# DESIGN AND TECHNOLOGY

**Paper 0445/1**

**Common Core**

## General comments

Candidates generally responded well to the question paper although there were very few outstanding responses, particularly to ***Part A***. It was clear from answers to questions such as **Questions 2, 7** and **9** that many candidates were able to apply their knowledge of the subject to a variety of different situations. This is reassuring.

Answers to ***Part B*** questions were generally set out well so that the Examiner could follow design thinking and award marks accordingly.

Centres are reminded that this will be the last June examination in its current format. The syllabus has been revised for first examination in June 2007 and in **Paper 1** candidates will be required to respond to a design question only, on the A3 pre-printed design sheets provided with the question paper.

## Comments on specific questions

***Part A***

**Question 1**

Candidates are now familiar with this type of question and the majority of them responded accurately. Full marks were only awarded where the 'half' car, representing 5000, had been cut along the vertical axis.

**Question 2**

Most candidates were able to show some method of stabilising the swing. Many extended the legs which were then concreted in the ground whereas others fitted plates to the legs and these were fixed to solid bases in the ground. For the award of full marks, candidates needed to show how the legs would be modified and then a suitable method of securing these to or in the ground.

**Question 3**

Many candidates knew the correct material, tools or process for the situations given although odd leg callipers, for marking parallel to the edge of metal, was answered correctly least often. The Examiner accepted metal or plastic for the hacksaw; tenon, dovetail or cross cut saw for cutting across wood; marking or testing right angles for the try square and coping saw, fret saw, abrafile or any type of small bladed power saw for curves in acrylic.

**Question 4**

Some candidates struggled to indicate the correct order for the stages in preparing a piece of material to width although most started at the correct place.

**Question 5**

Appropriate joining methods were familiar to most candidates with many being awarded full marks. Knock down fittings (KD) were accepted in addition to screws and bolts for the temporary joining of wood but only permanent methods specific to card, such as glue and staples were accepted.

**Question 6**

The Examiner was surprised by the small number of candidates able to draw the edge of plywood and the end grain of solid wood. For the award of full marks candidates needed to show an odd number of at least three veneers with grain at right angles to each other and clear indication of end grain pattern on the solid wood.

**Question 7**

The Examiner was reassured by the number of candidates able to score at least some of the marks on this question. For the award of four marks they needed to show the follower dropping vertically at the start, moving horizontally for 90° and then moving along and up to the starting height after 360°.

**Question 8**

Few candidates were able to calculate the reactions of 45N and 75N at A and B respectively. Many, for some reason, attempted to describe what would happen but never attempted to calculate the answers.

**Question 9**

Most candidates were able to draw some method of belt, chain or gearing system to transfer power from the electric motor to the axle but unfortunately many overlooked the required direction of travel. To reverse the direction of rotation the belt needed twisting or the system required some form of idler gear for this purpose.

**Question 10**

Most candidates were able to identify **two** reasons why people might choose one product over another but for the award of two marks in each case some form of explanation was required, as asked for in the question. Candidates often gave 'appearance' as a correct reason but for two marks they needed to add, for example that the product would then match the style or colours at home.

***Part B***

**Question 11**

This question was intended for those candidates following the Realisation option and it was anticipated that it would be quite popular as it covered a situation found in many schools. This appeared not to be the case. The design situation was intended to lead candidates to a fairly simple outcome as the question made the point that the stand shown was difficult to erect. Many candidates missed this point and tried to replicate the design shown. This did not necessarily cause problems but in some cases it reduced the possible range of designs that might be considered.

**(a)** Candidates were able to identify sensible functional points such as: little space; stable; correct angle; adjustable angle; folds up; lightweight; A3 size etc.

**(b)** Flexible joints described by candidates included: hinges; fabric; screws; bolts; rivets etc.

**(c)** Centres have clearly taken on the points made in previous reports and most candidates were able to produce good drawings of three of four completely different ideas. The quality of drawing was normally sufficient to make the ideas clear to an observer and in many cases good annotation covered all aspects of possible materials, construction, fittings and finish. Notes also gave some indication of how the products would function and this often helped to clarify the designs. Candidates should be encouraged to show as much detail as possible as marks are awarded for the suitability of the designs.

