DESIGN AND TECHNOLOGY

Paper 0445/01

Common Core

General comments

All questions were accessible to candidates and scripts covering a wide range of marks were submitted. There was no evidence to suggest that candidates were unable to complete the paper in the time available. Indeed some candidates should be congratulated on the quality and quantity of work submitted, particularly for ***Part B*** questions.

Most candidates labelled each part of their response to the chosen ***Part B*** question and this should be encouraged, as the Examiner is able to follow each individual design process in the marking of this question. The Instructions to candidates on the cover of the question paper ask candidates to fasten the separate drawing paper, used for ***Part B***, to the question paper at the end of the examination. The Examiner asks that this be done in such a way that it is easy to access all parts of candidates' responses for marking purposes. A treasury tag or a lightly tied piece of string holding the drawing paper at the back of the question paper is most suitable.

Comments on specific questions

Part A

Question 1

Most candidates were able to indicate an attendance of 2500 people by adding one and a half symbols. The Examiner expected the half symbol to be cut along a vertical axis for the award of the full 5 marks.

Question 2

The majority of candidates were able to identify the safety rules to be followed when using wood chisels and a drilling machine.

Question 3

(a) A few candidates answered with generic terms such as thermoforming plastic but a high proportion was able to be specific.

(b) Candidates should be congratulated on the use of precise terminology in answers to this part question.

Question 4

(a) Candidates commented on size, fixings, material, shape and finger grip space in their successful evaluations.

(b) The most popular correct answer was to improve the shape of the handle by rounding the corners.

Question 5

Many candidates were able to calculate the velocity ratio of the sprocket and chain system and in cases where the final answer was incorrect part marks were awarded for correct working.

Question 6

Most candidates attempted this drawing question with some success but many did not appreciate that the small cut out at the top would not be hidden detail on the required view.

Question 7

(a)(b) The majority of candidates were able to give sound reasons for quality control although some confused this with quality assurance and others simply repeated their answer for both parts.

Question 8

This question created few problems for candidates indicating that most have a broad knowledge of Design and Technology.

Question 9

(a) The question asked candidates to identify uses of the computer for research stages of a project and not manufacturing, as answered by a few.

(b) Most candidates knew the meaning of CAD.

(c) There was some confusion between CAD and CAM in answers to this part question although those who identified a link between the two were awarded a mark.

Question 10

(a) Most candidates were able to state at least one piece of information, age of the children being the most popular, and many were able to look beyond the target group referring to safety requirements and the like.

(b) Candidates successfully identified user tests and laboratory tests of one type or another in answer to this final question to ***Part A***.

Part B

Communication skills were often of a high standard and candidates should be congratulated on this aspect of their work. Good use was made of colour to enhance drawings and this should be encouraged.

Question 11

This was a reasonably popular question although candidates did not always include designs for both the mechanism *and* the case, as asked for in the question.

(a) Candidates had little difficulty identifying points about the safety of the toy suggesting: small parts, material and finish toxicity, sharp edges etc.

(b) Points about appearance were sometimes repetitive but included suitable answers such as: bright, interesting, colourful, bold etc.

(c) Some candidates sketched a vast number of ideas but these were often variations on a single theme rather than different approaches. Candidates should be encouraged to give some consideration to the detail of possible constructions and materials, in note form, rather than simply showing aesthetic aspects of their designs. Although there is no intention to specify the required number of design ideas, candidates should be able to gain high marks from perhaps three or four well communicated ideas if they are very different in kind and include good annotation and detail.

(d) Evaluations were often quite lengthy and wordy tending to be repetitive and somewhat subjective in nature. Candidates are encouraged to refer to the function and requirements of the design brief and to list evaluations point by point.

(e) The quality of responses to this part varied enormously and many drawings were just repeats of ideas from the previous parts of the question. Candidates are expected to show detail of all parts of the construction and to include dimensions, if high marks are to be gained. The information should be such that the design could be made by an appropriately experienced person.

