

CDT: DESIGN AND COMMUNICATION

Paper 7048/01

Structured

Key message

Whilst many excellent answers were seen, the following were considered to be areas where improvement could be made:

- the correct positioning of views in 3rd angle orthographic projection
- the ability to draw an isometric view to scale from given orthographic views
- the drawing of circular parts and lettering in isometric projection
- the rendering of components to look like wood or plastic
- the alignment of exploded views
- the development of a standard packaging carton
- the drawing of circular components in planometric projection
- the drawing of a solid in two point perspective
- the drawing of loci of a moving part
- the different methods of research and the writing of a specification
- the drawing of a given shape that involves circles touching
- flow charts of the stages involved in a process

General Comments

Candidates were required to complete **one** question from **Section A (Question 1 or Question 2)** and **two** questions from **Section B (Question 3 - Question 6)**. This rubric instruction was followed by the majority of candidates but a small number answered more than three questions. It would be beneficial to candidates if they were made aware that all the questions were not to be attempted and to follow the rubric instructions.

Question 1 was the most popular of the **Section A** questions, and question **6** the most popular of the **Section B** questions.

The standard of work was comparable to that of the previous year. It was clear from the responses that there are many able candidates who were well prepared for the examination.

Centres are reminded **not** to secure the papers together with string, staple, paper clip or a treasury tag. Candidate's answer sheets should be placed in the despatch envelope in the order listed on the attendance register. It is however, very important that the candidate completes his/her own details on **both** working sheets.

Comments on specific questions

Question 1

This question had been formatted to give the candidate the working order of drawing the views required.

- (a) (i) Candidates were required to complete the front view by extending the shelf to the correct length, and drawing in the R/H end consistent with the plan.
- (ii) The end view required the candidate to project the height from the front view, and the depth from the plan view, to give a rectangle 80 wide by 100 high.
- (iii) Most candidates recognised that the plan view outline was complete. The addition of a centrally placed Ø25 circle to the right of the given square was needed. An equilateral triangle to the same height as the given square was also to be added to the left of the square. This triangle was to be centrally placed in the space provided, and in the correct orientation.

- (b) Most candidates managed to add three dimensions. For full marks, the dimensioning had to be to B.S. standards.
- (c) Many candidates attempted a symbol. The correct symbol for 3rd angle projection is two concentric circles on the left and a truncated cone on the right. The small end of the truncated cone must be next to the two circles.
- (d) Many candidates drew the head of the wooden hammer. To gain full marks, this needed to be with the correct corner sited on **A** and 30 square by 60 tall. The shaft needed to be 120 long with a Ø25 at the outer end and a Ø15 at the head end. The shaft needed to be in projection with the head. To gain full marks, both ends must be represented as ellipses in the correct alignment.
- (e) Candidates were asked to render the two given pegs. The square shaped peg needed to have grain lines added. Candidates who drew in the end grain, and then joined the grain lines on each face with the end grain scored full marks. The circular shaped peg needed concentric rings adding to the circular top, and graduated shading to each long side.
- (f) This part of the question required the candidate to add 'HARRY' in isometric lettering to the face of the sticker. A convenient space had been left above the image of the hammer.

Question 2

- (a) (i) The three images had been drawn in oblique projection.
- (ii) Candidates were required to add shading to the first block with a different tone to each of the three faces. The second image required a thick line to every edge where only **one** side was evident that produced a corner. A shadow from the light source was required on the horizontal plane and to the right of the cube.
- (b) The question required candidates to complete the estimated two-point perspective of the cube with the letter L on one face. From the given start line, a line to VP1 gave the top L/H part of the cube. A vertical line in an estimated distance towards both VP1 and VP2 gave the left and right edges. Lines to VP1 and VP2 from the top of each line completed the cube. The letter L needed to be drawn (on one of the faces), with a proportional width of character and alignment to the relevant Vanishing Point.
- (c) (i) Two different arrangements of the 24 blocks were required to be drawn. A different view of the same arrangement was not required.
- (ii) Most candidates stated correctly that the box required to hold the stack of blocks shown in idea 1 needed to be 300 x 225 x 150.
- (iii) The pictorial image given was of a standard packaging box where the all the flaps fold and meet in the middle. The depth of the flap is therefore half the length of the adjacent side. Flap 1 given shows the length of one side. From the depth of this flap, half the length of the adjacent side is also given. This information should have given candidates the information to draw two sides 45 x 30 and two sides 60 x 30. A base 60 x 45 (or two bases 60 x 22.5) can be attached to any of the sides in the correct orientation. One glue tab should be evident to join the development sides and three glue flaps to secure the base. All fold lines needed to be drawn to the correct convention.

