

# DESIGN AND TECHNOLOGY

Paper 0445/11

Design

## Key Messages

- To score high credit throughout the paper, candidates need to use specific terms when referring to design issues, materials and manufacturing techniques.
- Successful responses to the design process are more likely to be achieved where each stage flows on from and is related to the one before.

## General comments

The majority of candidates appeared to be prepared well to respond to the question of their choice and many showed that they could engage competently in the design problem as set.

The A3 answer sheets are intended to help candidates follow the required design process and those who responded as and where required were able to evidence their design and thinking skills successfully.

## Comments on specific questions

### Question 1

This was, by far, the most popular question and the majority of candidates clearly understood the requirements of a folding unit on which students could do their homework in a bedroom.

- (a) Many candidates scored full credit on this starting point for the design process as they were able to identify four specific functional points required of the folding unit, in addition to those stated in the question. Successful responses included: easy to fold/open; cannot catch fingers; large enough working area; correct height for sitting; matches bedroom; storage for books and stationary items; etc. General responses such as 'durable' or 'lightweight' can be awarded credit only where the specific reason for the requirement is given.
- (b) Most candidates were able to identify two ways by which furniture can be made to fold. Appropriate responses included: hinges; screw/bolt pivots; swivel brackets; rods; sliders; knuckle joints; etc.
- (c) The majority of candidates presented three ideas and showed that they were able to be quite creative in their response to the design problem. Successful candidates enhanced their drawings with colour or other forms of highlighting and added annotations to help describe the nature and detail of each design idea. Candidates are advised to use all the space allocated for the answer to this part of the question so that they can show all detail clearly.
- (d) Successful candidates identified both positive and negative aspects of their design ideas so that they could discriminate clearly between all three. This was often more effective where some of the comments related to the functional points raised earlier. High credit was scored where comments included valid judgements rather than just simple descriptions of each point raised. Evaluation tables that simply ticked or awarded marks against each idea without adding meaningful comment could not be awarded maximum credit.
- (e) The level of response to this part of the question continues to show an improvement over recent examinations. Successful candidates selected a drawing format appropriate to and large enough for the design being presented and then added constructional detail in the form of sketched and

written annotation. Candidates are reminded of the need to add overall and some detail dimensions for the award of maximum credit.

- (f) Many excellent responses selected specific materials appropriate to the design presented in the previous part. Reasons given for choice indicated that candidates had considered the structure of their design and were familiar with the strengths and weaknesses of a range of different materials in this context.
- (g) Outlines that described an appropriate step by step manufacturing method for one part of the design solution, including the tools used, scored high credit. Responses to this part need to develop beyond general marking out and preparation methods that could be applied to any product.

### Question 2

There were some good responses to this question which was intended for those candidates following the Graphic Products option. Most candidates described how the desk tidy would function but the most successful answers included full details of how it could be folded, as asked for in the question.

- (a) The majority of candidates identified four additional points about the function of the desk tidy and successful responses included: appeal to candidates, compact in size, stable on desk, team colours, football theme, include School crest, identification of items to be held, etc.
- (b) Candidates generally had little difficulty showing two methods by which joints could be made in card and other lightweight materials. Appropriate methods included: slots, tabs, interlocking flaps, 'Velcro', staples, tape, slide-in corners, etc.
- (c) )
- (d) ) See **Question 1 (c) – (g)**
- (e) )
- (f) )
- (g) )

### Question 3

The requirements for the bicycle direction indicating system were such that candidates could make use of their knowledge and experience of systems and control, including electronics and/or mechanisms, in an interesting way. Proposed designs were generally suited to the environment in which the product would be used.

- (a) Most candidates had little difficulty identifying four additional points about the function of the direction indicator and these included: clearly visible to others, easy to fit on bicycle, safe to operate, lightweight, weatherproof, resist vibration, etc.
- (b) Candidates responded quite well to the drawing of one mechanical and one electronic system that could be used to indicate direction including: moving/semaphore arm, sliding pointer, flashing lights, moving LEDs, etc.
- (c) )
- (d) )
- (e) ) See **Question 1 (c) – (g)**
- (f) )
- (g) )

# DESIGN AND TECHNOLOGY

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Paper 0445/12  
Design

## Key Messages

- To score high marks throughout the paper candidates need to use specific terms when referring to design issues, materials and manufacturing techniques.
- Successful responses to the design process are more likely to be achieved where each stage flows on from and is related to the one before.

## General comments

The majority of candidates appeared to be prepared well to respond to the question of their choice and many showed that they could engage competently in the design problem as set.

The A3 answer sheets are intended to help candidates follow the required design process and those who responded as and where required were able to evidence their design and thinking skills successfully.

## Comments on specific questions

### Question 1

This was by far the most popular question and the majority of candidates clearly understood the requirements of a carrier for six milk containers, realising that the load was a heavy one.

- (a) Many candidates scored full marks on this starting point for the design process as they were able to identify four specific functional points required of the carrier, in addition to those stated in the question. Successful responses included: easy to load/unload, well balanced, hygienic, easy to clean, comfortable/ergonomic handle, etc. General responses such as 'durable' or 'lightweight' can be awarded marks only where the specific reason for the requirement is given.
- (b) Most candidates were able to identify two different types of carrying handle. Appropriate responses included: leather strap, rope, case type, lip on material, cut-out in material, knobs, etc.
- (c) The majority of candidates presented three ideas and showed that they were able to be quite creative in their response to the design problem. Successful candidates enhanced their drawings with colour or other forms of highlighting and added annotations to help describe the nature and detail of each design idea. Candidates are advised to use all the space allocated for the answer to this part of the question so that they can show all detail clearly.
- (d) Successful candidates identified both positive and negative aspects of their design ideas so that they could discriminate clearly between all three. This was often more effective where some of the comments related to the functional points raised earlier. High marks were scored where comments included valid judgements rather than just simple descriptions of each point raised. Evaluation tables that simply ticked or awarded marks against each idea without adding meaningful comment could not be awarded maximum credit.
- (e) The level of response to this part of the question continues to show an improvement over recent examinations. Successful candidates selected a drawing format appropriate to, and large enough for, the design being presented and then added constructional detail in the form of sketched and written annotation. Candidates are reminded of the need to add overall and some detail dimensions for the award of maximum credit.