**(d)** Evaluations have improved over the years and many candidates were able to gain high marks in this section of the assessment. It is important that all the proposed ideas are evaluated and that reasons are given for the choice made. This may not be a single idea but parts from different designs. As has happened before, many candidates evaluated their designs through annotation and so long as this is clear, full marks can be awarded.

**(e)** Many candidates are still failing to take advantage of the total of 18 marks available in this part of the design questions. They so often simply redraw on of the designs suggested earlier without

even adding any detail. The Examiner is looking for constructional detail for the chosen idea together with important dimensions and other detail of shape and form. A skilled person should be able to look at the final drawing and have a good idea of how the product is to be made. Either two or three dimensional drawings can achieve the desired outcome but an artistic view of a product on its own with no detail cannot be awarded high marks.

**(f)** It is reassuring to see more candidates being specific about the materials they intend to use but even so they must be suitable for the suggested design and the environment in which it will operate.

**(g)** Successful candidates produce a simple step by step description of the manufacturing method to be used for one part of their proposed design. This need not be complex but it should identify the main stages and the tools and materials being used.

**Question 12**

This question was obviously intended to appeal to those candidates taking the graphics option as it was anticipated that most model aircraft designs would be made from semi-resistant materials. There were some good drawings of aircraft designs but many candidates overlooked the point that the model was to be made from fold-flat lightweight materials and as such this would dictate the types of design that would be successful. Candidates tended to concentrate on the overall appearance of the model at the expense of its practicality and suitability for children to make.

**(a)** Points that were suggested for the new colour scheme included: attract attention; represent area or country; look modern; give impression of speed or movement; include LO-FLY etc.

**(b)** Any method of construction that would allow for easy assembly of the fold-flat model by children was accepted and appropriate answers included: tabs and slots; adhesive tape; 'velcro'; plastic or card joining pieces; metal clips etc

**(c)** )

**(d)** ) See **Question 11 (c) – (e)**

**(e)** )

**(f)** Candidates suggested suitable methods for applying colour to models including: transfers; plastic self-adhesive shapes; brush or spray paints; marker pens etc. So long as materials on which these could be used were broadly appropriate full mark could be awarded.

**(g)** Candidates suggested appropriate promotional gifts such as key rings; pens/pencils; desk items; note pads; rules; small bags etc. Marks were awarded for suitability, quality of communication and clear detail of the item suggested.

**Question 13**

Being more technological in nature, this was intended for those taking the Technology option. Although not the most popular question, it was often answered quite well and candidates made good use of their knowledge of mechanisms in the designs being suggested. Candidates seemed to have a good understanding of the nature of the problem and suggested solutions that were generally practical and sensible in nature.

**(a)** Functional requirements for the torch holder included: little maintenance; safe in use; adjustable; transportable; weather resistant; hold a range of torches etc.

**(b)** Candidates were generally quite imaginative with tightening devices and these included: screws; bolts/nuts; wedges; over centre devices; 'velcro'; belts/buckles etc. Candidates needed to produce clear drawings of two devices for full marks.

**(c)** )

**(d)** )

**(e)** ) See **Question 11 (c) – (g)**

**(f)** )

**(g)** )

**Question 14**

This was probably the most popular question in ***Part B*** and candidates suggested a good range of different types of feeding areas for birds, most of which focused on some form of raised product that could either be fixed to a pole or hung from a high spot. Candidates also suggested deterrents such as water or restricted access and others moved into more aggressive deterrents such as electricity, an idea that the Examiner was not too keen to explore!

**(a)** Functions for the bird feeding area included: water and food stored separately; easy to replace food; easy to clean; good access for birds; attracts birds etc.

**(b)** Ways of preventing access included: height; overhang; away from walls/trees/fences; small access to food; materials that animals cannot climb; water etc.

**(c)** )

**(d)** )

**(e)** ) See **Question 11 (c) – (g)**

**(f)** )

**(g)** )

# DESIGN & TECHNOLOGY

**Paper 0445/02**
**Communication**

## General comments

The standard of work was comparable to that of the previous year. **Questions 1** and **4** were the two most popular questions for candidates.

There are areas of the syllabus however, in which further improvements are needed. These include in particular, geometrical constructions for curves touching lines and points and the correct method for projecting views in orthographic projection. Sketching of ideas to show a modification to a design is also an area for improvement.

