented upon regarding their possible suitability for the problem being considered. In these cases it is not really possible to award marks above the lowest band set out in the assessment criteria.



The importance of presenting a wide range of different ideas, however practical they appear, cannot be understated, and these should then be considered with some form of written appraisal of each. Where ideas have touched on aspects of the Specification then these should be commented on and highlighted in some way.

Many candidates used a good 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 has developed.

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. Many candidates produced high quality and meaningful models that formed part of this process; others simply produced a mock-up of the chosen design idea and it was sometimes difficult to identify how it made a contribution to the design process.

Increasing numbers of candidates are modelling different aspects of their design ideas and using these to test for suitability and practicality in the production of a complete solution to their design problem. In this way the modelling stage plays a more meaningful part in designing.

DESIGN AND TECHNOLOGY

Paper 9705/31

Written 2

General comments

There was a full range of responses to all questions on this paper. Candidates were generally well prepared and there were very few rubric errors.

The majority of candidates used the time available effectively and made full attempts at all sections of the paper. Some candidates answered only one question from **Section A** and some candidates attempted more than two questions from **Section A**.

The quality and use of appropriate sketching and annotation continues to be of a very good standard throughout the paper. Candidates used sketches to describe the stages of particular processes and supported their answers to questions where appropriate in **Section A**.

There was evidence of the continued improvement in the standard of responses in **Section B**. It is clear that candidates are well prepared for this section with virtually all candidates fully completing all of the requirements. It is important that candidates are able to practise this part of the examination under timed conditions.

Comments on specific questions

Section A

Part A - Product Design

Question 1

- (a) The most popular correct responses given for an appropriate material included: Silver, Gold, Acrylic, Brass, Aluminium and Copper. Most candidates correctly gave appropriate reasons such as: good aesthetic qualities, non-corrosive, self-finishing.

Some candidates offered acceptable materials but did not give appropriate reasons or describe the correct manufacturing method for that material.

- (b) This part was generally answered well. Some answers were very detailed with specific materials, tools, processes outlined in logical order. Others were simplified with little detail. Piercing, shaping, soldering, gravity die casting, lost wax casting and plastic memory were the most popular correct responses.

There were a few responses for the single item that were inappropriate, such as high-pressure die-casting and injection moulding.

Candidates used annotated sketches very well in this question. It is important that only the key aspects of manufacture are presented to ensure that candidates do not spend too much time on this question.

- (c) The best responses focused on the simplification of the design, a change of material and the use of formers, moulds and dies. Some very detailed explanations of die casting, injection moulding, pressing and stamping were presented. Sand casting was occasionally given, but this is not an appropriate response for 50,000 items; candidates needed to consider the number of items to be produced.

Question 2

- (a) Blow moulding and shaping and joining were the most popular choices.

Blow moulding: This was generally answered well. Many candidates responded fully, detailing the extrusion of a parison through to the trimming of flashing/sprues. A large number of candidates described the free blowing and joining of 2 hemispheres in the manufacture of the football. Whilst the description *and* sketching of the process was given some credit, this was not the most appropriate response.

Shaping and joining: Again this was answered well. Candidates gave full responses including lamination or steam bending, and a step by step guide to the production of an appropriate wood joint. A number of candidates detailed the production of the whole chair, which was unnecessary. Sketching was used well.

Milling: Relatively few candidates described this process. Responses ranged from a full description of milling machine use and details of different cutters, to an incorrect explanation unrelated to milling.

- (b) Most candidates were able to explain correctly why the relevant process was suitable for the production of the items.

Question 3

There was a wide range of responses to this question.

Many candidates examined products in relation to a tourist market with appropriate cultural implications discussed. The examples/evidence given were interesting and relevant. The economic implications were not as well argued by many candidates.

The responses in regard to worldwide distribution were not so well supported by examples. Good responses included reference to value for money, the size and packaging of the products and the use of materials.

Part B - Practical Technology

Question 4

Relatively few candidates attempted this question.

- (a) Most candidates were able to identify the members in tension and compression.
- (b) Most candidates calculated correctly to find the force required to keep the beam in balance.
- (c) Most candidates could explain the difference between a monocoque and frame structure. Candidates gave clear descriptions of the structures and provided good supporting examples.
- (d) Most candidates discussed the change in materials due to regular use/external forces and the expansion and contraction of the materials due to temperature changes. Good examples such as bridges, paper clips and the torque on a screw were used to support answers.