- (f) Many excellent responses selected specific materials appropriate to the design presented in the previous part. Reasons given for choice indicated that candidates had considered the structure of their design and were familiar with the strengths and weaknesses of a range of different materials in this context.
- (g) Outlines that described an appropriate step-by-step manufacturing method for one part of the design solution, including the tools used, scored high credit. Responses to this part need to develop beyond general marking out and preparation methods that could be applied to any product.

### Question 2

There were some good responses to this question, which was intended for those candidates following the Graphic Products option. Most candidates described how the collection system would function but the most successful answers were appropriate for sending by post, as asked for in the question.

- (a) The majority of candidates identified four additional points about the function of the collection system and successful responses included: colourful, attract attention, hygienic, bags cannot blow/fall out, capacity for daily emptying, can be folded/dismantled for posting, easy to empty, etc.
- (b) Candidates, generally, had little difficulty showing two methods of attracting people's attention to information. Appropriate methods included: large/simple lettering, 3-D, movement in display, lighting, use of sound, etc.
- (c) )
- (d) ) See **Question 1 (c) – (g)**
- (e) )
- (f) )
- (g) )

### Question 3

The requirements for the play toy were such that candidates could make use of their knowledge and experience of a wide range of mechanisms, in an interesting way. Proposed designs were generally suited to the environment in which the toy would be played with.

- (a) Most candidates had little difficulty identifying four additional points about the function of the toy and these included: simple to play with, bright colours, easy to clean, safe shape, hygienic, rugged design, can be used by more than one child, etc.
- (b) Candidates responded quite well to the drawing of two methods of creating movement with sand. Appropriate methods included: paddle wheel, slide, chute, buckets, belt, balance, screw, etc.
- (c) )
- (d) )
- (d) ) See **Question 1 (c) – (g)**
- (f) )
- (g) )

# DESIGN AND TECHNOLOGY

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Paper 0445/21  
Graphic Products

## Key Message

- The focus of this assessment is Graphic Products. Future candidates would benefit from practical activities based on the questions contained in this paper.

## General Comments

Candidates were required to complete all questions in **Section A (A1, A2 and A3)** and then go on to answer *either B4 or B5* from **Section B**. **Question B4** and **B5** were equally popular optional questions for candidates. A small number of candidates did not follow the rubric instruction and omitted **Question A3**.

There are areas of the syllabus in which further improvements could be made. Candidates must be able to understand information given in one graphical format and be able to draw the same item correctly in another graphical format and also to scale. Drawing irregular shapes and arcs in isometric and displaying data in a three dimensional graphical format are other areas that need to be improved.

## Comments on specific questions

### **Question A1**

*DV Bank Logo*

The drawing of an equilateral triangle 90 side was achieved by most candidates. A well drawn and accurate triangle gave candidates the across flats dimension of the adjacent regular hexagon. Some candidates divided the left hand side of the triangle to get a 45 side and then used this information to draw the regular hexagon. Both approaches required the centre of the hexagon to be determined in order to draw a hexagon that was both 45 side and regular. Most candidates drew a vertical line touching the left hand corner of the hexagon to give the diameter of a semi circle. Whilst the semi circle was not directly dimensioned in the question, the requirement was for an arc that touched both top and bottom extended lines of the regular hexagon flats.

### **Question A2**

*DV BANK signboard*

The letter **K** was printed correctly and to the same style given in the question by most candidates. Candidates who did not 'crate' the letters, found the letter **B** more challenging. Whilst most of the lettering seen was to the correct height, the spacing of the letters by a large number of candidates was somewhat arbitrary.

Many candidates completed the remaining part of the border of the sign board. Not all candidates read the requirement in the question for the quadrilateral shape to be symmetrical.

### Question A3

#### *Savings box for young investors*

Unfortunately not all candidates attempted this compulsory question, losing the credit available.

- (a) Many candidates did not recognise that the given orthographic views were in 1<sup>st</sup> Angle projection (the hidden detail lines gave the information). This should have given a clear message that the coin slot was in the top surface. Successful candidates drew a front elevation of the side with the 60° lines and the Ø60 semi-circle so that they could use the true lengths in an isometric plane as part of their solution. Most candidates drew their solution full size with the height of the base 20 and the width 60. Candidates who did not draw an elevation first were not able to create the 60° slope and plot the Ø60 semi-circle on top of the 20 high base.
- (b) The question asked for the **V** lines to be drawn that highlighted the letter. Candidates who had not 'crated' the shape or drawn an accurate elevation to transfer dimensions drew the shape inaccurately.
- (c) The coin slot was drawn by most candidates on the correct face. The requirement that the coin slot be 30 × 5 was not always met.

### Question B4

#### *Football team logo*

This question was derived from a real 'Graphic' application that is used to transfer logos to actual products.

A logo made up from geometrical shapes was required to be transferred to the outline of a football team shirt. The question gave information that the logo needed to be enlarged by a ratio of 2:1.

Candidates who used measurement alone to scale the given logo onto the shirt found difficulty with the spacing of the relevant shapes.

