DESIGN AND TECHNOLOGY

Paper 0445/11
Design

Key Messages

- Candidates are required to outline the manufacture of only one part of their final solution in response to part **(g)** of **Question 1** and **Question 3**.
- Successful evaluations focus on both positive and negative aspects of proposed design ideas.

General comments

Successful candidates followed the design process as set out on the structured A3 answer sheets showing that they could apply their design skills in an imaginative and creative way. The three questions presented fairly open design situations whereby candidates could apply specific areas of knowledge and interest developed during the period of their study.

Candidates tended to score well when they focused their answers on the precise stage of the design process as set out on the A3 answer sheets.

Question 1 was, by far, the most popular question, followed by **Question 2** and only a small number of candidates answering **Question 3**.

Comments on specific questions

Question 1

Candidates appeared to understand fully the requirements of this design need for the storage of toys and it was clearly one with which they were familiar in their normal day-to-day experiences. Suggested outcomes were often quite imaginative with evidence of original thinking.

(a) Candidates were able to identify functional points required of the toy storage system in addition to those outlined in the question. Successful responses to this introductory part of the question included: easy to clean; stable in use; appropriate height/position; toys easy to access/remove; hygienic; colourful to encourage use; safe for child to use; etc.

(b) Most candidates were able to show two types of carcase (box) construction and sketches were often very accurate. Constructions included: dovetail; rebate; screwed/nailed butt; dowelled; housings; KD fittings; doors; flaps; etc.

(c) Responses to this part of design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that design details were clear to the viewer. Marks were awarded for the quality of communication techniques so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Marks were also awarded for the suitability of ideas and successful candidates explained their thinking and added detail as they progressed. Candidates should avoid adding annotations that are descriptions of what is already obvious from the drawings.

(d) The majority of candidates evaluated effectively each of their design ideas in turn and then identified the chosen idea with reasons for choice given. It is important that candidates carry out the evaluations in the space provided and not alongside their design ideas in part **(c)**. As has been mentioned in previous examinations, some candidates produced a table so that each design idea could be compared to specification points. The result was often a set of boxes with ticks or crosses

and no reasons or qualifications given. Candidates are required to comment on good and bad points about their design ideas, so this type of approach cannot be awarded full marks.

(e) There was evidence of good quality drawing in the presentation of the proposed design solution and constructional detail was provided either as part of the main presentation or through annotation or other surrounding smaller drawings. Candidates are free to choose their own drawing method so long as all constructional detail is clear to the viewer and significant dimensions are included. Candidates are not required to outline manufacturing methods here as this is required in the final part of the question.

(f) Many candidates were able to identify appropriate specific materials that could reasonably be used in the construction of the design outlined in the previous part of the question. Candidates must avoid the use of generic terms such as wood, metal and plastic as these cannot be marked positively.

(g) Successful candidates identified one part of their proposed solution and outlined a simple step by step approach to the production of this part, identifying tools at each stage. It is important that the process is specific to the chosen product and not general in nature. Marks are awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and most picked up on the fact that the model needed to be fairly simple in shape if it was to be cut out and assembled.

(a) Most candidates were able to suggest additional points to those identified in the question and successful responses included: appealing to children; colourful; interesting vehicle; have rounded corners; easy to cut out; child can fit together; etc.

(b) The majority of candidates were familiar with methods that could be used to attach wheels to the model and appropriate suggestions included: plastic pegs; bifurcated rivets; plastic/wooden axles; 'velcro'; adhesive pads; etc.

See **Question 1 (c)** – **(f)**

(c)

(d)

(e)

(f)

(g) Candidates were generally able to outline a method of producing a prototype of the proposed cut out card model in a School graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high marks only when a description of the process was included.

Question 3

Candidates who attempted this question had the opportunity to show their specialist interest in and knowledge of Systems and Control, as intended by the context of the design situation. Successful outcomes focused on the workshop experience of the candidate and kept the outcome simple in design and use.

(a) Additional points about the function of the tap turning device included: simple to fit; safe shape; easy to clean; hygienic; stays in place; rugged design; fits shape of hand; fits range of taps; etc.

(b) Most candidates were able to identify two methods that might assist in the function of the device including: increased leverage; larger gripping surface; better shaped grip; any suitable mechanical systems; etc.

See **Question 1 (c)** – **(g)**

(c)

(d)

(e)

(f)

(g)

DESIGN AND TECHNOLOGY

Paper 0445/12

Design

Key Messages

- Candidates are required to outline the manufacture of only one part of their final solution in response to part **(g)** of **Question 1** and **Question 3**.
- Successful evaluations focus on both positive and negative aspects of proposed design ideas.

General comments

Successful candidates followed the design process as set out on the structured A3 answer sheets, showing that they could apply their design skills in an imaginative and creative way. The three questions presented fairly open design situations whereby candidates could apply specific areas of knowledge and interest developed during the period of their study.

Candidates tended to score well when they focused their answers on the precise stage of the design process as set out on the A3 answer sheets.

Question 1 was, by far, the most popular question, followed by **Question 2** and only a small number of candidates answering **Question 3**.

Comments on specific questions

Question 1

Candidates appeared to understand fully the requirements of this design need for a candle holder and it was clearly one with which they were familiar in their normal day-to-day experiences. Suggested outcomes were often quite imaginative with evidence of original thinking.

(a) Candidates were able to identify functional points required of the candle holder in addition to those outlined in the question. Successful responses to this introductory part of the question included: stable in use; non-flammable materials; drip tray for wax; light at correct height; easy to light candles; easy to replace candles; etc.

(b) Most candidates were able to show two types of holding method and sketches were often very clear. Holding methods included: holes; tubes; spikes/pins/dowels; spring clips; rings; etc.

(c) Responses to this part of design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that design details were clear to the viewer. Marks were awarded for the quality of communication techniques so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Marks were also awarded for the suitability of ideas and successful candidates explained their thinking and added detail as they progressed. Candidates should avoid adding annotations that are descriptions of what is already obvious from the drawings.

(d) The majority of candidates evaluated effectively each of their design ideas in turn and then identified the chosen idea with reasons for choice given. It is important that candidates carry out the evaluations in the space provided and not alongside their design ideas in part **(c)**. As has been mentioned in previous examinations, some candidates produced a table so that each design idea could be compared to specification points. The result was often a set of boxes with ticks or crosses

with no reasons or qualifications given. Candidates are required to comment on good and bad points about their design ideas, so this type of approach cannot be awarded full marks.

(e) There was evidence of good quality drawing in the presentation of the proposed design solution and constructional detail was provided either as part of the main presentation or through annotation or other surrounding smaller drawings. Candidates are free to choose their own drawing method so long as all constructional detail is clear to the viewer and significant dimensions are included. Candidates are not required to outline manufacturing methods here as this is required in the final part of the question.

(f) Many candidates were able to identify appropriate specific materials that could reasonably be used in the construction of the design outlined in the previous part of the question. Candidates must avoid the use of generic terms such as wood, metal and plastic as these cannot be marked positively.

(g) Successful candidates identified one part of their proposed solution and outlined a simple step by step approach to the production of this part, identifying tools at each stage. It is important that the process is specific to the chosen product and not general in nature. Marks are awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and most picked up on the fact that the play house needed to be lightweight for easy storage.

(a) Most candidates were able to suggest additional points to those identified in the question and successful responses included: compact for storage; appealing to children; colourful; stable in use; no dangerous features; easy to erect; easy access for children; etc.

(b) The majority of candidates were familiar with methods that could be used to hinge lightweight materials and appropriate suggestions included: scored card; pressed hinge; planted plastic hinge; flexible tape; rings; cord; etc.

See **Question 1 (c)** – **(f)**

(c)

(d)

(e)

(f)

(g) Candidates were generally able to outline a method of producing a prototype of the proposed play house in a School graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high marks only when a description of the process was included.

Question 3

Candidates who attempted this question had the opportunity to show their specialist interest in and knowledge of Systems and Control, as intended by the context of the design situation. Successful outcomes focused on the experience of the candidate and kept the design simple in form and function.

(a) Additional points about the function of the garden water feature included: weather-proof; have visual impact; water resistant materials; stable in use; safe power supply; safe for pets/animals, safe for children; etc.

(c) Most candidates were able to identify two methods by which movement could be created by water including: paddles; wheels; screws; jets; propellers; turbines; tipping buckets; etc.