## Comments on specific questions

### Question 1

*National Sailing Club Logo*

This was the most popular question on the paper. Of those who attempted it, many scored high marks. All responses made by candidates included the hull, sails and mast. Many candidates however failed to draw the semi ellipse correctly. The construction for the centre of the R85 and the drawing of the curve, was achieved by only a few candidates. Where candidates had used a trammel method to draw the semi-ellipse, marks were lost if this was not attached to the script.

**(a)** A few candidates scored the full five marks for the construction and drawing of the R60 quadrant. Most candidates scored the one mark for the top deck line of the hull.

**(b)** Many candidates failed to score the full four marks for the accurate construction of the semi ellipse. Most candidates scored one mark for the outline. Candidates not attaching a trammel they had used in the construction, lost four marks here. The construction for finding the centre of the R85 for 2 marks was achieved by only a few candidates. Most candidates scored only one out of the three marks available for the accurate drawing of the curve to touch the three datum points.

**(c)** Many candidates constructed the mainsail correctly for 2 marks. The pennant sail however, proved very difficult for some candidates.

**(d)** Nearly all candidates scored all four marks for drawing the mast to the correct width (two marks) and height (one mark ) with a Ø10 ball on the top (one mark). A few candidates lost marks for drawing the mast to the incorrect width with a R10 ball on the top.

**(e)** Marks were achieved by all candidates who attempted the lettering NSC. However, many failed to draw guidelines (one mark) and space out the letters (one mark)

**(f)** The colouring of the lettering ranged in quality from very poor to excellent. Many candidates failed to apply colour evenly or in a graduated texture style.

**Question 2**

*Castor Assembly*

This was by far the least popular question. Few candidates scored a high range of marks for their answers.

**(a) (i)** Many candidates drew a view from **S**, but failed make the view a section. Most candidates scored marks for the overall shape with the NYLON WHEEL and Ø10 SHAFT in position. Very few candidates included the SWIVEL, 5 mm recess and the M10 bolt 25 long. Eight valuable marks were lost here by nearly all the candidates who attempted this question.

**(ii)** A few candidates drew the end view from **EV** correctly with the Ø60 NYLON WHEEL in position for four marks. The addition of the Ø10 SHAFT equally spaced with the ROLL PIN in the correct position scored a further five marks. The addition of the SWIVEL to this view at the correct height (recessed 5 mm deep) scored a further one mark.

**(iii)** Of those candidates who attempted this question, nearly all scored the four marks available for the outline of the plan. Many candidates failed to include the NYLON WHEEL protruding from the castor for the final one mark.

**(b)** Many candidates produced views that were not aligned or in projection. Of the candidates who did draw in Orthographic Projection, many used Third Angle and drew the correct symbol for 2 marks.

**Question 3**

*Drinking Cup Holder*

This question was attempted by a small number of candidates. The working and order of the instruction in the question should lead the candidate to the correct response. Where candidates followed these instructions, a correct solution was drawn and the candidate scored high marks. Overall, candidates gained a wide range of marks for their answers.

**(a) (i)** A plan and front elevation to the correct height, width and length scored three marks. The correct thickness of side and top scored a further two marks with the symbol matching the projection used a final one mark. Most candidates used Third Angle Projection with many drawing a symbol correctly that matched the projection used.

**(ii)** Dividing up the base to get the centres of six cup positions, was not correctly constructed by many candidates and a valuable ten marks were lost. Candidates who drew the Ø80 and Ø40 of the cup in plan view gained a further four marks. Many candidates managed to get the position of cup C correct in plan view in whatever projection they had used.

**(iii)** Whilst many candidates managed to draw the cup to the correct height, many did not project the Ø80 and Ø40 of the cup from the plan view for the full three marks.

**(iv)** Candidates who had projected the cup from the plan view, now achieved full marks for projecting back onto the plan from the elevation the hole needed in the top surface.

**(b)** Many candidates sketched a modification such as a cut-out or thumb hole in the top surface of the tray. Candidate sketching would benefit from the use of ‘crating’ when producing design ideas.

**Question 4**

*House Design*

This was the second most popular question on the paper.

Many candidates scored the general marks for the correct scale (one mark) suitable orientation (two marks), a house with three different roof heights (three marks) and quality of sketching (up to three marks). Up to three marks was available for the three main parts of the house drawn in the correct position.