The question paper had been printed with a large gap in the left hand border of the sheet. This was deliberate to enable the corners of the central equilateral triangle on both the shirt and the logo to be connected and extended to get a vanishing point in the border area.

Once this vanishing point had been achieved, the location of the other shapes relevant to the given triangle and the football combined with the enlargement ratio given, enabled the logo to be drawn accurately on the shirt.

### Question B5

#### *Transactions at the DV bank*

This question was derived from a common application of 'Graphics' to represent data in a visual form.

- (a) Candidates were presented with a list of data that matched different types of transactions at the bank on a busy day. The question required candidates to draw a 'pie chart' to give a visual display of the relative sizes of the different transactions. The data given readily transferred into degrees of a circle as the sum of the amounts given was \$36 000. Marks were awarded for drawing sectors of 120°, 90°, 60°, 45°, 30° and 15° accurately.

Some candidates failed to label the sectors correctly with both the type of transaction and the amount.

A table of business transactions by both individual customers and business customers for the busiest week of the year was presented for parts (b) and (c) of the question.

- (b)** Candidates were required to draw a two-dimensional bar chart showing the total number of customers for each of the five given days. Candidates chose their own vertical scale with most candidates using 1:20 (10 mm representing 200 customers – maximum of 1800 customers = 90 mm tall)

It was important that candidates drew columns that were accurate in value to the scale that they had chosen and also that each column was correctly labelled with the day of the week and the respective number of customers.

- (c)** A three dimensional bar chart was required to show the numbers of each type of customer over the five days. Candidates who drew isometric / planometric columns produced the most visual charts. By comparing the relevant data, the most successful candidates drew two rows of columns with the business customers (lower numbers / columns) in front of the individual customers.

# DESIGN AND TECHNOLOGY

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Paper 0445/22  
Graphic Products

## Key Message

- The focus of this assessment is Graphic Products. Future candidates would benefit from practical activities based on the questions contained in this paper.

## General Comments

Candidates were required to complete all questions in **Section A (A1, A2 and A3)** and then go on to answer *either B4 or B5* from **Section B**. **Question B4** and **B5** were equally popular optional questions for candidates. A small number of candidates did not follow the rubric instruction and omitted **Question A3**.

There are areas of the syllabus in which further improvements could be made. Candidates must be able to understand information given in one graphical format and be able to draw the same item correctly in another graphical format and also to scale. Drawing irregular shapes and arcs in isometric and drawing ellipses to given axis are other areas that need to be improved.

## Comments on specific questions

### Question A1

#### *EAT OUT Logo*

- (a) The drawing of a part regular octagon 50 side with 45° angles on the right hand side was achieved by most candidates. Outcomes from some candidates showed that the extension of the top line to 110 increased inaccuracies to the drawing of a regular half octagon on the left hand side.
- (b) A symmetrical cup shape was required to be drawn. Whilst most candidates achieved a 'mirror' drawing, some inaccuracies were evident in either the length of the top and/or the bottom line.
- (c) Most candidates drew a semi-circle based on the correct centre to represent the top of the burger bun. Some candidates used the centre of the given line to base their semi-circle upon.

### Question A2

#### *EAT OUT signboard*

The letter **U** was printed correctly and to the same style given in the question by most candidates. Candidates who did not 'crate' the letters found the letter **A** more challenging, with the horizontal bar being placed incorrectly in line with the horizontal bar of the letter **E**. Whilst most of the lettering seen was to the correct height and style, the spacing of the letters by a large number of candidates was somewhat arbitrary.

Many candidates completed the remaining part of the quadrilateral border of the sign board. Not all candidates read the requirement in the question for the quadrilateral shape to be symmetrical.



### Question A3

#### Savings box for loyalty points tokens

Unfortunately not all candidates attempted this compulsory question, losing the credit available.

- (a) Successful candidates drew a front elevation of the outline of the hexagon and the R27 of the burger bun, so that they could use the true lengths in an isometric plane as part of their solution. Most candidates drew their solution full size with the height of the hexagon 92/94 mm. Candidates who did not draw an elevation first were not able to create the 60° slope of the hexagonal shape.
- (b) The question asked for the burger outline to be drawn on the front face of the savings box. Candidates who had not drawn an accurate elevation to transfer dimensions of the R27 semi-circle drew the outline burger shape inaccurately. Most candidates drew the burger bun base and filling to the given 8 mm thickness.
- (c) The coin slot was drawn by most candidates on the top side face. The requirement that the coin slot be at least 25 × 4 to accept the Ø24 × 3 coin was not always met.

### Question B4

#### Bottle carrier for four bottles

This question was derived from a real graphic product.

The question showed a pictorial view of a bottle carrier and one bottle. The question required individual orthographic views to be drawn enabling the candidate to use 1<sup>st</sup> or 3<sup>rd</sup> angle projection. Candidates were not required to state which projection they had used. The views were required to be drawn to a scale of 1:2.

- (a) A front elevation was required that had a width of 61/62 (bottle width of 52 × 2 + 3 × 6 mm card walls). The height of the container was to be drawn at 40 with the handle 55 mm above the container. The handle had to have sloping sides and a finger slot of 39 × 10 with semi-circular ends. The finger slot was to be centrally placed on a centre line 10 from the top of the handle. The tennon of the central divider needed to be evident centrally in the container and 3 mm wide.
- (b) The plan view needed to show an external size of 61 × 61 with four equally sized square pockets 26 × 26. Hidden detail of the finger slot needed to be evident and centrally placed on the correct divider.
- (c) An end elevation needed to show a width consistent with the front elevation and the height of the container and handle projected from the front elevation. The finger slot again had to be evident in the handle portion, showing the correct projected position.
- (d) The drink bottle was to be drawn as two concentric circles in the required position D in the plan view as a Ø26 with a Ø10 inside it. The Ø26 was to be shown 50 high from the inner face of the 3 mm base with the Ø10 to a height of 75 on the front elevation. Joining the two diameters, a sloping line was to be drawn on either side of the bottle on the candidates' front elevation solution. The candidates' solution from the plan and front elevation needed to be projected to the end elevation to complete the three views.