See **Question 1 (c) – (g)**

(c)

(d)

(e)

(f)

(g)

DESIGN AND TECHNOLOGY

Paper 0445/13

Design

Key Messages

- Candidates are required to outline the manufacture of only one part of their final solution in response to part **(g)** of **Question 1** and **Question 3**.
- Successful evaluations focus on both positive and negative aspects of proposed design ideas.

General comments

Successful candidates followed the design process as set out on the structured A3 answer sheets, showing that they could apply their design skills in an imaginative and creative way. The three questions presented fairly open design situations whereby candidates could apply specific areas of knowledge and interest developed during the period of their study.

Candidates tended to score well when they focused their answers on the precise stage of the design process as set out on the A3 answer sheets.

Question 1 was, by far, the most popular question, followed by **Question 2** and only a small number of candidates answering **Question 3**.

Comments on specific questions

Question 1

Candidates appeared to understand fully the requirements of this design need for a candle holder and it was clearly one with which they were familiar in their normal day-to-day experiences. Suggested outcomes were often quite imaginative with evidence of original thinking.

(a) Candidates were able to identify functional points required of the candle holder in addition to those outlined in the question. Successful responses to this introductory part of the question included: stable in use; non-flammable materials; drip tray for wax; light at correct height; easy to light candles; easy to replace candles; etc.

(b) Most candidates were able to show two types of holding method and sketches were often very clear. Holding methods included: holes; tubes; spikes/pins/dowels; spring clips; rings; etc.

(c) Responses to this part of design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that design details were clear to the viewer. Marks were awarded for the quality of communication techniques so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Marks were also awarded for the suitability of ideas and successful candidates explained their thinking and added detail as they progressed. Candidates should avoid adding annotations that are descriptions of what is already obvious from the drawings.

(d) The majority of candidates evaluated effectively each of their design ideas in turn and then identified the chosen idea with reasons for choice given. It is important that candidates carry out the evaluations in the space provided and not alongside their design ideas in part **(c)**. As has been mentioned in previous examinations, some candidates produced a table so that each design idea could be compared to specification points. The result was often a set of boxes with ticks or crosses

with no reasons or qualifications given. Candidates are required to comment on good and bad points about their design ideas, so this type of approach cannot be awarded full marks.

(e) There was evidence of good quality drawing in the presentation of the proposed design solution and constructional detail was provided either as part of the main presentation or through annotation or other surrounding smaller drawings. Candidates are free to choose their own drawing method so long as all constructional detail is clear to the viewer and significant dimensions are included. Candidates are not required to outline manufacturing methods here as this is required in the final part of the question.

(f) Many candidates were able to identify appropriate specific materials that could reasonably be used in the construction of the design outlined in the previous part of the question. Candidates must avoid the use of generic terms such as wood, metal and plastic as these cannot be marked positively.

(g) Successful candidates identified one part of their proposed solution and outlined a simple step by step approach to the production of this part, identifying tools at each stage. It is important that the process is specific to the chosen product and not general in nature. Marks are awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and most picked up on the fact that the play house needed to be lightweight for easy storage.

(a) Most candidates were able to suggest additional points to those identified in the question and successful responses included: compact for storage; appealing to children; colourful; stable in use; no dangerous features; easy to erect; easy access for children; etc.

(b) The majority of candidates were familiar with methods that could be used to hinge lightweight materials and appropriate suggestions included: scored card; pressed hinge; planted plastic hinge; flexible tape; rings; cord; etc.

See **Question 1 (c)** – **(f)**

(c)

(d)

(e)

(f)

(g) Candidates were generally able to outline a method of producing a prototype of the proposed play house in a School graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high marks only when a description of the process was included.

Question 3

Candidates who attempted this question had the opportunity to show their specialist interest in and knowledge of Systems and Control, as intended by the context of the design situation. Successful outcomes focused on the experience of the candidate and kept the design simple in form and function.

(a) Additional points about the function of the garden water feature included: weather-proof; have visual impact; water resistant materials; stable in use; safe power supply; safe for pets/animals, safe for children; etc.

(c) Most candidates were able to identify two methods by which movement could be created by water including: paddles; wheels; screws; jets; propellers; turbines; tipping buckets; etc.

See **Question 1 (c) – (g)**

(c)

(d)

(e)

(f)

(g)

DESIGN AND TECHNOLOGY

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.

There are areas of the syllabus however, in which further improvements could be made. Candidates should be able to understand information given in one graphical format and be able to draw the same item correctly in another graphical format. Drawing polygons and cylinders in isometric view are areas that need to be improved. Candidates should have experienced dissembling packaging to help them understand where folds and flaps are used.

Comments on specific questions

Question A1

Swimming Club Logo

The drawing of a Ø40 for the head was achieved by most candidates. Some candidates drew the arm 16 wide but not to 120º to the body or with a 90º elbow.

Most candidates drew a leg 20 wide but not always at the same angle as the raised arm to the body. Whilst the Ø16 hand for the outstretched arm was given, not all candidates extended tangents to the top and bottom to form the outstretched arm. Candidates must study the source material for this type of question very carefully as the logo contained details that were missed completely by some candidates.

Question A2

LEANDER SC Signboard

The letter **E** 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 **R** more challenging. Whilst most of the lettering seen was to the correct height, the spacing of the letters was somewhat arbitrary by a large number of candidates.

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

Question A3

Trophy

Unfortunately, not all candidates attempted this compulsory question, losing the 10 marks available.

(a) Many candidates did not recognise that the given orthographic views were in 1st Angle projection. This should have given a clear message that Ø50 cylinder was sitting on a 70 square base x 20 thick. Successful candidates drew a 70 square base x 20 thick in isometric. Very few candidates drew a circle Ø50 in elevation with one quadrant divided to provide plots for the isometric view. Candidates who drew plots from their circle on the centre line of the top surface of the 70 square were able to draw the correct size ellipse that represented the Ø50 of the cylinder. Vertical lines 80 long could then be plotted on the ellipse to give the upper surface (ellipse) of the cylindrical column.

Drawing the Regular octagon in isometric also required an elevation view of the correct size octagon to be drawn. The crate (71 square) of the hexagon could be centrally placed on the top of the column and 10 mm forwards of the centre line. The corners of the hexagon could then be plotted on the 71 square 'crate' face. Adding the 20 thickness lines appropriately to the visible faces of the octagon completed the isometric view.

(b) The question asked for thick and thin lines to be applied to the regular octagon to enhance its appearance. Thick lines should have been applied to all edges where only one side producing the edge is visible.

Question B4

Prize-draw ticket box

This question was derived from a real 'Graphic' application that is used for many purposes on shop counters.

The given isometric view gave the candidates the positions of the glue tabs and subsequently where the folds were to make the box. The start given showed the front of the box with the word DRAW printed on it, in the folded down position. A glue tab evident on the isometric view had also been given to the right of the folded down front.

(a) Candidates were required to complete the full size one-piece development (net) of the box. Most candidates drew a 60 wide column vertically from the given fold-down side. The base 70 long and the 40 back could both be drawn along this column. The two 70 wide sides should have been drawn attached either side of the base with glue flaps on each end of the 40 high sides. The 40 high back should have the 70 long lid attached by a fold line. The lid should have a line at 35 high that showed a fold of 5 mm on the cheeks either side of the ellipse.

The ellipse should be drawn with the major axis 50 long on the centre line of the lid and the half minor axis evident 22 high.

All glue flaps that were added should have been consistent with the one given.

(b) Candidates were asked to draw a method of holding the folding lid open (as shown in the isometric view) without the use of glue. Many solutions were seen with the best showing a simple tongue added to the lid and a slit in the back of the box.

Question B5

Greetings card for swimming club members

This question was derived from a common application of 'Graphics' to a greetings card.

(a) Candidates were presented with a front view of the card before bending the sides back to stand it up. A pictorial view showed candidates what the card looked like when the sides were bent back enabling the card to stand.

The outline of the card could be drawn 120 high and 240 long from the starting point **A**. From the left hand side the fold line can be drawn in at 70. A R40 semi-circle was to be drawn on the centre lines given and a horizontal line continued from the semi-circle back to the fold line. The semi-circle needed to have its outline thickened to denote a cut line.

A semi ellipse major axis 120 (60 drawn) and minor axis 80 (vertical) needed to be constructed on the centre line below the hand of the swimmer. A second fold line (in two parts) was to be drawn with the top and bottom parts connecting with the outline of the ellipse.

Finally a line representing the step and the swimming pool edge and water level was to be drawn connecting the swimmer's feet with the ellipse.