Some candidates recognised that the garage roof was an unequal length from the ridge and that the end walls were not the same height (three marks). Most candidates drew the canopy with post and the roof of the canopy continuing for three marks. The first floor height (one mark), roof line (one mark), and chimney position (one mark) proved to be difficult for many candidates. Only a few candidates managed to draw the garage roof and first floor roof continuing (one mark). A small number of candidates drew the ground floor part to the correct size (one mark).

Many candidates drew in the detail of brace on post, correct shutters on the correct side of three windows for four marks. The bottom of the front door and shutter being visible for the final two marks.

# DESIGN & TECHNOLOGY

**Paper 0445/03**

**Realisation**

## General comments

Candidates' answers to Questions testing a knowledge and understanding of wood and plastics were better than answers to Questions about metal.

Many candidates failed to achieve maximum marks for Questions because their answers lacked detail, clarity or accuracy. Sometimes candidates provided information that was irrelevant to the Question being asked.

Many Questions have large mark allocations where candidates are required to use notes and sketches to show how a variety of processes or constructions may be carried out. It is essential that candidates understand that to gain maximum marks for these types of Questions they must provide good quality, clear sketches supported by notes that are both detailed and technically accurate. There is a direct relationship between the number of marks available and the depth and detail of answer required.

## Comments on specific Questions

### Question 1

**(a)** There were many good design requirements given for the child's desk by candidates. The most common answers referred to the need for comfort, appropriate height, safety factors and robust construction.

**(b) (i)** The majority of candidates named an appropriate hardwood with beech, oak and mahogany popular answers. There were softwoods and manufactured boards incorrectly identified.

**(ii)** The reasons given were generally sound. Many candidates highlighted the need for durability and attractive appearance. Some excellent answers included details about the colour of specific hardwoods and the characteristics of the grain.

**(c)** The majority of candidates named an appropriate joint: lap, butt [nailed and glued], finger, dovetail and dowel being the best answers. The quality of the sketched joint varied greatly and many candidates were unable to achieve the maximum 4 marks available.

**(d)** The majority of candidates named at least one appropriate joint. Good answers included mortise and tenon and dowel joints with a minority naming a bridle joint.

**(e) (i)** Very few candidates were able to name 4 marking out tools used to mark out the previous joint. Pencil, ruler, try square, marking knife, marking, mortise and cutting gauges were all basic marking out tools that candidates could have named. Many candidates named tools that would be used for cutting the joint and in many cases named inappropriate tools that would be used for marking out metal.

**(ii)** Many candidates were able to name up to 3 tools used to cut out the joint. The mark scheme did allow for answers that supported the cutting out process such as G cramps and mallet.

**(f)** The most common correctly named adhesive was PVA.

**(g) (i)** A wide range of manufactured boards was available for the desk top including: plywood, chipboard, blockboard and MDF. Most candidates answered this correctly.

**(ii)** There were 7 marks available for candidates to show how the desk top could be fitted to the desk. A minority of candidates fixed the manufactured board permanently to the desk using nails, screw and glue. This would deny a child access to the storage space in the desk. Only partial credit was given for this type of answer. The best answers included use of a hinge but the majority of candidates did not access the maximum 7 marks because they did not give sufficient detail to the fittings they would use or to the clarity of their sketches.

**Question 2**

**(a)(i)** Most candidates named steel as the suitable ferrous metal.

**(ii)** Most correctly named non-ferrous metals were aluminium and brass. Copper was not considered appropriate. Many candidates named a ferrous metal as a non-ferrous metal and vice versa.

**(b)** The majority of candidates showed a flat piece of metal correctly marked out. The mark scheme rewarded good proportion, rounded corners, flap A marked out, 3 bend lines and the inclusion of the title flap.

**(c)** There was a range of marking tools available to candidates, including scriber, ruler, odd-legs and try square. Many candidates achieved marks for naming 2 correct tools but did not achieve the maximum 3 marks for the sketch due to the poor quality of their pencil work.

**(d)** Generally this Question was not answered very well mainly due to a lack of accurate technical information about the tools and equipment used to form the bookend.

**(i)** The majority of candidates named a hacksaw as the tool to cut out the outline shape. This is incorrect because the back of the saw would restrict the depth of cut. The best answers described how bench shears or tin snips would be used.

**(ii)** Making the edges safe by means of filing was a correct answer but many candidates did not give enough detail or provide accurate sketches to achieve maximum 3 marks. There were some excellent answers where candidates described how a folded edge would provide a safe edge.