### Question B5

#### Counter top leaflet holder

This question was derived from a real 'Graphic' product.

The source information showed a leaflet holder with glue tabs on the front and the bottom edge of the side. This showed that the development (net) was a one-piece shape with the back, base and front connected vertically. The sides folded round to meet the front and glue tabs attached the sides to the base and front.

- (a) Many candidates drew 3 main panels with the central panel 100 wide and the back 120 down from the given top of the **EAT** box. The base panel needed to be 40 deep and also 100 wide with the front attached below and 70 tall. A second wing box to mirror the **EAT** box needed to be added to a size of 50 × 20 with the word **OUT** printed in the same style as **EAT**.

A half ellipse of major axis 100 and minor axis 50 was required to be drawn on the top of the back panel. The half ellipse was to add only 25 mm to the height of the back panel. The two sides 70 × 40 were to be drawn attached to the back panel with glue flaps along the 70 side. The base also had to have glue flaps drawn along its 40 side. Four glue flaps in total were required to be drawn. Fold lines using the correct convention needed to be evident between the back and base, the base and front, the back and sides, and where each glue flap was attached to the development (net).

- (b) A method of joining the holder without the use of glue need to be sketched. Many candidates used slots and tabs correctly with the best solutions showing a locking method of an arrow tab or similar.

# DESIGN AND TECHNOLOGY

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Paper 0445/23  
Graphic Products

## Key Message

- The focus of this assessment is Graphic Products. Future candidates would benefit from practical activities based on the questions contained in this paper.

## General Comments

Candidates were required to complete all questions in **Section A (A1, A2 and A3)** and then go on to answer *either B4 or B5* from **Section B**. **Question B4** and **B5** were equally popular optional questions for candidates. A small number of candidates did not follow the rubric instruction and omitted **Question A3**.

There are areas of the syllabus in which further improvements could be made. Candidates must be able to understand information given in one graphical format and be able to draw the same item correctly in another graphical format and also to scale. Drawing irregular shapes and arcs in isometric and drawing ellipses to given axis are other areas that need to be improved.

## Comments on specific questions

### Question A1

*EAT OUT Logo*

- (a) The drawing of a part regular octagon 50 side with 45° angles on the right hand side was achieved by most candidates. Outcomes from some candidates showed that the extension of the top line to 110 increased inaccuracies to the drawing of a regular half octagon on the left hand side.
- (b) A symmetrical cup shape was required to be drawn. Whilst most candidates achieved a 'mirror' drawing, some inaccuracies were evident in either the length of the top and/or the bottom line.
- (c) Most candidates drew a semi-circle based on the correct centre to represent the top of the burger bun. Some candidates used the centre of the given line to base their semi-circle upon.

### Question A2

*EAT OUT signboard*

The letter **U** was printed correctly and to the same style given in the question by most candidates. Candidates who did not 'crate' the letters found the letter **A** more challenging, with the horizontal bar being placed incorrectly in line with the horizontal bar of the letter **E**. Whilst most of the lettering seen was to the correct height and style, the spacing of the letters by a large number of candidates was somewhat arbitrary.

Many candidates completed the remaining part of the quadrilateral border of the sign board. Not all candidates read the requirement in the question for the quadrilateral shape to be symmetrical.

### Question A3

#### Savings box for loyalty points tokens

Unfortunately not all candidates attempted this compulsory question, losing the credit available.

- (a) Successful candidates drew a front elevation of the outline of the hexagon and the R27 of the burger bun, so that they could use the true lengths in an isometric plane as part of their solution. Most candidates drew their solution full size with the height of the hexagon 92/94 mm. Candidates who did not draw an elevation first were not able to create the 60° slope of the hexagonal shape.
- (b) The question asked for the burger outline to be drawn on the front face of the savings box. Candidates who had not drawn an accurate elevation to transfer dimensions of the R27 semi-circle drew the outline burger shape inaccurately. Most candidates drew the burger bun base and filling to the given 8 mm thickness.
- (c) The coin slot was drawn by most candidates on the top side face. The requirement that the coin slot be at least 25 × 4 to accept the Ø24 × 3 coin was not always met.

### Question B4

#### Bottle carrier for four bottles

This question was derived from a real graphic product.

The question showed a pictorial view of a bottle carrier and one bottle. The question required individual orthographic views to be drawn enabling the candidate to use 1<sup>st</sup> or 3<sup>rd</sup> angle projection. Candidates were not required to state which projection they had used. The views were required to be drawn to a scale of 1:2.

- (a) A front elevation was required that had a width of 61/62 (bottle width of 52 × 2 + 3 × 6 mm card walls). The height of the container was to be drawn at 40 with the handle 55 mm above the container. The handle had to have sloping sides and a finger slot of 39 × 10 with semi-circular ends. The finger slot was to be centrally placed on a centre line 10 from the top of the handle. The tennon of the central divider needed to be evident centrally in the container and 3 mm wide.
- (b) The plan view needed to show an external size of 61 × 61 with four equally sized square pockets 26 × 26. Hidden detail of the finger slot needed to be evident and centrally placed on the correct divider.
- (c) An end elevation needed to show a width consistent with the front elevation and the height of the container and handle projected from the front elevation. The finger slot again had to be evident in the handle portion, showing the correct projected position.
- (d) The drink bottle was to be drawn as two concentric circles in the required position D in the plan view as a Ø26 with a Ø10 inside it. The Ø26 was to be shown 50 high from the inner face of the 3 mm base with the Ø10 to a height of 75 on the front elevation. Joining the two diameters, a sloping line was to be drawn on either side of the bottle on the candidates' front elevation solution. The candidates' solution from the plan and front elevation needed to be projected to the end elevation to complete the three views.