(b) Candidates were required to drawn a plan below the full size elevation that showed the two sides folded back. Many candidates omitted this part or drew it inaccurately despite information given in the pictorial view showing the sides folded back.

(c) An additional piece of card was required with cross halving slots or similar to hold the two ends at 90º without the use of glue. Whilst this method is in frequent use with greetings cards that are on sale, many candidates did not answer this part of the question.

DESIGN AND TECHNOLOGY

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.

There are areas of the syllabus however, in which further improvements could be made. Candidates should be able to understand information given in one graphical format and be able to draw the same item correctly in another graphical format. Drawing circles in isometric view and drawing three dimensional graphs are other areas that need to be improved.

Comments on specific questions

Question A1

THE SMALL LOAF Logo

(a) Many candidates completed the back of the body and the R10 shoulder to touch the neckline and the back.

(b) The missing part of the arm was to be drawn at 90º to the upper arm with an R6 elbow. Some candidates omitted to draw the R6 semi-circle that represented the hand.

(c) The hexagon representing the oven casing was completed by many candidates. However, a regular half hexagon 30 side was not always evident.

(d) An R26 semi-circle was required to be drawn on the given centre to represent the oven. Not all semi-circles drawn were to the correct size.

Candidates must study the source material for this type of question very carefully as the logo contained details that were missed completely by some candidates.

Question A2

THE SMALL LOAF Signboard

The letter **A** 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 **S** more challenging. Whilst most of the lettering seen was to the correct height and style, the spacing of the letters was somewhat arbitrary by a large number of candidates.

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

Question A3

Box and cake support tray

This question was derived from a real graphic product.

Unfortunately, not all candidates attempted this compulsory question, losing the 10 marks available.

Many candidates did not recognise that the given orthographic views were in 1st Angle projection. The cake support tray was given as a development (net).

Candidates were required to draw a full-size isometric view of the cake box with the lid fully open and the cake support tray in position.

Many candidates drew an 80 square box with sides 40 high. The back was to be drawn 60 high with a 20 x 20 slope down to the 40 height of the two sides. The lid was required to be drawn in a vertical position with a 20 deep rim that also had a 20 x 20 slope on two sides and to the fold line.

The cake support tray needed to be drawn so that it sat 30 mm from the base.

Very few candidates drew a circle Ø50 in elevation with one quadrant divided to provide plots for the isometric hole in the support tray. Candidates who drew plots from their circle on the support tray were able to show the Ø50 hole in isometric and the base and inner corner of the box below the support tray.

Question B4

Box for transporting one slice of cake

This question was derived from a real graphic product.

The question showed a pictorial view of a box for transporting one slice of cake and an example of an arrow-tab and slot.

(a) Most candidates drew a 90 wide column vertically from the given base. The base 50 high could be drawn on this column and adjacent to the given base. Below the base a 20 deep front could be drawn by extending the 90 wide base. Two sides were to be constructed one on either side of the base with the back 50 tall and the front 20 tall. Once the sides were drawn, the length of the slope could be determined (85 +/- 2) and the length of the lid plotted on the previously drawn 90 wide column. The remaining flap of 20 could then be added to the lid. Some candidates did not take the lid length from the sloping side or draw the slope in the correct orientation.

Fold-out flaps were to be drawn at 90º to the sloping side and with R10 ends.

(b) Four arrow tabs were to be drawn that would hold the sides of the box together. Many candidates did not take the size and proportion of the arrow tabs from that given in the source material.

(c) Candidates were asked to draw a method of holding the lid securely in place without the use of glue. Many solutions were seen with the best examples showing a simple tongue and slot arrangement. A small number of candidates made a rubric error and drew a further arrow-tab and slot.

Question B5

Bakery sales in 2012

This question required statistics to be represented in a graphical format.

The source information showed the sales on one day in 2012 of six products sold in the shop.

(a) Candidates were presented with the quantities of six different products sold by the bakers' shop on a busy day in 2012. The question required candidates to draw a 'pie chart' to give a visual display of the relative sizes of the different sales. The data given readily transferred into degrees of a

circle as the sum of the amounts given was 360. 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 shop sales in 2012 for three main products was given to candidates.

(b) (i) Candidates were required to draw a two dimensional bar chart showing the sales of **cakes** over the spring, summer and autumn of 2012.

Candidates chose their own vertical scale with most candidates using 1:5 (20 mm representing 100 sales - maximum 550 sales = 110 mm).

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 season and the respective amount of sales of cakes only.

(ii) A three dimensional bar chart was required to show the difference in sales of all three products in the spring and the summer of 2012.

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 spring sales (lower numbers / columns) in front of the summer sales.

Candidates who used oblique projection did not produce a fully visual 3-D image.

DESIGN AND TECHNOLOGY

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.

There are areas of the syllabus however, in which further improvements could be made. Candidates should be able to understand information given in one graphical format and be able to draw the same item correctly in another graphical format. Drawing circles in isometric view and drawing three dimensional graphs are other areas that need to be improved.

Comments on specific questions

Question A1

THE SMALL LOAF Logo

(a) Many candidates completed the back of the body and the R10 shoulder to touch the neckline and the back.

(b) The missing part of the arm was to be drawn at 90º to the upper arm with an R6 elbow. Some candidates omitted to draw the R6 semi-circle that represented the hand.

(c) The hexagon representing the oven casing was completed by many candidates. However, a regular half hexagon 30 side was not always evident.

(d) An R26 semi-circle was required to be drawn on the given centre to represent the oven. Not all semi-circles drawn were to the correct size.

Candidates must study the source material for this type of question very carefully as the logo contained details that were missed completely by some candidates.

Question A2

THE SMALL LOAF Signboard

The letter **A** 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 **S** more challenging. Whilst most of the lettering seen was to the correct height and style, the spacing of the letters was somewhat arbitrary by a large number of candidates.

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

Question A3

Box and cake support tray

This question was derived from a real graphic product.

Unfortunately, not all candidates attempted this compulsory question, losing the 10 marks available.

Many candidates did not recognise that the given orthographic views were in 1st Angle projection. The cake support tray was given as a development (net).

Candidates were required to draw a full-size isometric view of the cake box with the lid fully open and the cake support tray in position.

Many candidates drew an 80 square box with sides 40 high. The back was to be drawn 60 high with a 20 x 20 slope down to the 40 height of the two sides. The lid was required to be drawn in a vertical position with a 20 deep rim that also had a 20 x 20 slope on two sides and to the fold line.

The cake support tray needed to be drawn so that it sat 30 mm from the base.

Very few candidates drew a circle Ø50 in elevation with one quadrant divided to provide plots for the isometric hole in the support tray. Candidates who drew plots from their circle on the support tray were able to show the Ø50 hole in isometric and the base and inner corner of the box below the support tray.

Question B4

Box for transporting one slice of cake

This question was derived from a real graphic product.

The question showed a pictorial view of a box for transporting one slice of cake and an example of an arrow-tab and slot.

(a) Most candidates drew a 90 wide column vertically from the given base. The base 50 high could be drawn on this column and adjacent to the given base. Below the base a 20 deep front could be drawn by extending the 90 wide base. Two sides were to be constructed one on either side of the base with the back 50 tall and the front 20 tall. Once the sides were drawn, the length of the slope could be determined (85 +/- 2) and the length of the lid plotted on the previously drawn 90 wide column. The remaining flap of 20 could then be added to the lid. Some candidates did not take the lid length from the sloping side or draw the slope in the correct orientation.

Fold-out flaps were to be drawn at 90º to the sloping side and with R10 ends.

(b) Four arrow tabs were to be drawn that would hold the sides of the box together. Many candidates did not take the size and proportion of the arrow tabs from that given in the source material.

(c) Candidates were asked to draw a method of holding the lid securely in place without the use of glue. Many solutions were seen with the best examples showing a simple tongue and slot arrangement. A small number of candidates made a rubric error and drew a further arrow-tab and slot.

Question B5

Bakery sales in 2012

This question required statistics to be represented in a graphical format.

The source information showed the sales on one day in 2012 of six products sold in the shop.

(a) Candidates were presented with the quantities of six different products sold by the bakers' shop on a busy day in 2012. The question required candidates to draw a 'pie chart' to give a visual display of the relative sizes of the different sales. The data given readily transferred into degrees of a

circle as the sum of the amounts given was 360. 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 shop sales in 2012 for three main products was given to candidates.

(b) (i) Candidates were required to draw a two dimensional bar chart showing the sales of **cakes** over the spring, summer and autumn of 2012.