Question 5

- (a) Most candidates correctly calculated the gear ratio, and showed their workings. It is important that the workings are shown in order to access full marks.
- (b)(i) The linkage was correctly shown with most candidates showing the use of fixed and moving pivots.
- (ii) Very few candidates responded with a correct linkage; a number used a rack and pinion mechanism with a gear train and were awarded credit for the correct distance and direction of movement.

- (c) Candidates gave good explanations of the different systems and were able to give examples such as car brakes (hydraulic), train doors (pneumatic) and cam shafts (mechanical). Most candidates did not make direct comparisons between the systems.

Question 6

- (a) The most common correct responses for the model car body were zinc, aluminium and polystyrene as appropriate materials, with reasons such as easily cast into complex shapes and finishes well.
- (b) Appropriate methods given were die-casting and injection moulding. Some candidates used an inappropriate method for their chosen material but were awarded some credit for the detailed description of the process. Sketches were of a good quality. Inappropriate methods given were vacuum forming and the step by step fabrication of a car model kit.
- (c) Most candidates responded to this question well. A range of relevant issues was discussed including: accuracy, saving/modification and transfer of data, CNC machines and automation. A number of candidates did not access the full mark range by focusing solely on the consequences of job loss and the local economy. Candidates should include discussion relating more closely to the question of manufacture of products.

Part C - Graphic Products

Question 7

A large number of candidates attempted this question with a wide range of responses.

The most successful responses referred to the identification of a target market, related to the affordability and quality of the sunglasses. Introductory offers and the marketing/placement of the product were also discussed.

Some responses were brief and lacking detail. Candidates would benefit from exploring a wider range of issues and using a broader range of relevant examples or evidence to support their answer.

Question 8

- (a) Most candidates correctly drew the required views to a scale of 2:1. Many of the candidates drew the tensioning screw protruding an incorrect distance from the bracket, and did not show correct sectional detail. Candidates needed to comply with all requirements of the question to access all the marks available.
- (b) A large number of candidates did not attempt this question. Successful responses included the knurling, shaping and application of rubber or plastic texturing to the tensioning screw. Some candidates misinterpreted the question and showed a split pin or two locking nuts to hold the screw in position.

Question 9

There were some excellent responses to this question. Most candidates correctly used 2 point perspective to the correct approximate scale. Some candidates drew the design using an oblique view. Candidates should practise reading drawings as a number of responses showed incorrect shape and proportion of the house. Successful responses were accurately drawn and candidates applied appropriate rendering techniques to the roof, walls and windows.

Section B

Some candidates produced responses of the highest standard to this section. Presentation skills were generally most impressive, with candidates showing the knowledge of appropriate materials and construction techniques.

All candidates prepared their answers on the A3 paper as instructed.

There was a significant improvement in the analysis of the problem. For most candidates, the analysis, in the form of scatter-charts or lists, was focused on the requirements of the given problem. Some candidates

produce generic charts that had no specific reference to the problem. There is no requirement for a question in the form of a brief.

This analysis should then lead to justified specification points. Single word or generic statements, with reference to the product do not gain credit.

The majority of candidates produced a range of at least three discrete and different design ideas, many including the exploration of sub-problems e.g. a range of quick assembly and disassembly methods for shelter construction.

Most candidates made good reference to appropriate specific materials, giving justifications for their use. Reference to generic terms such as wood, plastic or metal does not gain credit. It is recommended that candidates show their understanding of the appropriate use of a wider range (at least three) of appropriate materials.

A number of candidates employed tick lists to evaluate their ideas and identify a chosen solution. If these are used, they must be appropriately qualified. The higher marks are achieved when candidates give evaluative comments on ideas and can make a reasoned judgment on the best solution or features to take forward for further development.

The development of the idea/s to a final solution continues to improve. Most candidates used annotated sketches to show improvements or modifications to their idea and made clear the materials and constructional methods that would be used.

Candidates who developed selected features, clearly showing their reasoning behind decisions scored the highest marks.

Candidates are advised to not include the superficial development of features such as 'round off corners'.