### Question B5

#### Counter top leaflet holder

This question was derived from a real 'Graphic' product.

The source information showed a leaflet holder with glue tabs on the front and the bottom edge of the side. This showed that the development (net) was a one-piece shape with the back, base and front connected vertically. The sides folded round to meet the front and glue tabs attached the sides to the base and front.

- (a) Many candidates drew 3 main panels with the central panel 100 wide and the back 120 down from the given top of the **EAT** box. The base panel needed to be 40 deep and also 100 wide with the front attached below and 70 tall. A second wing box to mirror the **EAT** box needed to be added to a size of 50 × 20 with the word **OUT** printed in the same style as **EAT**.

A half ellipse of major axis 100 and minor axis 50 was required to be drawn on the top of the back panel. The half ellipse was to add only 25 mm to the height of the back panel. The two sides 70 × 40 were to be drawn attached to the back panel with glue flaps along the 70 side. The base also had to have glue flaps drawn along its 40 side. Four glue flaps in total were required to be drawn. Fold lines using the correct convention needed to be evident between the back and base, the base and front, the back and sides, and where each glue flap was attached to the development (net).

- (b) A method of joining the holder without the use of glue need to be sketched. Many candidates used slots and tabs correctly with the best solutions showing a locking method of an arrow tab or similar.

# DESIGN AND TECHNOLOGY

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Paper 0445/31  
Resistant Materials

## Key messages

- To perform well on this paper, candidates need to use technical terms accurately. This is particularly important when naming tools and materials and describing processes and techniques.
- Candidates need to provide clearly drawn sketches and supportive written notes when attempting questions that begin with the statement: "Use sketches and notes to..."
- Candidates need to make sure that their ideas are clear and accurate.

## General comments

### **Section A**

This section tests a very wide area of knowledge concerned with materials, tools and processes used when working with wood, metal and plastic. It is essential that candidates have at least a basic knowledge and understanding of tools, materials, processes and techniques associated with wood, metal and plastic. Some candidates did not have this all-round knowledge and understanding and performed less well on this section than on **Section B**.

### **Section B**

This section always has a number of questions with large mark allocations requiring a combination of clear and accurate sketches supported by detailed written notes. Careful reading of the questions is needed before answering. In some cases, candidates provided information not asked for in the question, which could not be awarded any credit. Some candidates did not follow the instruction *use sketches* and could not access the maximum credit available.

## Comments on specific questions

### **Section A**

#### **Question 1**

The majority of candidates did not name the three types of nail. Many candidates incorrectly gave the names of screws for the nails.

#### **Question 2**

The majority of candidates were able to name two tools used to cut out the dovetail joint. The most common answers were chisel and saw.

#### **Question 3**

Only a minority of candidates gained full credit by describing how impact adhesive would be used. Most candidates gained minimal credit if they stated that the adhesive would be applied to both surfaces. However, many answers included details of how the pieces would then be clamped and allowed to dry.

#### Question 4

- (a) Many candidates drew a long hinge for half credit. The remaining credit was awarded for showing the appropriate number of holes for the screws.
- (b) Many candidates were unclear of the benefit of the piano hinge. The best answers referred to the support it gave along its length.

#### Question 5

- (a) Many candidates were able to name blow moulding correctly. However, there were many incorrect answers relating to injection moulding.
- (b) Only a minority of candidates named polythene as the suitable plastic for the bottle. Some candidates gave generic terms that were not awarded credit. When a question asks for a *specific* plastic, candidates must give a name; for example, acrylic, polystyrene or nylon and not a generic term.

#### Question 6

Many candidates gained at least half credit for completing the drawing of the outside calipers. The remaining credit was awarded for the accuracy of the ends of the calipers. Many candidates drew the calipers with sharply pointed ends which gained no credit.

#### Question 7

The majority of candidates were unable to name the piercing saw. Many candidates named a coping saw and gave *cutting wood* for a specific use.

#### Question 8

Many candidates drew an accurate stopped housing joint. However, there were many interesting variations of a stopped housing joint that gained some credit. Candidates should have knowledge of a variety of joints used in different situations and should be encouraged to practice drawing them.

#### Question 9

- (a) Many candidates named a spring washer but there were many named variations including *spiral* that were not accepted.
- (b) The purpose of the spring washer was quite well known. The best correct answers referred to it protecting the surface or preventing the joint from becoming loose.

#### Question 10

- (a) Only a minority of candidates were familiar with the hollowing process.
- (b) Many candidates gained credit for naming the (bossing) mallet and fewer for naming the sandbag.

#### Section B

#### Question 11

- (a) Many candidates named softwoods instead of hardwoods. All candidates should be familiar with a selection of hardwoods and softwoods that they can refer to in a wide variety of situations.
- (b) Many candidates were able to show how the wheels could be fixed to the toy. Most answers included the use of dowel or metal rod as an axle that would be either secured in the toy or in the wheel and allowed to rotate. Other designs used screws or bolts. Most candidates gained credit for this question.