Candidates chose their own vertical scale with most candidates using 1:5 (20 mm representing 100 sales - maximum 550 sales = 110 mm).

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 season and the respective amount of sales of cakes only.

(ii) A three dimensional bar chart was required to show the difference in sales of all three products in the spring and the summer of 2012.

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 spring sales (lower numbers / columns) in front of the summer sales.

Candidates who used oblique projection did not produce a fully visual 3-D image.

DESIGN AND TECHNOLOGY

Paper 0445/31
Resistant Materials

Key messages

- It is essential that candidates read the questions carefully and understand exactly what is being asked before attempting a response.
- 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

To gain high marks for ***Section A***, candidates need to demonstrate a sound all-round basic knowledge of wood, metal and plastic. Therefore a good understanding of material properties, the processes involved and the tools and equipment used to work with these materials is essential.

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. Candidates are reminded that they should attempt only **one** question from ***Section B***.

Comments on specific questions

Section A

Question 1

(a) Most candidates gave a benefit of using a template to mark out the shape. Speed and accuracy were the most common answers. The majority of answers related to marking out in quantity which is acceptable even though the question referred to *"...the shape"* rather than many shapes.

(b) The most common correct answer was a coping saw. A Hegner saw or equivalent was acceptable but the jig saw would have been inappropriate.

Question 2

Overall, most candidates were unable to name a suitable specific material for the plastic gears or wooden rolling pin. Few named nylon and beech respectively. Only a few candidates stated that nylon was self-lubricating. It is essential that candidates are familiar with a wide variety of products and the materials from which they are made.

Question 3

Many candidates correctly named all three types of rivet.

Question 4

There were some excellent sketches of blockboard, with the core strips clearly shown sandwiched between top and bottom veneers or plies. Those answers that showed 'blocks' on both edges were awarded one mark only.

Question 5

Most candidates gained marks for this question. However, there were many vague answers such as 'working in a workshop' which gained no marks. The best answers stated a specific situation; for example, gauntlets would be used when sand casting and an apron would be used when using the sanding disc.

Question 6

The majority of candidates named three marking out tools used to mark out the bridle joint. Candidates generally were familiar with a range of marking out tools including marking, cutting and mortise gauges, pencil, marking knife, try square and steel rule. However, some candidates did name tools that would only be used with metal.

Question 7

(a) Many candidates named vacuum forming for the plastic food tray. Blow moulding and press forming were also acceptable processes.

(b) Injection moulding was the process to manufacture the fork. Many candidates named inappropriate processes such as extrusion.

Question 8

The majority of candidates named two different methods of joining parts of the picnic table. The most common included screws, nuts and bolts, mortise and tenon and dowel joints.

Question 9

Many candidates knew that the safe edge would protect the vertical face from being filed or distorted but the quality of explanations was often incomplete. Many candidates thought that the safe edge was there to prevent injury to the user.

Question 10

Many candidates gained one mark for stating that annealing would make shaping easier. For maximum two marks it was necessary to state that annealing relieved the stresses in or softened the copper.

Section B

Question 11

This question was attempted by the majority of candidates.

(a) Many candidates gained marks for stating two items of research for the toolbox. The most common correct answers related to the type of tools to be stored, their size and weight, where the toolbox would be used and information about the user.

(b) (i) Many candidates incorrectly thought that the reason for using softwood for the toolbox was because it was lightweight. The most common acceptable reasons were that it was easy to work, it was relatively cheap and readily available.

(ii) The most commonly named softwood was pine. Some candidates correctly named parana pine.

(c) Many candidates achieved marks for drawing and naming a suitable corner joint; including half lapped (rebated) finger (comb), dowel and dovetail. Candidates did not always achieve maximum three marks due to the poor quality of their sketches.

(d) (i) Many candidates correctly named a jig saw to cut out the shape. The key word in the question was "*portable*". Some candidates named saws that were not portable.

(ii) The majority of candidates provided a sensible safety precaution, the majority referring to eye protection. General statements such as wearing an apron were not rewarded.

(e) Generally the modifications to the toolbox so that it could be carried were over-complicated and inappropriate. The best answers described how a handle made from dowel or metal rod or tube could be fitted to the ends of the toolbox by means of a drilled hole and adhesive or how hand holds could be cut into the ends.

It was disappointing that many candidates ignored the last part of the question: *"Include details of materials, constructions and fittings used".* There are specific marks awarded for these details.

(f) There are three recognised methods of fitting a base to a carcase or box. One is a flush fitting using a combination of pins, screws and an adhesive. The second method is to cut a groove into all four sides and insert the base without using an adhesive. The third method is to cut a rebate or apply a bead to all four sides and then glue and pin or screw the base to the sides. Most answers did not show a recognised method. Many candidates did use nails, screws and dowel but inappropriately. Often nails were inserted into the edge of the 9 mm thick base which would be difficult to achieve.

(g) Many candidates achieved one or two marks for showing three different size areas for tool storage. Unfortunately many candidates stopped at this point and simply did not address the rest of the question: "*Include details of the materials and any constructions used*", therefore denying themselves access to the four marks available.

Question 12

This question was attempted by very few candidates.

(a) (i) Most candidates recognised that acrylic is a thermoplastic.

(ii) Some candidates gave a good explanation of the difference between a thermoplastic and a thermosetting plastic. Most answers described how acrylic could be heated and formed and reheated and reformed but were less clear about the properties of thermosetts.

(b) Most candidates drew the development (net) clearly and gained maximum four marks.

(c) A minority of candidates knew that an oven would be required to bend the acrylic. The use of a strip heater or line bender would not soften the entire piece of acrylic. Many answers included the use of a curved former and some answers included details of how the shape would be retained while it cooled.

(d) Very few candidates achieved maximum three marks for describing how the slot would be cut. Some answers only referred to sawing and filing and others to drilling and filing. All three stages would be required. It was not necessary to describe how the slot would be marked out.

(e) (i) Centres for small holes to be drilled are marked out as two lines bisecting each other at 90° and not by means of dividers or a compass. For two marks candidates needed to draw this and name the tool used to make the mark; for example, a scriber or chinagraph pencil with a try square.

(ii) There were some good answers showing how the hole would be drilled. Some candidates referred to the need to clamp the material securely, the use of scrap wood underneath the acrylic and the drill speed.

(f) Most candidates gained one mark for stating the need to wear gloves to protect the skin from acrylic cement. The use of an apron was not considered to be a safety precaution. The main precautions that most candidates did not mention were the need for good ventilation and the use of face masks and the absence of naked flames.

(g) (i) Most answers described how wet and dry (silicon carbide) paper would be used to remove fine scratches.

(ii) Many candidates described how the polishing mop and compound would be used to produce a high quality polished surface.

(h) Most candidates did not recognise the purpose of the lugs and simply cut or filed them off so that the display unit could fit flat against the wall. The best answers recognised the need for some form of 'spacer' that would allow the unit to fit flat against the wall.

Question 13

(a) (i) Most candidates named mild steel as a suitable ferrous metal. Stainless steel was also acceptable.

(ii) The most common correctly named non-ferrous metal was aluminium. Brass and copper were also acceptable non-ferrous metals.

(iii) There were some excellent answers to this question. Most candidates stated that non-ferrous metal was generally easier to work or bend, that they did not corrode to the same extent as ferrous metals and that they could be self-finished.

(b) There were some excellent answers to this question. Some candidates showed the rod held in a vice and the end filed to a chamfer. There were some accurate drawings of a die held in a die stock accompanied by excellent technical information relating to the cutting action of the die.

(c) Some answers included the use of a former around which the R15 curve could be achieved. Those answers that simply showed the rod in a vice gained no marks as this would not produce the required curve. It was necessary to show how the end of the rod would be secured at the start of the curve. Many candidates did not show this. The use of a mallet rather than a hammer which could damage the rod was worthy of one mark.

(d) Only a few candidates completed the drawing showing the threaded disc and the M4 nuts 'sunk' in the base for maximum three marks. Most answers showed the threaded discs and M4 nuts screwed onto the rod up against the top and underside of the base.

(e) While the best way to achieve a round base is to turn the wood on a wood turning lathe very few candidates attempted this. Most answers showed a block of wood that could be marked out, cut roughly to shape and then finished using a sanding disc and/or files. Many candidates gained some marks for this question but most lacked sufficient accurate technical detail to achieve maximum six marks. For example, some answers included the use of a scriber to mark out the wood or a hacksaw to cut off the waste. Candidates need to be familiar with those tools and equipment that are used specifically with wood, metal and plastic.