Most proposed solutions were feasible and well presented. Some were exceptional ideas with potential commercial possibility. Most included overall dimensions. To achieve the top range of marks candidates need to give more detailed dimensions such as the section or thickness of materials used. For full marks in the detail section, candidates would be expected to include dimensions, materials and possible finishes.

Evaluations showed a slight improvement. Many candidates described both successful and unsuccessful elements of their design proposal and gave details of improvements or modifications. Some candidates copied out their specification points and placed a tick to show whether the point had been satisfied or not. This approach does not access the full mark range. To achieve full marks, candidates are expected to evaluate their final proposal, based on key specification points and also to highlight possible modifications or improvements.

Question 10

This was generally well answered with a full range of responses to this question.

Acceptable specification points included:

- the shelter must be easily erected without the need for specialist tools as weather changes quickly
- the shelter must be robust enough to withstand heavy winds
- the shelter must be constructed from materials that would be suitable for outdoor environments
- the shelter must allow the free movement of adults and candidates so that they do not feel cramped or uncomfortable
- the shelter must be easily disassembled or folded for ease of storage.

Most candidates generated a range of different ideas, some were slight variations on a similar theme e.g. square 4 pole framework. Some candidates produced interesting and innovative proposals.

Final proposals were generally realistic with most including details of materials or important dimensions.

Question 11

This was a popular question with the full range of responses. Many candidates fully complied with the requirement to design a litter bin for drinks containers with an accompanying mechanism to reduce the volume of metal cans. The best solutions separated the materials and considered the practical issues of stability and maintenance.

Acceptable specification points included:

- the litter bin should have a method of emptying the compartments when full
- the litter bin should have an obvious and clear method of operation to avoid confusion
- the litter bin should be stable in use, particularly when using the mechanism to compress cans
- the litter bin could be portable to enable easy transportation to different locations
- the litter bin should be resistant to drinks spillage to prevent damage and corrosion.

Many candidates produced functional, feasible proposals, which met the requirements of the question. Those candidates who produced exciting and innovative ideas that would encourage and entice users to use their device achieved the highest marks.

Some candidates explored a range of mechanisms to crush metal cans using foot- or hand-operated systems. The most successful ideas integrated the mechanism in the overall design of the litter bin.

Question 12

Some candidates produced very exciting and creative ideas. Candidates needed to explore more than one basic concept to access the higher mark range.

The analysis of most candidates tended to be generic with very few focusing on the specific task.

Acceptable specification points included:

- the container must have effective separators to ensure food stuffs and equipment do not mix
- the container must have a lid to prevent contamination
- the container must have clear and easy-to-read instructions on how to dispose of it
- the container must have a transparent lid so that the consumer can see the products
- the container must be of a suitable size to carry easily, possibly with the use of a handle.

Candidates looked at a variety of concepts including the design of boxes that could be discarded or re-used. Some looked at the possibility of trays that could be re-used but did not in all cases consider the requirement to give customer information relating to the contents of the container and the responsible disposal of used items.

For this type of application, candidates need to give details of the types of card that are suitable and show appropriate construction methods when using card.

DESIGN AND TECHNOLOGY

Paper 9705/32

Written 2

General comments

There was a full range of responses to all questions on this paper. Candidates were generally well prepared and there were very few rubric errors.

The majority of candidates used the time available effectively and made full attempts at all sections of the paper. Some candidates answered only one question from **Section A** and some candidates attempted more than two questions from **Section A**.

The quality and use of appropriate sketching and annotation continues to be of a very good standard throughout the paper. Candidates used sketches to describe the stages of particular processes and supported their answers to questions where appropriate in **Section A**.

There was evidence of the continued improvement in the standard of responses in **Section B**. It is clear that candidates are well prepared for this section with virtually all candidates fully completing all of the requirements. It is important that candidates are able to practise this part of the examination under timed conditions.

Comments on specific questions

Section A

Part A - Product Design

Question 1

- (a) The most popular correct responses given for an appropriate material included: Silver, Gold, Acrylic, Brass, Aluminium and Copper. Most candidates correctly gave appropriate reasons such as: good aesthetic qualities, non-corrosive, self-finishing.

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Candidates used annotated sketches very well in this question. It is important that only the key aspects of manufacture are presented to ensure that candidates do not spend too much time on this question.