(f) Generic terms such as wood, metal and plastic are not acceptable and candidates should identify specific materials relating to the chosen and developed design idea. Again reasons should be specific to the design and not general such as: strong, durable, cheap etc.

(g) Candidates tended to lack meaningful detail in the manufacture of one part of the toy and often spent too much time on simple tasks such as marking out and preparing materials to size.

Question 12

This was quite a popular question, obviously for those candidates who had followed the graphics option. The standard of drawing was often very high although candidates rarely gave sufficient detailed information on materials and production methods to be used. For example, it was often not clear how a pop-up design would operate, this information being vital to the making of the design.

(a) Candidates often struggled to list four points about the appearance of the design but acceptable responses focused on: interesting, surprising, catches imagination, bold, linked to snow etc.

(b)-(d) See **Question 11 (c) – (e)**.

(e) The majority of candidates were able to identify two benefits of using computer-aided techniques but these were often rather general and/or vague for the award of six marks.

(f) Few candidates were able to specify a professional printing method.

(g) Candidates often repeated the catalogue design here rather than giving specific consideration to the requirements and size of a shop window display.

Question 13

This was, by far, the most popular question in ***Part B*** and candidates generally showed sensitivity to and knowledge of the requirements of low level lighting in a child's bedroom.

(a) Candidates were very knowledgeable about safety requirements for an article of this type and included specific points such as: electrical safety, heat conductivity of materials, stability etc.

(b) Aspects of the appearance of the lighting unit considered by candidates included both the shape and colour of the unit and the overall impact of its image on young children. Candidates identified the need for children to feel safe and secure when they go to bed.

(c)-(f) See **Question 11 (c) – (f)**.

(g) Most candidates produced a design for the box although the amount of detail varied considerably. For high marks, candidates were expected to show how the box would be formed and opened.

Question 14

This was quite a popular question although, unfortunately, a small number of candidates did not appreciate the need for the repair unit to be low to the ground so that it could support a person under a car. Some good design ideas were forthcoming but these were often let down by a lack of construction detail.

(a) Many candidates simply repeated the specification points as listed in the question. Clearly, this was not acceptable and candidates were required to go beyond these to include such points as: move in any direction, be comfortable to lie on, be easily carried and stored, have an adjustable head rest etc.

(b) Candidates were more successful in the identification of safety points and included: no sharp edges, brake system, non-flammable materials, rigid so as not to cause injury etc.

(c)-(f) See **Question 11 (c) – (f)**.

(g) Candidates often talked vaguely about the cutting and welding of metal components but gave little detail on the manufacture of *one* part.

Paper 0445/02
Communication

General comments

Again, it was pleasing to see a general improvement in the overall standard of work presented.

Comments on specific questions

Question 1

Building Site

(a) Almost every solution was to the correct scale and gained one mark. In addition, most candidates gained the one mark for making the angle EDC perpendicular to the given line ED. Many candidates, however, failed to complete the outline of the field accurately. Usually the distances EA, AB and DC were drawn the correct size, but the position of B was not constructed and, as a result, the outline was inaccurate. Two marks were given for the position of B and one mark each for the other sizes. Inaccuracies in the outline resulted in point S being incorrectly positioned horizontally relative to ED. One mark each was given for the arc centre S, the width of the road and for the sides of the road being parallel. Four additional marks were given for the tangential arcs: two for construction and two for accuracy. Many candidates either sketched the arcs or omitted them completely.

(b) Up to five marks were given for any accurate method to determine the area of the field. Equal credit was given for the use of triangulation, geometrical reduction or division into squares. Up to three marks were given for the accuracy of the answer and a further mark for stating the area in square metres. Few candidates gained all nine marks for this part of the question.