(f) (i) Most candidates named some sort of varnish or paint correctly.

(ii) For maximum marks candidates needed to describe how various grades of glasspaper would be used to produce a fine surface, the removal of the dust and a description of how the finish would be applied carefully. Most candidates did not give sufficient details to achieve maximum marks.

DESIGN AND TECHNOLOGY

Paper 0445/32
Resistant Materials

Key messages

- It is essential that candidates read the questions carefully and understand exactly what is being asked before attempting a response.
- 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

To gain high marks for ***Section A***, candidates need to demonstrate a sound all-round basic knowledge of wood, metal and plastic. Therefore a good understanding of material properties, the processes involved and the tools and equipment used to work with these materials is essential.

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. Candidates are reminded that they should attempt only **one** question from ***Section B***.

Comments on specific questions

Section A

Question 1

Many candidates stated two properties of balsa wood, the most common being that it is lightweight and easy to work.

Question 2

(a) Many candidates named a coping saw or scroll saw correctly. A jig saw would not be suitable when cutting material 60 mm × 60 mm.

(b) Very few candidates named a correct tool to cut the curved shape in 1 mm thick brass. Suitable saws included a piercing saw and abra file saw. Tin snips would not be suitable.

Question 3

(a) Many candidates named a spanner or wrench as the tool used to tighten the hexagonal nut.

(b) Only a minority of candidates were familiar with an allen key.

Question 4

(a) Most candidates named aluminium correctly as the non-ferrous metal for the drinks can.

(b) Most candidates gave the reason for its suitability correctly as its resistance to corrosion.

Question 5

Only a small minority of candidates achieved marks for this question. The key phrase in this question was "*working with chipboard"*. The main drawbacks are that chipboard is brittle, it breaks easily, traditional constructions are often inappropriate and that it can be difficult to finish the surfaces of chipboard to a good standard.

Question 6

Most candidates gave two advantages of plastic over metal for the watering cans. The most popular answers were that it was lighter in weight, its ability to resist corrosion and that the moulded shape was more comfortable to hold. Many candidates referred to plastic not conducting heat which was considered irrelevant.

Question 7

Many candidates completed a sketch of a through housing joint and gained maximum marks. However, the question required the sketch to provide *"an **exploded** view".* A maximum of two marks was awarded where sketches showed an assembled housing joint.

Question 8

Many candidates did not understand the reasons for the solid wood boards being glued together in the arrangement shown. There were some excellent answers referring to increased stability, to prevent warping or that a single board of the required width was not available. Answers that suggested increased strength were also rewarded.

Question 9

Very few candidates were able to name the tools and provide a specific use. Although many candidates could not name the pincers, many understood their purpose and described an accurate use for them. There were many variations in the spelling of *"pincers".* Incorrect spellings are not penalised as long as the technical word can be understood. Very few candidates recognised the mortise gauge with many incorrect answers such as a marking gauge. To gain a mark for a specific use for the mortise gauge candidates needed to refer to the gauge marking lines (not a single line) parallel to an edge.

Question 10

It was disappointing that very few candidates were able to name a specific plastic for each of the products. There is a list of specific plastics named in the syllabus. Candidates should be familiar with the characteristics of these and their common uses.

Section B

Question 11

This question was attempted by the vast majority of candidates.

(a) Many candidates gained marks for showing how the finger joint could be marked and cut out. Three marks were allocated to the marking out and three marks to the cutting out. Most candidates named the correct marking out tools: pencil, knife, rule and try square. Candidates were less accurate when using gauges to mark out: the marking and mortise gauges should be used along the grain while the cutting gauge is used to mark the lines across the grain.

Many candidates used a coping saw to remove most of the waste, with or without a tenon saw to make the vertical saw cuts first. The use of a jig saw was inappropriate. The best answers included references to chiselling and the use of a mallet. There were many instances where

candidates used files to remove the remaining waste wood. While this is technically incorrect, Examiners recognise that this is often common practice in centres.

(b) Many candidates did not read the question carefully and provided details of nailing the finger joint. Often, inappropriate cramps were named including a G cramp. The sash cramp was the most suitable method of holding the four sides together. For maximum marks there should be two sash cramps across the holder in one direction and two more in the opposite direction. Scrap wood should be used to avoid bruising and to distribute pressure. Use of a corner cramp, while not ideal, was given some credit. Most candidates named PVA correctly as a suitable adhesive.

(c) (i) Many candidates achieved at least two marks for this question. Most answers included the use of a small drill through which a blade of a coping saw or Hegner saw could be inserted and the hole cut out roughly. The shape was then finished using a combination of files and / or wet and dry abrasive paper. The use of a hole saw was acceptable but for maximum marks candidates needed to provide details relating to the use of scrap wood under the work piece and the use of some form of clamping.

(ii) Most candidates gave a suitable safety precaution, the most common relating to eye protection. Some candidates did not read the question carefully and described how the backing paper or plastic sheet needed to be retained to avoid scratches to the surface of the acrylic. This is not a "*safety precaution*".

(d) Many candidates achieved at least one mark for showing how the acrylic could be supported. The best answers included use of applied strips or corner blocks and grooves and rebates. Maximum marks were awarded to those answers that included constructional details.

(e) Generally the modifications to assist a candidate carrying the paints safely were over-complicated and inappropriate. The best answers described how handles could be applied to the holder or how hand holds could be cut out of the sides. Many candidates applied 'extra' boxes or even hinged lids that were completely irrelevant to the design problem. It was disappointing that many candidates ignored the last part of the question, "Include details of materials, constructions and fittings used". There are specific marks awarded for these details.

Question 12

This question was attempted by very few candidates. Knowledge and understanding of working with metal appeared to be poor.

(a) Mild steel was suitable because it can be bent to shape, can be worked and joined in a variety of ways and that it is relatively cheap (not cheap). Answers such as "*strong*" are not specific enough to achieve a mark.

(b) Most candidates knew that a scriber, rule or try square would be used to mark out a straight line. Some candidates named correctly a dot or centre punch to mark the centre for a drilled hole. Fewer candidates could name dividers to mark out the radius.

(c) A minority of candidates knew that to bend the mild steel it would be held in a vice, a former would be required and that some force such as a mallet or hammer and scrap wood would be used to achieve the bend.

Some candidates described how a bending machine could be used to bend the mild steel. A bending machine would be inappropriate due to the 3 mm thickness of the mild steel. Some candidates applied techniques of line bending acrylic to the mild steel. This also was inappropriate.

(d) Very few candidates understood the brazing process. The question required candidates to include details of preparation as well as the brazing process itself. Brazing is a very important basic process used to join mild steel permanently.

(e) Only a small minority of candidates had any knowledge of taps and dies used to produce a screw thread in a hole and on a rod respectively. These processes are fundamental as a method of joining metals together temporarily.

(f) Most candidates gained a mark for showing some form of 'stop' that would prevent the roll from sliding off the arm.

(g) Most of the modifications described by sketches and notes provided a degree of stability to the holder.

Question 13

(a) The best properties referred to plywood being stable and that it could be bent to shape.

(b) Most candidates understood why a model could be helpful before making the DVD holder from plywood. The best answers referred to checking the size, checking stability, avoiding costly mistakes and the overall appearance.

(c) Candidates generally were not familiar with laminating techniques. Very few answers showed use of male and female formers and the use of cramps. However, there were some very good answers that involved use of a vacuum forming bag that only required a single mould or former.

(d) (i) Some candidates did recognise that the only construction that could be used to join a shelf to the body was a halving joint. For maximum marks the joint needed to be drawn with equal 'halves'.

(ii) Most candidates named PVA as a suitable adhesive.

(e) (i) It was disappointing that many candidates could not describe in sufficient detail how the surfaces could be prepared to take an applied finish. While there were some good answers that included references to using different grades of glasspaper, few mentioned the removal of dust or the use of a cork rubber/block.

(ii) Most candidates named a suitable finish for the DVD holder, the most popular being varnish and paint. Good reasons for the choice were provided: to preserve and protect and to enhance the appearance were the most popular.

(f) Most candidates sketched a rectangular block to which the DVD holder could be joined. Marks were awarded for a practical idea. The method of construction was often some form of mortise or housing and was appropriate. However, some candidates did not look carefully enough at the 140 mm wide body of the holder and subsequently did not provide two important sizes that took this into account.

DESIGN AND TECHNOLOGY

Paper 0445/33
Resistant Materials

Key messages

- It is essential that candidates read the questions carefully and understand exactly what is being asked before attempting a response.
- 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

To gain high marks for ***Section A***, candidates need to demonstrate a sound all-round basic knowledge of wood, metal and plastic. Therefore a good understanding of material properties, the processes involved and the tools and equipment used to work with these materials is essential.