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Many candidates examined products in relation to a tourist market with appropriate cultural implications discussed. The examples/evidence given were interesting and relevant. The economic implications were not as well argued by many candidates.

The responses in regard to worldwide distribution were not so well supported by examples. Good responses included reference to value for money, the size and packaging of the products and the use of materials.

Part B - Practical Technology

Question 4

Relatively few candidates attempted this question.

- (a) Most candidates were able to identify the members in tension and compression.
- (b) Most candidates calculated correctly to find the force required to keep the beam in balance.
- (c) Most candidates could explain the difference between a monocoque and frame structure. Candidates gave clear descriptions of the structures and provided good supporting examples.
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Part C - Graphic Products

Question 7

A large number of candidates attempted this question with a wide range of responses.

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Section B

Some candidates produced responses of the highest standard to this section. Presentation skills were generally most impressive, with candidates showing the knowledge of appropriate materials and construction techniques.

All candidates prepared their answers on the A3 paper as instructed.

There was a significant improvement in the analysis of the problem. For most candidates, the analysis, in the form of scatter-charts or lists, was focused on the requirements of the given problem. Some candidates

produce generic charts that had no specific reference to the problem. There is no requirement for a question in the form of a brief.

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Question 10

This was generally well answered with a full range of responses to this question.

Acceptable specification points included:

- the shelter must be easily erected without the need for specialist tools as weather changes quickly
- the shelter must be robust enough to withstand heavy winds
- the shelter must be constructed from materials that would be suitable for outdoor environments
- the shelter must allow the free movement of adults and candidates so that they do not feel cramped or uncomfortable
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Most candidates generated a range of different ideas, some were slight variations on a similar theme e.g. square 4 pole framework. Some candidates produced interesting and innovative proposals.

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Question 11

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Acceptable specification points included:

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The analysis of most candidates tended to be generic with very few focusing on the specific task.

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- the container must have a transparent lid so that the consumer can see the products
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Candidates looked at a variety of concepts including the design of boxes that could be discarded or re-used. Some looked at the possibility of trays that could be re-used but did not in all cases consider the requirement to give customer information relating to the contents of the container and the responsible disposal of used items.

For this type of application, candidates need to give details of the types of card that are suitable and show appropriate construction methods when using card.

DESIGN AND TECHNOLOGY

Paper 9705/33

Written 2

General comments

Candidates were well prepared and there were very few rubric errors.

The majority of candidates used the time available effectively and made full attempts at all sections of the paper. Some candidates answered only one question from **Section A** and some candidates attempted more than two questions from **Section A**.

The quality and use of appropriate sketching and annotation was of a very good standard throughout the paper. Candidates used sketches to describe the stages of particular processes and support their answers to questions where appropriate in **Section A**.

Candidates generally answered questions including the instruction 'to discuss' very well. Some candidates would have benefited from preparing a simple outline of their proposed response to ensure that all key points were addressed and that their answer was appropriately structured.

Responses to **Section B** were generally good, with some outstanding answers. It is clear that candidates were well prepared for this section with virtually all candidates fully completing all of the requirements.

Comments on specific questions

Section A

Part A – Product Design

Question 1

There was a wide range of responses to this question.

- (a) Most candidates chose to describe the injection moulding of the plastic bucket. Most answers were correctly detailed with features of the mould identified. Some responses to the turning of the pencil holder were very detailed, using correct technical terminology and describing tools used. Other candidates did not include sufficient specific detail.
- (b) Most candidates were able to explain correctly why the relevant process was suitable for the production of the items. Injection moulding and turning were explained in detail; most candidates gave speed and accuracy as responses to the suitability of pressing.

Question 2

This was a very popular question. Most candidates gave appropriate materials and reasons for suitability. MDF and specific hard/softwoods were the most popular correct responses

The majority of candidates described in detail the manufacture of the cabinet using permanent and semi-permanent construction methods. Some candidates did not include details of a correct fitting method for the back.

Most candidates changed materials, many selecting a pre-finished manufactured board. The better responses included details of the jigs and templates required to manufacture a batch of 10,000.

Question 3

Very few candidates attempted this question. The best responses included specific details of either plastics and/or composite materials available for cycling, tennis and swimming.