Question 2

Computer Monitor

(a) Most candidates gained the two marks given for line quality, three marks for the correct axes for isometric projection, one mark for correct scale and one mark for showing the screen of the monitor to the front. The remaining marks for this part of the question were given for the accuracy of the answer: two marks for the base; two for the stem and eleven marks for the body of the monitor. Most marks were lost for inaccuracies in the body for which candidates were unable to construct the sloping surfaces accurately.

(b) A total of six marks was given for suitable and accurate pencil shading to represent the materials from which the monitor was made. To gain all six marks, shading had to show the roundness of the base, variations in tone on adjacent flat surfaces and the shininess of the screen. Although there was some improvement in the technique of pencil shading, much remains to be done.

Question 3

Architect's Model

It was intended that this question, comprising a number of geometrical constructions, would provide candidates with the opportunity to demonstrate their individual knowledge and abilities.

(a)(i) To gain the two marks given, the correct symbol had to be drawn accurately.

(ii) Again, to gain the two marks the correct scale had to be presented as a ratio.

(b) Most candidates were unable to construct the centres for the three arcs. Three marks were given for the correct construction and three marks for an accurate solution.

(c)(i) One mark each was given for the vertical lines. Many candidates incorrectly drew two vertical lines to complete a rectangle on the given horizontal lines.

(ii) Equally, most solutions did not show the wire stays accurately projected from the given plan to view SV.

(d) To gain the eight marks given for this part of the question, candidates had to draw a rectangle (one mark), of the correct height (one mark), use a suitable method to determine the true length of one of the curved surfaces (up to four marks) and produce a solution of the correct length (up to two marks). Few candidates were able to do this.

(e) It would appear that many candidates estimated the true length of one of the stays without any construction. To gain the four marks given, in addition to a suitable construction being used, the answer had to be scaled.

Generally, this question was answered badly.

Question 4

Book Cover

By comparison, this was answered much better than the previous question.

(a) Most candidates answered this part of the question well. Two marks were given or drawing quality and two marks for letters of the correct size accurately positioned in the given squares. The remaining four marks were given for letters of similar design to the given J and E. The letter T could be made up entirely of straight lines, but it was expected that the S would include radiused corners as seen in the J.

(b) Ten marks were given for an illustration of a jet fighter. To gain all these marks, there had to be appropriate design sketches, for which four marks were given and the jet fighter had to be shown in **simplified form**. This was not done on most solutions, with a large number of candidates merely copying the given sketch.

(c) To draw a regular five-pointed star in the given circle, it was first necessary to divide the circle into five equal parts. It should be noted that equal credit was given for the use of a geometrical construction and the use of a protractor. Most solutions did not show this. One mark was given for any five-pointed star, three marks for the star being regular, and three marks for the star being suitably positioned and accurately inscribed in the given circle.

(d) There was a general improvement in the use of colour. Most candidates now apply colour accurately and with discretion. One mark each was given for colouring the lettering, the aircraft and the star and two marks for the background. As stated in the question, it was not necessary for candidates to colour the whole of their answer to gain full marks providing a clear indication was given of the appearance of the final cover.

Paper 0445/03

Realisation

General comments

Once again the entry has increased and the general standard seems to have improved on last years good effort. Greater proportions of candidates are now reaching the higher grades, with fewer candidates not attempting questions. Answers are fuller and contain greater detail, illustrations are much clearer and contain valid notations.

Question 1 was particularly well answered this year.

Comments on specific questions

Question 1

The child's chair proved to be a very popular question.

(a) Most candidates seemed well able to name a suitable wood for the chair, these ranged from pine, teak, beech, mahogany, etc. The two reasons given for choice ranged from colour, grain, workability, durability, etc.

(b) The main two methods suggested for joining the chair rails to the legs were the mortise and tenon joint and the dowel joint. Sketching of these tended to of a high standard. Less able candidates suggested nailing or just a glued butt joint.

(c) Making the chosen joint was less well done, with many candidates using the wrong tools for marking out, cutting, etc. Better candidates produced staged drawings with excellent details of marking out the joint, method of holding work, cutting each part of the joint, fitting together, etc.