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. Candidates are reminded that they should attempt only **one** question from ***Section B***.

Comments on specific questions

Section A

Question 1

Many candidates stated two properties of balsa wood, the most common being that it is lightweight and easy to work.

Question 2

(a) Many candidates named a coping saw or scroll saw correctly. A jig saw would not be suitable when cutting material 60 mm × 60 mm.

(b) Very few candidates named a correct tool to cut the curved shape in 1 mm thick brass. Suitable saws included a piercing saw and abra file saw. Tin snips would not be suitable.

Question 3

(a) Many candidates named a spanner or wrench as the tool used to tighten the hexagonal nut.

(b) Only a minority of candidates were familiar with an allen key.

Question 4

(a) Most candidates named aluminium correctly as the non-ferrous metal for the drinks can.

(b) Most candidates gave the reason for its suitability correctly as its resistance to corrosion.

Question 5

Only a small minority of candidates achieved marks for this question. The key phrase in this question was "*working with chipboard"*. The main drawbacks are that chipboard is brittle, it breaks easily, traditional constructions are often inappropriate and that it can be difficult to finish the surfaces of chipboard to a good standard.

Question 6

Most candidates gave two advantages of plastic over metal for the watering cans. The most popular answers were that it was lighter in weight, its ability to resist corrosion and that the moulded shape was more comfortable to hold. Many candidates referred to plastic not conducting heat which was considered irrelevant.

Question 7

Many candidates completed a sketch of a through housing joint and gained maximum marks. However, the question required the sketch to provide *"an **exploded** view".* A maximum of two marks was awarded where sketches showed an assembled housing joint.

Question 8

Many candidates did not understand the reasons for the solid wood boards being glued together in the arrangement shown. There were some excellent answers referring to increased stability, to prevent warping or that a single board of the required width was not available. Answers that suggested increased strength were also rewarded.

Question 9

Very few candidates were able to name the tools and provide a specific use. Although many candidates could not name the pincers, many understood their purpose and described an accurate use for them. There were many variations in the spelling of *"pincers".* Incorrect spellings are not penalised as long as the technical word can be understood. Very few candidates recognised the mortise gauge with many incorrect answers such as a marking gauge. To gain a mark for a specific use for the mortise gauge candidates needed to refer to the gauge marking lines (not a single line) parallel to an edge.

Question 10

It was disappointing that very few candidates were able to name a specific plastic for each of the products. There is a list of specific plastics named in the syllabus. Candidates should be familiar with the characteristics of these and their common uses.

Section B

Question 11

This question was attempted by the vast majority of candidates.

(a) Many candidates gained marks for showing how the finger joint could be marked and cut out. Three marks were allocated to the marking out and three marks to the cutting out. Most candidates named the correct marking out tools: pencil, knife, rule and try square. Candidates were less accurate when using gauges to mark out: the marking and mortise gauges should be used along the grain while the cutting gauge is used to mark the lines across the grain.

Many candidates used a coping saw to remove most of the waste, with or without a tenon saw to make the vertical saw cuts first. The use of a jig saw was inappropriate. The best answers included references to chiselling and the use of a mallet. There were many instances where

candidates used files to remove the remaining waste wood. While this is technically incorrect, Examiners recognise that this is often common practice in centres.

(b) Many candidates did not read the question carefully and provided details of nailing the finger joint. Often, inappropriate cramps were named including a G cramp. The sash cramp was the most suitable method of holding the four sides together. For maximum marks there should be two sash cramps across the holder in one direction and two more in the opposite direction. Scrap wood should be used to avoid bruising and to distribute pressure. Use of a corner cramp, while not ideal, was given some credit. Most candidates named PVA correctly as a suitable adhesive.

(c) (i) Many candidates achieved at least two marks for this question. Most answers included the use of a small drill through which a blade of a coping saw or Hegner saw could be inserted and the hole cut out roughly. The shape was then finished using a combination of files and / or wet and dry abrasive paper. The use of a hole saw was acceptable but for maximum marks candidates needed to provide details relating to the use of scrap wood under the work piece and the use of some form of clamping.

(ii) Most candidates gave a suitable safety precaution, the most common relating to eye protection. Some candidates did not read the question carefully and described how the backing paper or plastic sheet needed to be retained to avoid scratches to the surface of the acrylic. This is not a "*safety precaution*".

(d) Many candidates achieved at least one mark for showing how the acrylic could be supported. The best answers included use of applied strips or corner blocks and grooves and rebates. Maximum marks were awarded to those answers that included constructional details.

(e) Generally the modifications to assist a candidate carrying the paints safely were over-complicated and inappropriate. The best answers described how handles could be applied to the holder or how hand holds could be cut out of the sides. Many candidates applied 'extra' boxes or even hinged lids that were completely irrelevant to the design problem. It was disappointing that many candidates ignored the last part of the question, "Include details of materials, constructions and fittings used". There are specific marks awarded for these details.

Question 12

This question was attempted by very few candidates. Knowledge and understanding of working with metal appeared to be poor.

(a) Mild steel was suitable because it can be bent to shape, can be worked and joined in a variety of ways and that it is relatively cheap (not cheap). Answers such as "*strong*" are not specific enough to achieve a mark.

(b) Most candidates knew that a scriber, rule or try square would be used to mark out a straight line. Some candidates named correctly a dot or centre punch to mark the centre for a drilled hole. Fewer candidates could name dividers to mark out the radius.

(c) A minority of candidates knew that to bend the mild steel it would be held in a vice, a former would be required and that some force such as a mallet or hammer and scrap wood would be used to achieve the bend.

Some candidates described how a bending machine could be used to bend the mild steel. A bending machine would be inappropriate due to the 3 mm thickness of the mild steel. Some candidates applied techniques of line bending acrylic to the mild steel. This also was inappropriate.

(d) Very few candidates understood the brazing process. The question required candidates to include details of preparation as well as the brazing process itself. Brazing is a very important basic process used to join mild steel permanently.

(e) Only a small minority of candidates had any knowledge of taps and dies used to produce a screw thread in a hole and on a rod respectively. These processes are fundamental as a method of joining metals together temporarily.

(f) Most candidates gained a mark for showing some form of 'stop' that would prevent the roll from sliding off the arm.

(g) Most of the modifications described by sketches and notes provided a degree of stability to the holder.

Question 13

(a) The best properties referred to plywood being stable and that it could be bent to shape.

(b) Most candidates understood why a model could be helpful before making the DVD holder from plywood. The best answers referred to checking the size, checking stability, avoiding costly mistakes and the overall appearance.

(c) Candidates generally were not familiar with laminating techniques. Very few answers showed use of male and female formers and the use of cramps. However, there were some very good answers that involved use of a vacuum forming bag that only required a single mould or former.

(d) (i) Some candidates did recognise that the only construction that could be used to join a shelf to the body was a halving joint. For maximum marks the joint needed to be drawn with equal 'halves'.

(ii) Most candidates named PVA as a suitable adhesive.

(e) (i) It was disappointing that many candidates could not describe in sufficient detail how the surfaces could be prepared to take an applied finish. While there were some good answers that included references to using different grades of glasspaper, few mentioned the removal of dust or the use of a cork rubber/block.

(ii) Most candidates named a suitable finish for the DVD holder, the most popular being varnish and paint. Good reasons for the choice were provided: to preserve and protect and to enhance the appearance were the most popular.

(f) Most candidates sketched a rectangular block to which the DVD holder could be joined. Marks were awarded for a practical idea. The method of construction was often some form of mortise or housing and was appropriate. However, some candidates did not look carefully enough at the 140 mm wide body of the holder and subsequently did not provide two important sizes that took this into account.

DESIGN AND TECHNOLOGY

Paper 0445/41
Systems and Control

Key Messages

- A small number of candidates had responded to all questions in ***Section B***. Candidates should be reminded that time is wasted by either starting or not completing a question or by completion of all questions.
- Responses were generally clear and sketching was of a high quality in most cases.
- There was little evidence of part answers or calculation working being carried out in margins or anywhere other than the correct place; this does ensure that all work can be credited.