- (c) Many candidates started well by drilling a hole through the chimney and inserting a connecting rod. However, the rod was often connected directly to the roller which meant that, while it could be steered, the roller could not rotate. There were some excellent designs that included the use of some sort of bracket to which the rod was connected, allowing the roller to rotate. Due to the amount of available credit in this question, it is essential that candidates address every part. It was evident that some candidates gave little or no details of materials, constructions and fittings used. There was specific credit awarded for this part of the question.
- (d) Those candidates who had some knowledge and experience of woodturning were able to access much of the available credit. The bullet points in the question are designed to help candidates address the essential issues and there are specific marks allocated to each bullet point. There were some excellent sketches showing preparation and setting up of the wood on the lathe.

### Question 12

- (a) Most candidates stated the advantage that thermoplastics could be reheated and reshaped.
- (b) Many candidates named line bending or use of a strip heater as one method of heating plastic sheet and the oven as a second method.
- (c) This question was divided into four specific areas to be addressed. Most candidates attempted all four areas. It is essential that candidates communicate their ideas clearly by way of notes and sketches. Often, potentially good ideas failed to obtain the highest credit because specific detail was lacking or that a sketch lacked clarity. The best way of fixing the support (plastic) to the base (hardwood) was by screws and not an adhesive. Most candidates showed a dowel or similar rod to support the roll of tape but did not show how it would be kept in place during use. Many candidates used some sort of blade to cut the tape but did not show how this would be fitted to the dispenser.
- (d) There were many excellent descriptions of the extrusion process.
- (e) Candidates used either pop riveting or traditional riveting using a rivet snap. Credit was available for any relevant stage in either process. Candidates must provide as much detailed information as possible. For example, many answers relating to pop riveting simply stated that a pop rivet gun would be used without recalling any other detail.
- (f) (i) Many candidates did not realise that self-finishing means that no additional finish will be applied.
- (ii) Aluminium could be self-finished by using a fine grade of wet and dry paper followed by polishing either by hand or by using a buffing wheel.

### Question 13

- (a) Most candidates gained credit for completing the cutting list but only a minority gained full credit. Candidates need to understand the terms length, width and thickness and read working drawings accurately in order to determine specific dimensions.
- (b) There were many excellent answers showing how the sides of the box would be screwed together. While the majority of candidates did address all parts of the question, some candidates did not state the type of head, material or length of the screws used.
- (c) Many candidates gained some credit for showing how the mirror could be fixed. The most common methods included some form of block or grooves. However, some of the adhesives named to provide permanent fixing were not appropriate and therefore could not achieve maximum credit.
- (d) Many candidates gained credit for showing sound designs for a hand hold. However, the methods of construction and fittings used were not always appropriate.
- (e) The majority of candidates gained credit throughout this question. There were excellent answers showing how the rod would be marked out and cut to length. Bending techniques were less accurate. Most candidates drilled a hole in the wooden block into which the rod could fit but few named an appropriate adhesive; epoxy resin being the most appropriate.



# DESIGN AND TECHNOLOGY

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Paper 0445/32  
Resistant Materials

## Key messages

- To perform well on this paper, candidates need to use technical terms accurately. This is particularly important when naming tools and materials and describing processes and techniques.
- Candidates need to provide clearly drawn sketches and supportive written notes when attempting questions that begin with the statement: *Use sketches and notes to...*
- Candidates need to make sure that their ideas are clear and accurate so that the Examiner can understand what they are trying to communicate.

## General comments

### Section A

This section tests a very wide area of knowledge concerned with materials, tools and processes used when working with wood, metal and plastic. It is essential that candidates have at least a basic knowledge and understanding of tools, materials, processes and techniques associated with wood, metal and plastic. Some candidates did not have this all-round knowledge and understanding and performed less well on this section than on **Section B**.

### Section B

This section always has a number of questions with large mark allocations requiring a combination of clear and accurate sketches supported by detailed written notes. Careful reading of the questions is needed before answering. In some cases, candidates provided information not asked for in the question, which could not be given any credit. Some candidates did not follow the instruction *use sketches* and could not access the maximum credit available.

## Comments on specific questions

### Section A

#### Question 1

The majority of candidates did not answer that the metal bracket was too thin to be countersunk or that the round head would exert more evenly distributed pressure.

#### Question 2

Only a minority of candidates were able to give reasons why the solid wood had warped. There were some good answers referring to poor seasoning or poor stacking while drying but there were many imprecise references to *heat* or *moisture* that gained no credit.

#### Question 3

Only a minority of candidates gained full credit by drawing the firmer chisel. There were many bevel edge chisels drawn which gained half credit.

#### Question 4

Many candidates named the chuck key and gave its specific use. The majority of candidates did not name the tap or provide a specific use. Candidates were rewarded if they were able to state a specific use even without being able to name the tool or item of equipment.

#### Question 5

Only a small minority of candidates were able to name both standard metal sections. While some variation from the terms *square tube* and *flat* or *strip* was rewarded, it is important that candidates are familiar with the exact terms of sections not only in metal but also in wood.

#### Question 6

- (a) Many candidates were unable to name a suitable plastic for the kettle. Acrylic, polystyrene and melamine are not suitable materials. The most common correct answers included ABS and polypropylene.
- (b) While injection moulding was named correctly by many candidates, there were many incorrect methods of manufacture given, including blow moulding and vacuum forming. Candidates need to be clear about the methods used to manufacture plastics products.
- (c) There were many excellent advantages for a kettle made from plastic rather than metal. The most popular answers referred to it being lighter weight and that it did not become as hot as metal.

#### Question 7

The majority of candidates were able to draw a junior hacksaw. This is a tool of which candidates should have practical experience.

#### Question 8

Many candidates did not fully understand the term annealing. However, many candidates did state that the brass would need to be heated up and gained half credit, but failed to add that it would then be left to cool. There are different methods of annealing for different metals.

#### Question 9

The majority of candidates were unable to draw a flat bit.