(d) This proved to be the difficult part of the question for most, with few able to describe how the chair parts would be assembled in order. Some suggested it could all be done in one go, others just covered one joint. Many named the correct type of cramp to be used - the sash cramp, but others suggested a G-cramp that would have been far to small.

(e) Only a few candidates seemed able to attach the seat top correctly, most just screwed it down from the top and then tried to cover it with material.

(f) Well answered by all, with a number of valid answers given such as paint, varnish, wax, oil, etc. Reasons varied from bright colours, surface protection, enhancement, cleanliness, etc.

Question 2

Not a very popular question and only answered by a very small number of candidates. It seemed to depend very much on whether the Centre had covered casting of metals or not.

(a) Two main reasons for aluminium given as – lightness and non-rust.

(b)(i) Few understood the meaning of 'green sand', with some saying it was a type of sandpaper!

(ii) Most were able to give a meaning to the term 'pattern' and adding a valid drawing. Some even showed split patterns to illustrate to answer.

(iii) Again most able to explain 'cope and drag', with valid drawings of the two boxes ready for casting.

(iv) This was a little more difficult for candidates, explaining 'runner and riser'. Most understood that the reason for 'runner' which allowed molten aluminium into the mould but were not clear what the riser was for!

(v) Only the very best candidates managed this part of the question. 'Venting' had a wide range of meanings according to some candidates such as opening the window!

(c) Not as well answered as it should have been. Threading the blind holes proved to be more difficult than expected. Most understood the use of taps and tap holder but missed out a number of important stages in the cutting of the thread. Little information was given on holding the work, adding cutting oil, alignment, clearing the taps, etc. Many of the answers tended to be very brief and lacking in real detail.

Question 3

Not a popular question with only weaker candidates in the main attempting it in a rubric error situation.

(a) Materials given – brass, stainless steel, etc, with the reason given as non-rust. It was not clear why the small drawer knob had to non-rust.

(b) This section was very poorly answered and showed a general lack of knowledge of the lathe, its tools and processes.

(i) Few gave the three jaw chuck as the method of holding the work and incorrectly suggested the four jaw or between centres.

(ii) Little understanding of tools or process by those who attempted this part.

(iii) As above.

(iv) As above.

(c)(i) Very few correct answers to this section with most candidates having no clear idea how to mark out the finger grooves on the turned knob.

(ii) Some suggested cutting this out with a coping saw but failed to explain how it would be held and finish to shape.

Question 4

Another very popular question for the majority of candidates, with some very pleasing results. It showed that candidates are very much at ease with the use of acrylic.

(a) Well answered section with reasons for using acrylic as colourful, easily cleaned, can bend easily under heat, good finish, etc.

(b) The two methods of marking out was a little more difficult but most gave chinagraph pencil, crayon, felt tip, normal pencil of protective paper. Less able candidates suggested the scriber, odd legs.

(c) The main two tools for cutting the shape tended to be the coping and band saw, but others suggested the fretsaw, piercing saw, abrafile, jig saw, etc. Most were well drawn with only minor detail missing.

(d) This section was well answered by nearly every one attempting the question with some good illustrations.

(i) Most used the strip heater to heat the acrylic for bending. Explaining how the position needs marking out, work must be turned to prevent problems, etc. A few did get mixed up and heat the whole design in an oven, which would have been difficult to work with once heated.

(ii) Handling was covered by the use protective gloves or tongs and holding the work well away from the heated area.

(iii) Bending was well done with most using a right angle former or table edge. Explain the simple pressure needed and allowing the hot acrylic to cool in position.

(e) Candidates tended to be less sure how to finish the edges of the bend acrylic. Better candidates used wet and dry paper followed by the buffing machine and acrylic polish. Poor answers gave sandpaper, file, etc.