General Comments

Candidates were able to access all of the questions on the paper and there was no evidence that any candidate had run out of time. There was little evidence of question parts not being attempted either in ***Section A*** or in ***Section B***. Instructions in the rubrics had generally been followed, which gave candidates the best chance of gaining marks. Candidates should be advised to note carefully the command words used as the start of the question along with the mark allocation; this would help to prevent time being spent on an answer that has already gained maximum marks. Presentation of work in most cases was clear and care had been taken in the annotation of sketches. In ***Section B*** the mechanisms question proved to be the most popular choice with an even split between the other two questions.

Comments on Specific Questions

Section A

Question 1

(a) The majority of candidates recognised that torsion or torque is the force applied to a screw as it is inserted.

(b) There were rather fewer correct responses to this part; with a number of candidates not noticing that the question asked for the force acting on the screw, rather than on the shelf. Shear was the only answer accepted for this part.

(c) There were two marks for this part and the majority of candidates gained the first mark for suggesting that extra screws be added. Valid answers for the second mark were not so common. Gauge of the screw and use of hardened screws were rarely mentioned. Those candidates who had justified the use of more screws by stating which part they would be added to were awarded a second mark.

Question 2

Clear examples of natural shell structures were given in the majority of cases. A variety of examples were seen with several unusual ones, all of which gained credit.

The examples of manufactured shell structures were valid in most cases but a few examples where the shell was a part of a much larger structure that included other structure types, e.g. ‘a boat’, it was not clear enough to gain the mark. Candidates should be encouraged where possible to go for the ‘safe’ examples rather than unusual ones that may be borderline in terms of accuracy.

Question 3

Knowledge of levers was sound in the majority of responses with clear examples being given. Only a few candidates chose first or second order examples.

Question 4

Clear drawings of the folded card were shown in most cases. The first mark for folds that reinforced the structure was given in the majority of cases. The ability to support a load was frequently compromised by placing the card in the wrong position.

Question 5

The question asked for labels to be added to structural components. In a number of cases the rope holding the load was used to illustrate tension. The mark was awarded because tension is present in the rope but it is not strictly a part of the basic structure. There were a number of examples where credit could not be given because the leader from the label to the drawing did not go to a definite position on the structure.

Question 6

(a) The majority of candidates recognised the worm gear system but a significant number had placed the labels the wrong way around, naming part **A** as the worm gear. A small number of responses had parts of other mechanisms wrongly included.

(b) There was a tendency for the gear ratio to be written the wrong way around. Candidates should remember that the number of turns of the driver should be stated first.

Question 7

(a) This question was well answered with most responses giving the correct transfer of motion. Marks were awarded either for reciprocating to rotary, or for rotary to reciprocating.

(b) In most cases the cam was correctly chosen.

Question 8

(a) The majority of reasons given for use of a colour code were clear and gained credit; the most popular response related to the small size of the resistor. Not many referred to the value being readable regardless of orientation of the resistor.

(b) Full knowledge of application of the colour code was in many cases not evident. Most had the first band correctly labelled as green; many candidates did not get the colour for the multiplier correct.

Question 9

Knowledge of the microswitch contact configuration was on the whole very good. Only a small number of candidates lost marks through either using the normally open contact or by joining all of the contacts together.

Question 10

Approximately half of the responses had the two capacitors with the same value correctly identified.

Section B

Question 11

(a) In most cases a correct indication was given of the load on the arch being distributed around the circumference of the arch. Very few examples were seen of the load from the top courses of brickwork being distributed downward at 45º to left and right.

(b) (i) With the exception of a few that had the forces the wrong way around the majority stated that tension would be measured on the top face and compression on the lower face. Those who chose

to state that the upper gauge would extend and the lower face gauge would get shorter were also rewarded with marks.

(ii) Very few candidates recognised that the markings on the strain gauge are there to allow accurate alignment when the gauge is applied to a surface.

(c) (i) The elastic limit was correctly identified in most cases with rather fewer gaining the mark for the upper yield point. Credit was given in cases where understanding was shown and the candidate had provided a clear description of what was happening to the sample.

(ii) The area of plastic deformation was not well known and descriptions were often not clear enough to award a mark.

(iii) The area of the graph where Young's modulus would apply was not well understood. A small minority of candidates gained credit for identifying a single point on the graph where it would apply.

(d) (i) In most cases candidates added strengthening in a suitable way to prevent the gate from sagging but very few had noted the distortion in the top bar that required a vertical support for correction.

(ii) Clear indication of welding or bolting was given for the fixing of reinforcement.

(e) A number of accurate drawings were seen that arrived at the correct solution. In cases where the resultant force was incorrect credit could be given for the method chosen or for parts of the drawing.

(f) The ideal solution to the problem of joining timbers end to end required some form of scarf joint to spread any loading along the length of the pieces. Those who had used plates, either screwed or bolted, gained credit; those who relied on adhesive with no reinforcement did not gain credit. Both vertical and horizontal movement of the beams had to be addressed for full marks.

(g) (i) The requirement for gaining the mark was 'force × distance', in some cases the mark was earned through a complex statement that did include the required term but went into more depth than necessary. Candidates should be advised to look at the mark allocation and command word at the start of the question.

(ii) Those candidates who had experience of this type of calculation did well and gained all of the available marks. There were a few examples where knowledge was not enough or that had got part way through and the final calculation had been incorrect. Credit can still be given even when the final answer is incorrect, provided the method is clearly shown.

Question 12

(a) There was a high proportion of correct responses to this part of the question. In most cases the energy losses in the form of heat, sound and friction were correctly matched to the parts of the system where they occurred.

(b) Some very clear and valid benefits and drawbacks for battery power were seen. Credit was not given where the same benefit or drawback could also apply to mains power.

(c) In nearly all cases the rotational arrows had been correctly drawn.

(ii) Most candidates had realised that the idler played no part in the calculation and arrived at the correct rotational speed.

(iii) Understanding of why an idler should rotate freely was in general good, though clarity in the explanation was at times missing. Marks were awarded for understanding being shown.

(d) (i) In the majority of cases the ratchet and pawl mechanism was correctly identified.

(ii) The number of turns was correctly calculated in most cases.

(iii) Clear responses to this part were the norm; with all of the valid responses from the mark scheme being seen. Higher achieving candidates recognise that a smaller thread pitch would reduce the effort but require more turns.

(e) Benefits of each bearing type were generally not well known. For the ball race marks were gained for recognising the reduced contact area and ease of replacement but few had noted that it can also resist thrust which the other examples would not do.

The roller race advantage was the increased radial loading that it could take.

Low cost was the most frequently seen response for the plain bearing; few noted that it can be pre-oiled and used in areas where regular oiling would not be possible.

(ii) The self lubricating nature of nylon was widely known; the other possible answers included ease of bulk production and low cost; neither of which were mentioned by candidates.

(iii) The majority of responses mentioned the low melting point of nylon and the fact that high speed rotation would melt the bearing.

(f) (i) This part was well answered with most candidates noting that the angle of movement is 90º.

(ii) A high proportion of candidates answering this part stated that mechanical advantage would be reduced, which was the opposite of the required answer. Those who had got it correct also noted that the input link would have to move further though using less effort.

Question 13

(a) (i) The electrical conductors were correctly identified by most candidates answering this question.

(ii) With the exception of incorrect sensor examples, such as thermistor or LDR, the majority of responses contained valid examples of semiconductors.

(iii) Answers to this part were varied; a number of references to the wearing qualities of switches were made and a few candidates had realised there is a cost advantage to conductive rubber switches.

(b) (i) Clear understanding of the way in which the polarity is switched was evident.

(ii) Advantages of a relay in terms of voltage change and higher current rating were seen; no candidates had given isolation of drive circuit from the motor with the accompanying loss of interference.

(c) (i) The features of different types of LED were well known, with most responses gaining credit.

(ii) Not using the forward voltage information was a frequent cause of lost marks in this part. Those who did use it generally completed the calculation correctly.

(d) (i) A change in resistance when a strain gauge is in use was correctly identified by higher achieving candidates.

(ii) The fact that the strain gauge circuit is made up of potential dividers was not widely recognised. The purpose of the voltmeter in registering a change was also not given in many cases.

(e) (i) The two logic gates used in the circuit were correctly identified in the majority of responses.

(ii) Totally correct explanations for the working of the circuit were rare. The role of NOT gate **D** was correctly given as providing a logic 1 signal to AND gate **A**. The second mark for stating that as soon as gate **A** has a positive output gate **B** has one of the inputs held low so cannot give a positive output was rarely awarded.

(iii) The transistor circuit was partially correct in a number of cases but the full mark for the question rarely awarded. In a minority of cases an emitter follower circuit was used with the lamp being placed between the emitter and 0V rail.