Part B - Practical Technology

Question 4

There were very few responses to this question. Answers were mostly detailed fully, describing the mechanisms and providing appropriate applications.

Question 5

There were very few attempts at this question.

- (a) Candidates were generally able to calculate the output voltage correctly; some did not apply the formula correctly.
- (b) Candidates described the use of a 555 timer and resistor/capacitor combination to create a basic timer.
- (c) Most responses focused on the consumer and raised issues relating to the expansion and increase of products available. Very few answers considered the research and cost implications to the manufacturer.

Question 6

Very few candidates attempted this question.

- (a) The best responses included specific details of the welding/brazing of the rail to the frame, including the need for cleaning/applying flux and holding the rail in place whilst joining.

Most candidates fully described the joining of the resistor to the PCB.

Part C – Graphic Products

Question 7

This was a very popular question.

- (a) Some candidates were able to construct the front elevation. Candidates should have used the side elevation to correctly sub-divide the cylindrical shape in order to transfer construction lines across to generate an accurate front elevation.
- (b) Most candidates produced an outline development with rudimentary fixing tabs. The best responses included full and accurate details of the construction of the net.
- (c) The best responses to this question gave clear details of the different methods of applying colour and detail in both a batch of 5 and a batch of 5000 helmets. They then went on to explain and compare the methods.

Question 8

This was the least popular question in Part C, but was generally well answered. Most candidates used specific and relevant examples to explain the use of modelling and testing to architects, designers and engineers. Most answers were full and well composed. Some candidates would have benefited from preparing a simple outline of a response to ensure that all key points were addressed and that the answer was structured.

Question 9

There were very few responses to this question.

- (a) Candidates were able to draw the loci for point B correctly and accurately.
- (b) The best responses had full details of a working model, including materials and components required to make it operate well. Some responses were brief and lacking the detail required to access the higher mark range.

Section B

Some candidates produced responses of the highest standard to this section. Presentation skills were generally most impressive with candidates showing the knowledge of appropriate materials and construction techniques.

All candidates prepared their answers on the A3 paper as instructed.

Most candidates achieved high marks for the analysis, producing scatter-charts or lists focused on the requirements of the given problem. Candidates went on to give justified and appropriate specification points. Single word or generic statements, with no reference to the product do not gain credit.

The majority of candidates produced a range of at least three discrete and different design ideas, many including the exploration of sub-problems e.g. a range of quick assembly and disassembly methods for shelter construction.

Most candidates made good reference to appropriate specific materials, giving justifications for their use. Reference to generic terms such as wood, plastic or metal does not gain credit. It is recommended that candidates show their understanding of the appropriate use of a wider range (at least three) of appropriate materials.

Some candidates did not give reasons for the selection of an idea/s for further development. The higher marks were achieved when candidates gave evaluative comments on their ideas and made a reasoned judgment on the best solution or features to take forward.

The development of the idea/s to a final solution was generally very good. Most candidates used annotated sketches to show improvements or modifications to their idea and made clear the materials and constructional methods that would be used.

Candidates who developed selected features, clearly showing their reasoning behind decisions, would have access to the full range of marks.

Candidates are advised to not include the superficial development of features such as 'round off corners'.

Most proposed solutions were feasible and well presented. Some were exceptional ideas with potential commercial possibility. Most included overall dimensions. To achieve the top range of marks candidates need to give more detailed dimensions such as the section or thickness of materials used. For full marks in the detail section, candidates would be expected to include dimensions, materials and possible finishes.

Evaluations were generally very good. Many candidates described successful and unsuccessful elements of their design proposal and gave details of improvements or modifications.

Question 10

This was the most popular question in this Section. It was generally well answered with a full range of responses to this question.

Acceptable specification points included:

- the seating unit must be quick to assemble and disassemble
- the seating unit must be suitable for children and adults, a minimum seat width of 520 would ensure most would be able to sit in comfort.
- the seating unit will be used outside and should be constructed from materials that are appropriate for an outdoor environment
- the seating unit must be stable enough to withstand the weight of four large adults
- the seating unit must reflect the spirit of the School, incorporate a logo or use School colours.

Most candidates generated a range of ideas, some were slight variations on a similar traditional chair based design. Some candidates produced innovative and creative alternative solutions.