Further general comment

A very pleasing year, with Centres certainly improving their standards as they gain experience of the subject. Candidates seem to be much more confident and express themselves in a more fluent way. Illustrations are much better and contain greater detail. Knowledge of tools, equipment, and processes is certainly improving. However some materials do seem to be ignored, for example metalwork. It was very clear from this years results that many Centres do not cover the full range of the syllabus. While this is understandable in the early years of the examination. It should be the aim of all Centres to develop and extend the range of design and technology work for the future. It can also put their candidates at an advantage in the examination situation and not limit the range of question that can be answered.

Paper 0445/04

Technology

General comments

The overall performance of the candidates was comparable those in previous years. This was typified by a sound knowledge and understanding across the whole of the syllabus. The use of appropriate technological vocabulary was satisfactory and this meant that many responses were clear though many lacked the required depth to access full marks. Sketching was used as a communication method but candidates' responses more often relied upon written methods. Some candidates struggled to illustrate their answers with real examples of everyday technological products, demonstrating a lack of thorough understanding of the syllabus and lack of hands on experience.

Comments on specific questions

Question 1

This question was very popular with the candidature. It elicited the best responses and gave candidates good opportunities to show their knowledge and understanding of the syllabus. Candidates' knowledge of both motion conversion and energy conversions was generally good.

Responses to the mechanisms' elements of the question showed depth and marks were gained accordingly. The calculation in respect of the can opener was well executed, many candidates picked up marks here. Knowledge of modelling techniques was patchy with few Centres having clearly covered this aspect of the syllabus in great depth. Those candidates who had experienced modelling clearly were at an advantage here. Similarly the use of flow diagrams to simulate systems was generally very weak.

Question 2

Few candidates attempted this question. Of those that did the basic concepts of structures were generally sound though many could not explain the differences between frame and carcase construction in structures. There was generally good response to the need for a washer to spread loading from the nut on the cupboard door. Few candidates recognised the advantage of using a wood screw in joining the handle as being aesthetic and to reduce the risk of snagging on the exposed nut and bolt behind the door. Candidates struggled to express the notion of triangulation or rigidity with correct technological terminology in the stepladder question. The candidates recognised the rigidity of the triangular elements of structures. They also were able to identify the areas of compression, tension and neutrality on a simply bent beam. Many candidates recognised the need to reduce the sagging of the shelf by using wither additional brackets or adding a reinforcing longitudinal member across the front underside of the shelf. The calculation was generally well executed with candidate clearly showing their understanding of the concept of equilibrium and moments. The use of shear force diagrams and bending moment diagrams was without exception the worst element of this question. No candidate attempting this element could draw either of these diagrams.

Question 3

Candidates were able in some cases to score in most areas but their answers lacked depth to access the full range of marks. Again the application of knowledge to everyday technological objects was weak. Few could explain the difference between a fixed and a moving pivot. Good candidates identified the need to use bevel gears in the conversion and transmission of motion in the mixer. No candidate could draw a "Black Box" diagram. The selection of materials for the mixer gears was poorly attempted with few candidates identifying the use of Nylon in this situation. There was generally good understanding of the use of worm gears though there was some confusion over the gear ratio, which subsequently lost some marks on the calculation element of the question. Few candidates identified the contrate gear wheel though some did deduce its use for converting motion and were able to suggest suitable applications for it. A few candidates benefited from experience with construction kits and were able to describe the use of a grub screw to fix the gear wheel to a shaft. A small number of candidates recognised the need to reduce the weight of gear wheels in kits by drilling holes in the wheel face.

Question 4

This was a popular question and generally one that most candidates scored well on. Many recognised the use of IC's in terms of miniaturisation. Few though could identify the PTM switch. The numbering of the pins was very well answered and many candidates were able to name the functions of the pins too (not required by the question). Most knew that a combination of differing values of the R and C_1 would determine the time interval obtained. They could also see that replacing R with a VR would give a range of intervals more easily. Fewer candidates could relate to the practical needs of using an IC carrier to reduce the risk of burning the IC during soldering to a PCB. Many viable alternative applications for the 555 timer were given. The calculation of the LED current was well attempted with marks being lost for units errors in only a few cases. Surprisingly few candidates could identify both practical ways of locating the negative connection on the LED. Similarly few could name in the correct order the stages in producing a PCB. Again this points to lack of practical experience - essential in reinforcing candidates' knowledge and understanding of the syllabus. This was borne out in the final part of the question where few candidates could suggest a feasible way of securing the PCB in the casing.