**(iii)** Most candidates gave information about hitting the metal with a hammer or mallet but often failed to describe how the metal would be held in the vice or the use of folding bars or the use of a former over which the metal could be shaped. Many candidates incorrectly described the need to heat up the sheet metal before it could be bent to shape.

**(e)** Many candidates understood that before the flap could be cut out a hole would need to be drilled so that a blade could be inserted. Credit was given for this part of the answer. The best answers then described how an abrafile saw blade would be taken out and threaded through the metal to enable it to be cut. A minority of candidates provided useful information describing how the metal would be held while sawing took place. However, many candidates incorrectly named a coping saw as the saw they would use.

**(f)** The majority of candidates selected a ferrous metal and described how a painted finish would be applied. Of those candidates who selected a non-ferrous metal many of them gave vague answers about polishing the metal without sufficient detail to merit the 2 marks available.

**Question 3**

**(a) (i)** The majority of candidates named an appropriate manufactured board for the table. Plywood and MDF were correctly named but chipboard and blockboard, because of their construction, were not appropriate.

**(ii)** There were many excellent advantages given for using a manufactured board rather than a hardwood; including the lower cost, stability and larger sizes available. Some candidates referred correctly to manufactured boards being more environmentally friendly.

**(b)** Many candidates gave a correct answer to either the thickness of the top or the legs but few gave the correct thickness for both. Candidates should be aware of standard stock sizes. The top could have been made from a board 15-21 mm thick and the legs 12-19mm thick.

**(c)** The majority of candidates failed to appreciate the depth of the slots in the table shown in the Question. The slot would be at least 200mm deep and therefore back saws including the tenon and coping saws were inappropriate. The best answers referred to the use of power saws such as a jig saw, Hegner saw or band saw. Numerous candidates named and sketched a power router or the use of a mallet and chisel which were also excellent answers.

**(d) (i)** Very few candidates provided details about an appropriate K-D fitting such as a plastic modesty bloc. There were many dowel joints described. In this part of the Question candidates received no reward for this answer.

**(ii)** Many candidates were able to provide at least some details about how the legs could be fitted to the table top. Those candidates who gave details of dowel in part **(i)** received some reward if they showed the correct positioning of the dowel used to attach the legs to the top.

**(e) (i)** There were many good reasons given why manufacturers do not apply a finish to the table. Many stated that customers might prefer to apply a finish of their choice and the fact that manufacturers could reduce the cost of the table.

**(ii)** Many candidates understood that it would be much more awkward and therefore not good practice to apply a finish after the table was assembled.

**(f) (i)** The most commonly named power tool was a jig saw with some candidates suggesting the use of a power router which was excellent. The use of a band saw was not correct as the Question did specifically require a portable power tool.

**(ii)** Excellent safety precautions were described including the use of goggles, holding the work securely and the need to ensure long hair was tied back.

**(iii)** There were 4 marks available for candidates to show how the table top could be made round and smooth after it had been cut. Glasspaper alone would not make the top circular, it would only make it smooth. For maximum marks candidates need to describe how a disc sander could be used followed by use of abrasive papers to achieve a smooth finish. When asked to use sketches candidates need to provide details that are accurate as well as being neatly presented.

**Question 4**

**(a)** Very few candidates were able to name a specific wood, metal and plastic from which the cooking tool could be made.

**(i)** Beech was the best wood for the tool.

**(ii)** Aluminium and stainless steel were good answers for a suitable metal but many answers naming mild steel were incorrect.

**(iii)** Nylon, polypropylene and polythene were the most suitable plastics. Candidates should have realised through practical experience of working with acrylic that its low melting point made it unsuitable.

**(b)** The main reasons for plastic being the best choice of material for the cooking tool included its ability to be formed easily and that it is hygienic. Many candidates achieved at least one mark for this Question.

**(c)** This Question tested candidates' knowledge of marking out tools used with plastic. A wide range was available, including scriber, ruler, chinagraph pencil, marker and dividers. Many candidates were unable to name two correct tools.

**(d)** This Question required a working knowledge of the basic processes involved in cutting, edge finishing and bending plastic.

**(i)** Most candidates understood that plastic could be cut with a coping saw but for 3 marks needed to show, using sketches and providing notes, how the plastic would be supported and to name the equipment used.

**(ii)** Most candidates recognised the need to file the edges of the plastic but did not refer to draw filing. Details about further stages such as scraping, the use of wet and dry or polishing wheel to buff the edges were lacking by many.