Final proposals were generally realistic with most including details of materials or important dimensions.

Question 11

A popular question with a full range of responses. Many candidates fully complied with the requirement to design a stand that would hold music for seated and standing performances and incorporate a light.

Acceptable specification points included:

- the stand should be easily and quickly adjustable for the different heights
- the stand should be stable to cope with accidental knocks
- the stand light must illuminate the music but not distract the audience
- the stand must fold or disassemble for easy storage
- the stand must not have a folding mechanism that could trap or injure the user when adjusting, setting up or folding down.

Many candidates produced functional, feasible proposals, which met all of the requirements of the question. Some candidates focused solely on the stand and ignored the need to provide a simple light. Most candidates created a 'clip on' additional lighting component to enable ease of erection and storage.

Question 12

This was the least popular question in the Section. Some candidates produced exciting and innovative solutions; others would have benefited from exploring more than one basic concept to access the higher mark range. Very few candidates included details of materials and construction methods for the scale model.

Acceptable specification points included:

- the stage must have easy access and exits for performers
- the stage must have a system for the fixing of lighting
- the stage must have protection to take into account a change in the weather
- the stage must have raised areas for individual performers that are easy to access and stable in use
- the stage must have raised areas that can be easily attached in a variety of positions on the stage or removed from the stage.

Candidates looked at a variety of concepts including the design of boxes that could be discarded or re-used. Some looked at the possibility of trays that could be re-used but did not in all cases consider the requirement to give customer information relating to the contents of the container and the responsible disposal of used items.

A significant number of candidates did not give details of the types of card suitable for this type of application or show appropriate construction methods when using card.

DESIGN AND TECHNOLOGY

Paper 9705/04

Project 2

General comments

There is no single approach to the way that Centres introduce this important part of the Design and Technology course to their candidates. Some set a common theme or topic to which candidates respond in their own way, while others encourage their candidates to identify their own design problem which may be derived from hobbies, interests or life at home or in the community. Outcomes resulted from a wide variety of design problems and it was clear that many candidates had developed a keen interest in the area being studied. In addition to the usual range of household items and furniture, interesting outcomes this year included: car roof rack system, humane animal trap, vehicle lifting device, wind tunnel, cat activity centre, puppet theatre, water storage and heating system, fishing rod support and bite detector, biltong drying box, solar cooker, security lighting system, baby's bath, running shoe, back posture improver, squash training aid, golf club grip drier, tennis ball launcher, cheese slicer, wind power generator. Several projects resulted in architectural models, the appropriateness and standard of which have improved as more experience has been gained in this approach to Design and Technology.

In general, candidates presented design folders neatly and in such an order that the design process could be followed. Centres are reminded of the importance of clear photographic evidence of models made for Project 1 and the Product Realisation for Project 2.

Comments on Individual Assessment Criteria

5. Product Development

Successful candidates took the final design idea(s) from Project 1 and then considered all aspects of form, materials, components, constructions, finish and production methods in detail. All information was linked to the chosen idea and where alternatives had been considered, and choices made, reasons for these were given.

This section of the assessment scheme also requires candidates to carry out some form of testing. This can be of materials, constructions, form, etc. but it should be obvious how this links to the design idea being developed. Candidates need to include written or photographic evidence that this has been carried out.

In some projects it is not always clear why selections have been made and there is often a big gap between the chosen design idea and the final product. 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

Most candidates were able to set out the sequence for the main stages of production, often produced in flow chart or tabular form linked to some form of time plan. There is no requirement for candidates to show how basic techniques will be carried out but many candidates included details of the more complex methods of manufacture.

Candidates are not required to include lengthy photographic evidence of all stages of manufacture, as this is taking place, although photographs can be helpful when highlighting certain aspects of the manufacturing process.



7. Product Realisation

Many candidates produced high-quality products that could clearly be put to their intended use. Candidates clearly demonstrated care and enthusiasm in the making of their design outcomes in terms of construction methods and finishing techniques; there are many well developed practical skills being applied.

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.

8. Testing and Evaluation

There continues to be an improvement in the number of candidates 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.

The completion of questionnaires and the unqualified views of others are only of use where the results can be compared to the intended use of the product and some form of qualified judgement made and recorded.