Paper 0445/05

Coursework

General comments

The majority of Centres continued to use the marking scheme very accurately this year showing that a clear understanding of what is required has been established. The quality of coursework seems to be improving each year and the range of products seen, was most impressive. The topics covered were wide ranging, many of them being innovative and challenging. Many Centres provided stimuli and encouraged candidates to seek information outside of school, providing an opportunity for them to develop skills in seeking and using information. This leads to sensible and logical problem solving, allowing a chance to achieve higher success at design.

The folders were generally well organised and presented with good use of graphics. Few problems were experienced with moderation.

Consistency is the key to successful marking. When several Teachers are involved in internal assessment all candidates must be assessed to a common standard. Establishing a rank order, from high achievement to low achievement, initially ensure marking is consistent, rather than trying to establish if the marking is lenient or strict, therefore Teachers can jointly moderate work to a common standard. External moderation will establish too much or too little weight being given to marking.

Comments on specific questions

General analysis of the problem and formulation of design brief

The general quality of work presented in this section was good and the majority of candidates began their folder by setting out a clear problem or need. In some cases this may have developed from the preliminary investigation of a set theme or themes. A small number of candidates spent far too much time looking into a theme prior to producing a clear design brief, often to the detriment of later work. They would benefit from selecting a single theme from those on offer and analysing a range of aspects of that particular problem.

It is worthwhile considering that whilst candidates need to complete adequate research/analysis in order to create a suitable knowledge base for themselves, they should not lose sight of the weighting for this section and the maximum mark available.

Specification

The specification is important, as it focuses the design activity down to a number of parameters that give a clear insight into what the candidate is attempting to do and can be used in the evaluation of the product.

Nearly all candidates produced under separate headings, a specification. There were fewer cases of the specification being headed incorrectly or difficult to find.

The more able candidates provided qualification for each point made and some produced 'essential' and 'desirable' lists in their specification.

Exploration of ideas

This section differentiated effectively across the ability range of the candidates entered for the examination. Ideas ranged from single, simple sketches of a small number of ideas, to a variety of detailed, annoted sketches of each of a variety of ideas. The better projects provided a range of different ideas, each illustrated by a series of sketches with some details developed, e.g. Aesthetics, construction detail and technologies. Furthermore, sufficient information was provided as to how the ideas would perform against the specification.

Development of proposed solution

This section should ideally view the selected proposal for a solution. It should show evidence of further development in the form of sketches to create the optimum solution.

A good number of candidates provided detailed working drawings, presentation drawings, details of construction and chosen materials.

This year more candidates made good use of models and test pieces in order to aid the selection of the optimum solution. These were exhibited in the form of photographs or card models within the folder.

Planning for production

Once again it should be noted that completed work is not in itself evidence that planning was carried out in advance and time management considered. The planning section needs to be a working document where manufacture might be broken down into logical stages and materials selected and prepared in advance.

Quality of production

Most Centres are to be congratulated on the provision of clear photographic evidence of craft–work. Many Centres now provide a series of digital photographs often included in the evaluation. Once again there was evidence of high quality work in both construction and finish. It is pleasing to see a range of technologies/materials being used, ranging from the traditional materials to textiles and electronics.

Evaluation

A continued improvement was seen in this section although not in all Centres. It was clear that the majority of candidates were aware of the need to relate the evaluation to the specification and also to suggest improvement or modification. Few candidates provided 'real' evidence of testing. Candidates could provide photographic evidence to indicate on-going testing, final testing and intended usage.