**(iii)** Most candidates understood that an oven or line bender would be needed to provide the heat to soften the plastic for bending, but only a minority of answers included details about the use of a former or jig to bend to the required shape accurately.

**(e)** Candidates' knowledge and understanding of safety when carrying out a range of practical processes was good.

**(f)** A large mark allocation, 8 marks, was available for answers to this part of the Question. This means that candidates have to provide clear sketches and technically accurate notes to support their thinking. There were some excellent answers that showed two halves of the handle, ergonomically shaped for grip, glued and riveted or screwed to the plastic tool.

**(g)** The advantages of using recycled plastics were to do with reducing the amount of raw materials being used and the more environmentally friendly issues. Many candidates were able to achieve at least one mark for this Question.

# DESIGN AND TECHNOLOGY

**Paper 0445/4**

**Technology**

**General comments**

Good responses were characterised by the use of appropriate technological terminology and were supported by examples drawn from candidates' hands on experience of processes, components and project work. The use of annotated sketches was indicative of good responses. There was evidence too of good preparation of candidates for this paper in the way in which questions were selected and approached. One area of very good practice was in 'Mechanisms' where there was clear evidence of good teaching, preparation and practical application of knowledge. Candidates' knowledge and understanding of energy and systems was less satisfactory.

**Comments on specific questions**

**Question 1**

**This was not a very popular question choice but it was clear that some candidates had very good knowledge and understanding of electronic applications but this was specific to certain centres.**

**(a)** Most candidates were able to draw a suitable circuit for the electronic game though some candidates did not correctly interpret the question requirements and design over complex circuits that were incorrect and dysfunctional.

**(b)(i)** Most candidates were able to give two benefits of using the 555 IC as compact and economic (both in terms of cost and time).

**(ii)** Though many candidates knew that the VR was used to vary time delay fewer were able to link this to speaker output frequency control.

**(iii)** Most candidates were able to label the pins on the 555 IC.

**(iv)** Most candidates were able to identify the electrolytic (polarised) capacitor.

**(c)** Most candidates were able to correctly complete the block diagram for the given circuit.

**(d)(i)** Most candidates were able to identify the values of R and C.

**(ii)** Most candidates were able to find the 100 second time delay value from the chart.

**(iii)** Most candidates were able to show some understanding of the relationship between R and C but fewer were able to correctly state the Time Delay Formula.

**(e)(i)** Most candidates were able to identify one reason for the inaccuracy as the nominal value of R but fewer recognised the inaccuracy of nominal values for C also.

**(ii)** Most candidates were able to nominate the use of a VR to overcome the inaccuracy of the time delay value.

**Question 2**

**This was a very popular question choice.**

**(a)** Most candidates were able to identify two mechanisms; fewer named all three successfully. There was also some confusion in the naming of the worm and worm wheel with a significant number on candidates naming it a 'wheel and axel'.

**(b)** Few candidates were able to access the full marks for this part. Few identified the change in axial direction of motion through 90° made by the worm gear. Similarly few identified the conversion of rotary to reciprocating motion brought about by the cams.

**(c)(i)** Most candidates were able to identify friction as the main factor.

**(ii)** Most candidates were able to explain how the use of lubrication would overcome the friction.

**(d)(i)** Most candidates were able to identify either nylon or brass as suitable materials for mechanism A.

**(ii)** Some candidates were able to show how these materials were suited to the mechanism due to low friction, high resistance to wear and tear and low weight.

**(e)(i)** Most candidates were able to identify two suitable mechanisms such as bevel gears, crown gears, cranks and rack and pinion.

**(ii)** Most candidates were able to give appropriate examples of the use of the mechanisms stated in **Part e (i)**.

**(iii)** There were some very good sketches of bevel gears and rack and pinion gear systems.

**(f)(i)** Few candidates were able to determine the ratio due to confusion over the driver and driven gear teeth in the formula.

**(ii)** Many candidates were able to obtain the correct numerical answer to this part despite getting **Part f(i)** wrong.

**(iii)** Most candidates were able to show how the use of an idler wheel would ensure the output direction was the same as the input direction.

**Question 3**

**This was a very popular question choice.**

**(a)** Few candidates were able to show how the beam in position B had more rigidity and offered more resistance to bending in this alignment.