#### Question 10

Very few candidates were able to provide a drying time and specific use for PVA and synthetic resin adhesives. The term *specific* means that candidates have to provide an exact example of where each adhesive would be used, such as, *when gluing the frame of a table together* or *when gluing parts of a wooden boat*.

### Section B

#### Question 11

- (a) Most candidates named two manufactured boards, the most common being plywood, chipboard and MDF.
- (b) Many candidates were unable to state two advantages of manufactured board over solid wood. Common misconceptions included that it was lighter in weight, that it was stronger and that it was easier to work with. The best answers stated correctly that manufactured board is cheaper than solid wood, that it is more stable and that it is available in large sheets.
- (c) Many candidates gave good reasons for the popularity of flat-pack furniture. The most common answers referred to it being cheaper than ready assembled furniture, that it took up less storage space and that customers felt a sense of satisfaction when assembling it themselves.

- (d)(i)(ii) These questions were not well answered by candidates. Most candidates did not draw the two KD fittings attached to the correct parts of the computer desk or in the correct orientation. Candidates are encouraged to learn, through practical experience, not just about the different types of KD fittings but how they are used to join different parts of furniture together.
- (e) (i) Many candidates named a jig saw correctly. However, many named hand tools such as a tenon saw or coping saw and many named machine saws that are not portable power tools.
- (ii) Many candidates stated a sensible safety precaution irrespective of whether or not they had given the correct answer to part (i). The most common answers referred to eye protection and the need to clamp the work safely.
- (iii) Many candidates gained at least minimal credit for this question. There were three essential details to show through sketches and notes: the correctly named plane; smoothing or jack, the method of securing the wood in a vice or clamps and the wood tilted so that the sawn edge remained horizontal while it was planed.
- (f) Generally this question was not well answered by candidates. Candidates were given the opportunity to show how the computer desk could be modified to accommodate the tower and 20 CDs. What was required was some sort of shelf, cabinet or support onto which the tower and 20 CDs could be stored. Some candidates simply showed the tower on the floor. Designs that provided storage on the outside of the existing desk were awarded fewer marks than those that were incorporated within the desk. The final sentence of the question was worth much of the credit available, i.e. *Include details of materials, constructions and fittings used*. Many candidates did not attempt to provide any details at all and therefore lost credit.

#### Question 12

- (a) Most candidates were able to state at least one advantage of using aluminium rather than steel for the holder. The most common correct answers referring to its ability to be formed more easily or that it did not corrode. While aluminium is lightweight compared to steel, this was not considered relevant to this particular product.
- (b) Many candidates gained some credit for this question. Many candidates did not know how to cut the blank as a hacksaw would not be appropriate. Tin snips were correctly named by a minority of candidates. A variety of answers were accepted for cleaning the surface of the blank, including abrasive paper, emery cloth, wet and dry paper, metal polish and buffing wheel.
- (c) The majority of candidates were unable to draw a bending jig that incorporated pins with a former. However, it was still possible to achieve at least half credit for a well drawn former and accurate technical notes describing how the bends would be achieved.
- (d) Many candidates drew some form of stop that would prevent the slider from falling out of the holder. Many solutions included the use of additional sheet material that would be bent over at each end.
- (e) Candidates generally demonstrated a good understanding of making the slider from acrylic. Credit was awarded for any four correct stages during manufacture: marking out, cutting, squaring up edges, drilling and finally cementing the rod into the slider.
- (f) The majority of answers described how the signboard could be made from acrylic. Generally, candidates demonstrated a good level of understanding, showing the acrylic 'net' marked out, heating by means of a strip heater or line bender and the use of a former around which the shape would be achieved.

### Question 13

- (a) Most correct answers referred to the type, quantity and sizes of garden tools. Other items of research such as the target user and location for the rack were equally good answers.
- (b)(i) The majority of candidates achieved marks for drawing a suitable construction. Dowel, housing and mortise and tenon were awarded maximum credit while butt joints using nails or screws with or without glue were awarded partial credit.
- (ii) The majority of candidates named the joint they had drawn in part (i).
- (c) Many candidates achieved marks for showing how the bracket could be produced. The best method was to drill the holes first, saw off the waste, make the sawn edge flat, then remove the sharp edges. Many candidates noted most of the stages but not necessarily in the correct order or with sufficient accurate technical detail to secure maximum credit.
- (d)(i) Only a minority of candidates indicated clearly the short grain.
- (ii) Generally, candidates were unsure why short grain was only a problem in solid wood. Many candidates hinted at the reason by stating that manufactured boards are processed, without extending their answers.
- (e)(i) The majority of candidates gave two good reasons for applying a finish; appearance and protection being the most common answers.
- (ii) The majority of candidates named two suitable finishes; the most common being varnish, oil, lacquer and stain.
- (iii) This part was not answered well by candidates. Candidates should have related to their practical experiences of cleaning up wood using a smoothing plane, different grades of glasspaper and wiping the surface clean before applying their chosen finish.
- (iv) Many candidates recognised that the advantage of applying a finish before assembly was that all the parts would be covered. Some candidates made an excellent point that this would also allow for different parts to receive different colours.

The advantage of applying the finish after assembly was that it was quicker. There were also some valid answers stating that this would allow the joints to be covered.

# DESIGN AND TECHNOLOGY

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Paper 0445/33  
Resistant Materials

## Key messages

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The advantage of applying the finish after assembly was that it was quicker. There were also some valid answers stating that this would allow the joints to be covered.



# DESIGN AND TECHNOLOGY

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**Paper 0445/41**  
**Systems and Control**

There were too few candidates for us to be able to produce a meaningful report.

# DESIGN AND TECHNOLOGY

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**Paper 0445/42**  
**Systems and Control**

There were too few candidates for us to be able to produce a meaningful report.