Question 3

A small number of candidates attempted this optional question

- (a) A full size drawing of the cam shown in profile was required. A Ø40 semi circle needed to be drawn on the given centre lines. At a vertical distance of 30 from the horizontal centre line (40 height – R10), a second semi-circle of Radius 10 needed to be drawn. Connecting lines on each side completed the cam shape.
- (b) Many candidates named correctly the shape of the first cam as Hexagonal. Very few candidates named the last shape as Snail. Candidates who answered 'Escargo' were awarded the mark. The drawing of an eccentric cam needed a circle to be drawn with the given centre off-set. The elliptical

cam needed to be drawn with a 60 major axis (horizontal) and a 40 minor axis (vertical). Evidence of construction was required for full marks.

- (c) (i) The body of the ladybird toy was required to be drawn 80 x 40 x 20. One end needed to have 30 x 15 tapers on two sides. A Ø6 hole in isometric positioned centrally on the 20 x 50 side completed the view.
- (ii) A pictorial sketch of the body with two wheels exploded was required. The wheels were to be drawn at different rotational alignments to each other and aligned with a Ø6 hole and stub axle.

Question 4

- (a) Candidates were required to complete the clock face by adding the centres of eleven more circles to represent the remaining numbers. A Pitch Circle Diameter (PCD) was needed to be drawn and divided into 12 to give the centres. Horizontal and vertical centre lines needed to be added to mark the correct positions on the clock face. The eleven circles were not required to be drawn.
- (b) Many candidates added some shading to the acrylic stand. To make it look like clear acrylic, the edges needed to have graduated shading and the faces needed to have groups of 3 or 4 inclined lines to show transparency.
- (c) (i) A suitable colour scheme was needed that clearly contrasted between the face and the hands of the clock.
- (ii) Justification of the colour scheme used was required.
- (d) A sectional drawing of the clock face with the hands attached using the plastic screw-bolt was required. The bolt needed to be inserted so that the hands could be located onto the plain nut, with the screwed bolt going through the back. Section lines were needed to the back and each hand at different angles. The screw-bolt was to be left plain and not sectioned.
- (e) The four stages listed in the question were to be added to the start of a flow chart. The four activity boxes needed to be of the same width as the start box. A finish box in the same shape as the start box was also needed. A decision box (diamond shape – does it work?) was required to be included between the third and fourth activity box. This decision box needed YES and NO lines with arrows. The YES line needed to connect with the last activity box and the NO to return to the top of the 'fasten the hands to the correct tightness' box.

Question 5

- (a) Many candidates did not answer the first part that required sketches and notes to show how a stencil would be used to add numbers to dice 1.

A triangular pyramid had to be given as the name of dice 2. Dice 2 has four surfaces.

The spinner shown had an octagonal (eight sided) shape. The benefits of making a spinner from plastic are that it last longer than card, is durable, and can be easily moulded with integral numbers in a variety of colours.

- (b) Many candidates were successful at converting the data into relevant degrees of a pie chart. The chart needed to be colour coded and have labels to each sector to score full marks.
- (c) A full size planometric view of the shaker cup was required to be drawn from the orthographic views given. A Ø40 circle representing the base has to be drawn first on the two given centre lines. The height can then be marked off 70 mm up the vertical from the centre of the Ø40 circle. A second circle of Ø60 to represent the top can be drawn on this new centre with tangential lines connecting the two circles. Drawing an item such as this cup in planometric projection appears to be an area of the syllabus that is less well known.

- (d) The two card pieces of the shaker cup were required to be drawn with accompanying notes to explain how the two parts are joined together. The base of the shaker cup is a circle with many small glue tabs around the circumference. The wall of the cup is in the shape of a truncated cone with one glue tab to join the wall together.

Question 6

A large number of candidates attempted this question.

- (a) This question required candidates to show the path of the load (**L**) as the arm of the toy lorry swings down. Initially, an arc needs to be drawn from the given start point of the moving pivot. The arc then needs to be divided up into at least three positions for the arm. A vertical line can now be drawn to the moving pivot end of the arm to give at least three positions of **L**. The last position drawn should be touching the ground. Finally, all the positions of **L** can be joined with a curved line to give the loci of the path of **L**.
- (b) This question required candidates to draw full size the shape of the lorry window. Marks were awarded for drawing the following:
- a vertical line 30 to the right of **A**
 - a horizontal line 80 up from **A**
 - the corner position 80 to the left of **A**
 - a radius of 80 centred on **A**
 - a horizontal line 30 long touching the 80 radius at the bottom left
 - a horizontal line 20 up from **A** and to the right
 - an R10 radius to the bottom R/H corner
 - an R50 line to touch the 20 horizontal and the end of the 30 line

The incorrect construction of the centres for the arcs appeared to be the most difficult part for candidates to achieve.