**(b)** Most candidates were able to draw a diagram showing that a beam loaded has tensile forces, compressive forces and a neutral axis.

**(c)** Most candidates were able to show how for equilibrium a simply supported beam centrally loaded would equally share the load giving two numerically equal reactions.

**(d)(i)** Few candidates were able to explain how the hollow sections offered a greater strength to weight ratio, had less loading effect on a given structure and were therefore more economical to use.

**(ii)** A very small number of candidates were able to explain how the maximum forces were concentrated at the outer edges of beams (due to turning moments) and thus this is where the maximum material should be located.

**(iii)** Most candidates were able to identify one practical application for one of the beams but fewer were able to select and describe two scenarios successfully.

**(iv)** Though many candidates could nominate welding as a correct method fewer were then able to show with sketches and notes how the corner was achieved.

**(e)(i)** This was the least well answered of all parts of this question with a very small number of candidates able to employ Bow's notation and draw a force diagram to scale and thus determine the values and nature of the internal forces and reactions on the structure.

**(ii)** More candidates were able to identify those members in compression (AD and BD) and tension (DC).

**Question 4**

**This was the least popular question.**

**(a)** Most candidates were able to show how potential energy and kinetic energy were employed in the firing mechanism for the game.

**(b)** Few candidates were able to show the use of a force meter to test the spring.

**(c)** Most candidates were able to explain the term elasticity.

**(d)** Most candidates were able to sketch correctly the solenoid in terms of the three component parts but few sketched a 'real' example offering instead a textbook diagram.

**(e)** Few candidates were able to draw a suitable circuit but it was clear that some candidates had a very thorough understanding of the circuit and were able to show this.

**(f)(i)** Few candidates were able to describe the use of a dial test indicator to determine the deflection of the side part of the game.

**(ii)** Most candidates were able to calculate the strain in the pin.

**(iii)** Few candidates understood the term 'dynamic loading'.

# DESIGN &TECHNOLOGY

**Paper 0445/05**

**Coursework**

## General comments

The Moderator would like to thank the majority of Centres that submitted the moderation sample in line with CIE's requirements. In these cases work was well presented and the Coursework Assessment Summary form and Moderator copy of MS1 were included as required. Centres are reminded that, for entries up to 50 candidates, a sample of the work of just 10 candidates is required.

Unfortunately, some Centres are still allowing their candidates to produce design folders written in the past tense and, as such, these are really only reports of what has already taken place. It is imperative that folders are based on evidence that a design process has been followed. If this is not done then marks cannot be awarded against some of the assessment criteria in the syllabus. This applies particularly to the 'Planning for Production' section where a series of photographs showing what has taken place is not evidence of planning.

Projects covered a wide range of topics, many of which had obviously originated from candidates' own interests and involvement in School, community and family life. Interesting outcomes included: garden lighting; jewellery storage; home security systems; model hovercraft; internal lighting; chalkboard duster cleaner; egg storage system; simple clothes washer; portable barbeque; bird feeder; toy garage; model kits; guitar stand; polythene bag sealer; groundnut oil extractor; bunk beds; point of sale displays.

Centres are reminded that this will be the last June examination using the existing coursework assessment scheme. The syllabus has been revised for first examination in June 2007 and, although the new assessment scheme will have limited impact on the nature of work produced, teachers are advised to familiarise themselves with it so that they can advise their candidates appropriately at the start of their coursework projects.

## Comments on specific assessment headings

### Analysis of Problem and Design Brief

Most candidates were able to state the problem clearly and this was usually followed by a clear design brief but many candidates failed to analyse and research fully the actual **problem**. In this section candidates are required to identify the aspects of the design problem that need to be considered and subsequently researched. Many candidates include several pages of photographic evidence of existing products that might solve the design problem but so often they fail to comment on these in a meaningful way. This should not be a simple description of the products but an identification of good and bad points that might help with future design ideas. As the starting point for most design processes, it is important that candidates complete this section correctly.

Unfortunately many Centres are still allowing their candidates to include several pages of information on materials, constructions, finishes and fittings, this before any ideas or concepts have been put forward. This is often information simply taken from textbooks and really is a waste of time as marks cannot be awarded under this section of the assessment. These issues should be considered as part of the development of the final idea.