# DESIGN AND TECHNOLOGY

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**Paper 0445/43**  
**Systems and Control**

There were too few candidates for us to be able to produce a meaningful report.

# DESIGN AND TECHNOLOGY

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**Paper 0445/05**

**School Based Assessment**

## **General comments.**

A significant number of new Centres entered candidates for this component in the November assessment session.

All of the new Centres have embraced the aim of this Unit; to develop in candidates an expertise in creative thinking and expressing it through their research, designing, planning and making skills.

Some of the work submitted this session was highly innovative, exceptionally well presented with high quality outcomes. Candidates and Centres are to be congratulated on the care, effort and quality of their work.

The majority of projects were appropriate, with many having interesting and challenging briefs. Many candidates identified projects related to their School/college, the home/local environment or specialist interest and hobbies. In many cases, candidates were able to make good use of clients to inform them of the particular need; give guidance for the generation of a specification and assist in the testing and evaluation of the product.

Whilst most work submitted was detailed and concise; there are a number of candidates who produce exceptionally large folders. Candidates should be encouraged to focus their research and make fuller use of the space available on each sheet. Some candidates present over-large research sections, containing mostly generic information that will not help them produce a detailed specification or aid them in designing.

The majority of candidates manage their time effectively to ensure that a functional product is completed leaving sufficient time for appropriate testing and evaluation.

Many Centres included individual candidate assessment sheets; these were very helpful for Moderators to see how and where marks were awarded.

Some Centres submitted their work in a digital format. Work was detailed and well presented; design ideas were scanned in and they contained clear photographic evidence of manufacture, testing and evaluation. Any Centres wishing to submit their work in a digital form should contact CIE for details of the approved format.

The majority of Centres apply marks consistently and accurately and in line with the standards set by the Awarding Body. Centres are encouraged to use the detailed guidance given in the syllabus and the Moderators report when assessing the work of candidates.

Whilst most Centres fully complied with the requirements to forward the correct sample and accompanying documentation, it is important that both the MS1 form and the Coursework Assessment Summary Form 0445/05/CW/S/12 are carefully completed and submitted with the sample.

## **Comments on specific headlines**

### **1. Identification of a need or opportunity with a brief analysis leading to a design brief**

Candidates generally complete this section well. They explained the need fully; using photographs where appropriate, and described the user group before producing a clear and detailed design brief. Many included details of the client and their requirements. Some candidates produced charts indicating a wide range of options and selected one; giving a brief explanation of the brief. To access the higher mark range, candidates must analyse the need in more detail and consider the requirements of possible users.

## **2. Research into the design brief resulting in a specification**

Many candidates produced focused and relevant research. Many looked at existing products and highlighted positive design features that they could use as inspiration for their initial designs. Some candidates produced targeted questionnaires to potential users. The responses helped to define the specification.

Some candidates would benefit from sifting through their research and only include information that is relevant. When including anthropometric data, for example, only select those particular anthropometric features that apply to their brief. Some candidates include large amounts of information on a wide range of materials material; research should focus on appropriate materials for the particular brief and include an explanation as to why they are suitable.

The best specifications were detailed, clear and justified. Candidates are reminded not to include generic statements such as 'must be value for money, must be aesthetically pleasing' and so on.

To achieve the higher mark range, candidates must include all relevant information such as important sizes and only include research that is related to their brief. Specifications should include specific details of the requirements for the product.

## **3. Generation and exploration of design ideas**

Most candidates produced a range of interesting designs. Design pages were generally well annotated and the quality of presentation was generally high. Some candidates focused on one idea from the outset and did not access the higher mark ranges.

There is an increased integration of annotated sketching, 2D and 3D modelling and computer aided images to explore design possibilities. This is to be encouraged.

To access the higher mark range, candidates must produce a wide range of well-annotated creative and innovative possibilities. They must clearly evaluate their ideas with reference to the specification.

## **4. Development of proposed solution**

This section required candidates to show their decision-making regarding the concept, materials and construction methods, through trialling, testing and modelling. Although many candidates had clear evidence of developmental work, a significant number had very little evidence of decision-making.

To achieve the higher mark range, candidates must show clearly the trialling or testing of alternatives and of the decisions that they make, e.g. design improvements/modifications, constructional/manufacturing detail and choice of specific materials.

## **5. Planning for production**

Many candidates produced detailed plans for production. They produced a logical sequence of the stages of manufacture, including detailed cutting lists, approximate time allocations and appropriate Health and Safety considerations. Some candidates draw out detailed stages of production; this is unnecessary, only drawings of specific constructional detail, mechanisms, fixings, jigs or moulds are required.

Working drawings were generally of a very good standard, with candidates producing high quality working drawings. Some candidates made very good use of Computer Aided Design software. To achieve the higher mark range candidates must produce an effective sequence of operations and a fully dimensioned and detailed drawing of their product.

## **6. Product realisation**

The vast majority of candidates completed the manufacture of a practical outcome. The quality of manufacture in a number of cases was outstanding.

Most candidates used a number of good quality photographs to show full details of their product. Many gave photographic evidence of key stages of manufacture of the product to emphasise the quality of making.

Centres must ensure that candidates include clear evidence of their practical outcome. Marks cannot be accepted for the practical realisation if there is no photographic evidence of the candidates work.

Most Centres were accurate in awarding credit commensurate with the quality of work produced.

## **7. Testing and evaluation**

Most candidates tested their product, evaluated it, and indicated areas for modification or improvement. An increasing number of candidates utilise their client to test the product, for the provision of positive views and areas for improvement.

To access the higher mark range, candidates must test and evaluate the product, in its intended environment where possible, and produce detailed and meaningful conclusions leading to proposals for further development.