- (c) Most candidate responses were correct, with 'questionnaire' and 'the Internet' being the most popular. Ergonomics / Aesthetics were not allowed.
- (d) Many specification points were given by candidates. The most popular correct responses were "must have no sharp edges", "must be colourful", "must not have toxic paint" and "toy lorry must move smoothly and in a straight line".
- (e) Many candidates drew a bar chart using the given data. The question required the candidate to provide a vertical and a horizontal axis. The five years needed to be labelled along the horizontal axis with five equal width columns drawn. The vertical axis needed an appropriate scale and labelled 'sales'. Candidates' responses were also needed to be accurately drawn to the scale they had chosen for each year plotted.

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Coursework

General comments

A good proportion of the candidates had used the assessment criteria headings to identify the different sections of their work and should be congratulated on the clear presentation of their folders. A number of candidates had made use of ICT and some good computer generated graphics work was seen. It is, however, important to maintain an appropriate balance between computer and hand generated work. As has been reported in previous years some candidates still tend to spend too much time on the Research and Analysis section sometimes, at the expense of other areas of their coursework folders. The mark allocation given in the assessment criteria provides a good guide as to the amount of time that should be spent on each section of the coursework.

Comments on specific assessment headings

Problem identification

Many candidates scored highly in this section. Candidates had obviously been able to select a design problem from those given in the question paper that was of interest to them. It is at this stage that the intention of the project should be identified and set out clearly. The majority of candidates had successfully done this by sensibly basing their work in a local context and on a situation that they were familiar with. In the majority of cases a clear design brief had been written.

Research and analysis

This section provides candidates with the opportunity to consider all aspects of the design problem they have chosen to base their project on. Before collecting and analysing information, candidates should be encouraged to ask themselves the following questions: “what do I need to know?”, “why do I need to know this?”, “where will I find the information I need?” and “how will I use what I have found out?” Candidates need to understand that the research they undertake needs to be focused and relevant to their chosen design problem.

A fair number of candidates looked in an appropriate way at existing situations or solutions, so that they could draw on this experience when producing their own solutions to the design problem. However, many candidates gathered general information on materials, construction techniques and other aspects which had little or no relevance at this stage of the design process. This type of information was often taken directly from the internet or textbooks. Candidates need to understand that this approach simply wastes time and cannot be awarded credit.

The majority of the work undertaken in this section should be based around the research requirements outlined on the question paper. It is important that all research is analysed, is not sufficient to just collect and describe a series of photographs.

Specification for a solution

The specification is worth 10% of the total marks available and, as such, should not be treated lightly. The more successful specifications were those where candidates had drawn on the results of their research and analysis to produce a list of specific requirements that their design solution must meet. Candidates need to understand that a detailed and meaningful design specification can form a useful aid for both producing their design ideas, and for the evaluation of the final solution. In a good number of cases, specifications were far too general in their content. The better specifications justified why particular features needed to be included. For example, “the product needs to be made from a waterproof material because ..”.

Proposals for a solution

This is the opportunity for candidates to be really creative, and to record and consider a range of different ideas for a solution to their chosen design problem. Successful candidates did not restrict themselves to one or two basic ideas, but produced a range of distinctly different design proposals which were well communicated using a variety of graphic techniques.

It is important that candidates annotate their design drawings and record their thoughts on each idea for possible future development. It is these notes that indicate to the reader how and why the candidate's ideas have been produced and developed.

A good number of candidates failed to carry out any real design development. In these cases they simply selected an idea and made it.

Many candidates should be congratulated on the high quality of their drawing skills in this section of their design folders.

Realisation

It is important that candidates include a number of high quality drawings and photographs of their final outcome in their folder, as this is the only evidence of the final product that is seen by the Moderator. Currently, not all candidates are doing this. It is difficult to comment in detail about the products that had been made, but the work appeared to cover the intended range of appropriate materials and making skills and techniques. Many of the final outcomes were produced to a very high standard.

There needs to be evidence that a candidate has planned the making of the product or model that they have designed. This should include details such as sizes, the materials that will be used, the construction techniques that will be used, and the tools and equipment that will be used.

It is important that photographs showing the candidate making their product are annotated to explain what is going on in the photograph.

Evaluation

The better evaluations were those where there was evidence to show that a candidate had carried out meaningful testing, and considered the results against the original design specification.

Although some candidates continue to use ticked boxes against specification points, many others gave sound objective comments to indicate the success or failure of their solution. Candidates need to understand that as a result of objective testing, meaningful recommendations for improvement and modification can be made.

Some candidates did not attempt this section of the Assessment Criteria.