**Specification**

Most candidates were able to identify sensible specification points in the form of a list but these were often generic in nature or such that they started to identify materials and other issues as solutions to the problem. If the list of specification points is completed with care then it becomes the natural tool for use at the evaluation stage after the product has been completed.

Specification points such as: 'It must look good.' are not acceptable. However, if a candidate is designing a piece of furniture to go in a particular room then issues of appearance might be opened up to: 'The product must match the colour scheme and style of other pieces in the room.' This could be further enhanced by stating the colours and style to be taken into account.

Many candidates take on projects that result in a model as the outcome. This is fine but, unfortunately, this is not always made clear in the specification. Where a model is to be produced then the reason for this or the use to which the model will be put must be stated clearly so that meaningful testing and evaluation can be carried out at the end of the project.

**Exploration of Ideas**

This is the stage in the design folder where a candidate can start to visualise what outcomes to their design problem might look like. There are no right or wrong answers to this part and candidates should be encouraged to record any idea that comes to mind however silly it may appear to be at the time. It is important that candidates display a wide range of different ideas rather than concentrate on variations of one or two themes. These drawings should also be annotated with any views, comments or points for future consideration might be of interest.

Many candidates should be congratulated on the variety of design ideas put forward and on the high quality of graphic techniques used to communicate these ideas. Some Centres are allowing their candidates to make use of computer drawing packages in their folders and this is to be encouraged. However, the use of such software should not be allowed to inhibit or restrict candidates' design thinking to the extent that it becomes an end in itself purely for the purpose of good presentation. Many good outcomes to this section of the design folder are simply pencil drawings covered with annotations and using colour to enhance points or features.

**Development of Proposed Solution**

This is the point at which candidates should consider and make reasoned decisions about the form, materials, construction and finish of the proposed solution to their design problem. There should be evidence that alternative approaches have been considered in all these areas if high marks are to be gained. These decisions should then be followed by the production of working drawings that give all the required information for the manufacture of the final product in the School workshop.

Some Centres are encouraging their candidates to test certain materials and/or constructions or model parts of the final product, an approach that the Moderator is pleased to see.

Where a model is to form the final product then this section should focus on the form, materials, construction and finish for the model depending on its purpose. Candidates sometimes fall into the trap of considering the full size article when they already know that a model is to be made. However, there may be cases when the best material to represent certain full size materials needs to be considered for use in the final model.

**Planning for Production**

Successful candidates considered how they were to go about making the solution before any work commenced and then produced some form of planning chart outlining the significant stages of manufacture. Unfortunately this was one area where candidates often produced the content after making had been completed and as such was simply a record of what had already taken place. This was obvious to the reader as it was often written in the past tense and marks cannot be awarded for this approach.

There is no requirement for candidates to give detailed descriptions of basic procedures but they are advised to give some consideration of complex tasks or those that are new to them.

**Quality of Production**

It was clear that many candidates had gained considerable experience from and were very proud of the product they had made. Some design solutions were of a very high standard indeed and would clearly perform the required function for a considerable period of time. It is reassuring to see candidates achieve success in this way and to gain so much satisfaction from their hard work.

When candidates decide to make a model as the final product then they should give careful consideration to the quality of materials to be used and methods of production. Because modelling techniques are often fairly straightforward in nature and use fewer tools it is easy for candidates to become complacent but in some ways it is more difficult to achieve as high a standard of outcome as with the familiar resistant materials.

Centres are reminded of CIE's assessment requirement to include clear photographic evidence of made products. These should include an overall view of the article together with appropriate evidence of detail to support the mark awarded. Unfortunately, some Centres are failing to do this as required.

**Evaluation**

It would be fair to acknowledge that evaluations are improving in quality and becoming more meaningful. This is particularly the case where candidates have gone to the trouble of arranging appropriate testing of the product and then linked the outcome to their original design specification for the solution. It is not sufficient to produce a simple list of tick boxes against each specification point as candidates need to qualify how and why the point has been met.

Unfortunately some candidates focus the evaluation on how well the **project** has progressed and simply outline problems they faced in the use of facilities, equipment or time. They omit to test, consider and comment on the **product** in its intended environment, leading to suggestions for improvement. The former approach can be awarded very few marks.

**Fitness for Purpose**

Many candidates seem to be awarded fairly high marks for this section of the assessment and it is very difficult for the Moderator to make meaningful judgement as the product is not to hand. However, it is important for internal markers to be fair to all and to discriminate between candidates in a meaningful way.