DESIGN AND TECHNOLOGY

Paper 0445/43
Systems and Control

Key Messages

- A small number of candidates had responded to all questions in ***Section B***. Candidates should be reminded that time is wasted by either starting or not completing a question or by completion of all questions.
- Responses were generally clear and sketching was of a high quality in most cases.
- There was little evidence of part answers or calculation working being carried out in margins or anywhere other than the correct place; this does ensure that all work can be credited.

General Comments

Candidates were able to access all of the questions on the paper and there was no evidence that any candidate had run out of time. There was little evidence of question parts not being attempted either in ***Section A*** or in ***Section B***. Instructions in the rubrics had generally been followed, which gave candidates the best chance of gaining marks. Candidates should be advised to note carefully the command words used as the start of the question along with the mark allocation; this would help to prevent time being spent on an answer that has already gained maximum marks. Presentation of work in most cases was clear and care had been taken in the annotation of sketches. In ***Section B*** the mechanisms question proved to be the most popular choice with an even split between the other two questions.

Comments on Specific Questions

Section A

Question 1

(a) The majority of candidates recognised that torsion or torque is the force applied to a screw as it is inserted.

(b) There were rather fewer correct responses to this part; with a number of candidates not noticing that the question asked for the force acting on the screw, rather than on the shelf. Shear was the only answer accepted for this part.

(c) There were two marks for this part and the majority of candidates gained the first mark for suggesting that extra screws be added. Valid answers for the second mark were not so common. Gauge of the screw and use of hardened screws were rarely mentioned. Those candidates who had justified the use of more screws by stating which part they would be added to were awarded a second mark.

Question 2

Clear examples of natural shell structures were given in the majority of cases. A variety of examples were seen with several unusual ones, all of which gained credit.

The examples of manufactured shell structures were valid in most cases but a few examples where the shell was a part of a much larger structure that included other structure types, e.g. ‘a boat’, it was not clear enough to gain the mark. Candidates should be encouraged where possible to go for the ‘safe’ examples rather than unusual ones that may be borderline in terms of accuracy.

Question 3

Knowledge of levers was sound in the majority of responses with clear examples being given. Only a few candidates chose first or second order examples.

Question 4

Clear drawings of the folded card were shown in most cases. The first mark for folds that reinforced the structure was given in the majority of cases. The ability to support a load was frequently compromised by placing the card in the wrong position.

Question 5

The question asked for labels to be added to structural components. In a number of cases the rope holding the load was used to illustrate tension. The mark was awarded because tension is present in the rope but it is not strictly a part of the basic structure. There were a number of examples where credit could not be given because the leader from the label to the drawing did not go to a definite position on the structure.

Question 6

(a) The majority of candidates recognised the worm gear system but a significant number had placed the labels the wrong way around, naming part **A** as the worm gear. A small number of responses had parts of other mechanisms wrongly included.

(b) There was a tendency for the gear ratio to be written the wrong way around. Candidates should remember that the number of turns of the driver should be stated first.

Question 7

(a) This question was well answered with most responses giving the correct transfer of motion. Marks were awarded either for reciprocating to rotary, or for rotary to reciprocating.

(b) In most cases the cam was correctly chosen.

Question 8

(a) The majority of reasons given for use of a colour code were clear and gained credit; the most popular response related to the small size of the resistor. Not many referred to the value being readable regardless of orientation of the resistor.

(b) Full knowledge of application of the colour code was in many cases not evident. Most had the first band correctly labelled as green; many candidates did not get the colour for the multiplier correct.

Question 9

Knowledge of the microswitch contact configuration was on the whole very good. Only a small number of candidates lost marks through either using the normally open contact or by joining all of the contacts together.

Question 10

Approximately half of the responses had the two capacitors with the same value correctly identified.

Section B

Question 11

(a) In most cases a correct indication was given of the load on the arch being distributed around the circumference of the arch. Very few examples were seen of the load from the top courses of brickwork being distributed downward at 45º to left and right.

(b) (i) With the exception of a few that had the forces the wrong way around the majority stated that tension would be measured on the top face and compression on the lower face. Those who chose

to state that the upper gauge would extend and the lower face gauge would get shorter were also rewarded with marks.

(ii) Very few candidates recognised that the markings on the strain gauge are there to allow accurate alignment when the gauge is applied to a surface.

(c) (i) The elastic limit was correctly identified in most cases with rather fewer gaining the mark for the upper yield point. Credit was given in cases where understanding was shown and the candidate had provided a clear description of what was happening to the sample.

(ii) The area of plastic deformation was not well known and descriptions were often not clear enough to award a mark.

(iii) The area of the graph where Young's modulus would apply was not well understood. A small minority of candidates gained credit for identifying a single point on the graph where it would apply.

(d) (i) In most cases candidates added strengthening in a suitable way to prevent the gate from sagging but very few had noted the distortion in the top bar that required a vertical support for correction.

(ii) Clear indication of welding or bolting was given for the fixing of reinforcement.

(e) A number of accurate drawings were seen that arrived at the correct solution. In cases where the resultant force was incorrect credit could be given for the method chosen or for parts of the drawing.

(f) The ideal solution to the problem of joining timbers end to end required some form of scarf joint to spread any loading along the length of the pieces. Those who had used plates, either screwed or bolted, gained credit; those who relied on adhesive with no reinforcement did not gain credit. Both vertical and horizontal movement of the beams had to be addressed for full marks.

(g) (i) The requirement for gaining the mark was 'force × distance', in some cases the mark was earned through a complex statement that did include the required term but went into more depth than necessary. Candidates should be advised to look at the mark allocation and command word at the start of the question.

(ii) Those candidates who had experience of this type of calculation did well and gained all of the available marks. There were a few examples where knowledge was not enough or that had got part way through and the final calculation had been incorrect. Credit can still be given even when the final answer is incorrect, provided the method is clearly shown.

Question 12

(a) There was a high proportion of correct responses to this part of the question. In most cases the energy losses in the form of heat, sound and friction were correctly matched to the parts of the system where they occurred.

(b) Some very clear and valid benefits and drawbacks for battery power were seen. Credit was not given where the same benefit or drawback could also apply to mains power.

(c) In nearly all cases the rotational arrows had been correctly drawn.

(ii) Most candidates had realised that the idler played no part in the calculation and arrived at the correct rotational speed.

(iii) Understanding of why an idler should rotate freely was in general good, though clarity in the explanation was at times missing. Marks were awarded for understanding being shown.

(d) (i) In the majority of cases the ratchet and pawl mechanism was correctly identified.

(ii) The number of turns was correctly calculated in most cases.

(iii) Clear responses to this part were the norm; with all of the valid responses from the mark scheme being seen. Higher achieving candidates recognise that a smaller thread pitch would reduce the effort but require more turns.

(e) Benefits of each bearing type were generally not well known. For the ball race marks were gained for recognising the reduced contact area and ease of replacement but few had noted that it can also resist thrust which the other examples would not do.

The roller race advantage was the increased radial loading that it could take.

Low cost was the most frequently seen response for the plain bearing; few noted that it can be pre-oiled and used in areas where regular oiling would not be possible.

(ii) The self lubricating nature of nylon was widely known; the other possible answers included ease of bulk production and low cost; neither of which were mentioned by candidates.

(iii) The majority of responses mentioned the low melting point of nylon and the fact that high speed rotation would melt the bearing.

(f) (i) This part was well answered with most candidates noting that the angle of movement is 90º.

(ii) A high proportion of candidates answering this part stated that mechanical advantage would be reduced, which was the opposite of the required answer. Those who had got it correct also noted that the input link would have to move further though using less effort.

Question 13

(a) (i) The electrical conductors were correctly identified by most candidates answering this question.

(ii) With the exception of incorrect sensor examples, such as thermistor or LDR, the majority of responses contained valid examples of semiconductors.

(iii) Answers to this part were varied; a number of references to the wearing qualities of switches were made and a few candidates had realised there is a cost advantage to conductive rubber switches.

(b) (i) Clear understanding of the way in which the polarity is switched was evident.

(ii) Advantages of a relay in terms of voltage change and higher current rating were seen; no candidates had given isolation of drive circuit from the motor with the accompanying loss of interference.

(c) (i) The features of different types of LED were well known, with most responses gaining credit.

(ii) Not using the forward voltage information was a frequent cause of lost marks in this part. Those who did use it generally completed the calculation correctly.

(d) (i) A change in resistance when a strain gauge is in use was correctly identified by higher achieving candidates.

(ii) The fact that the strain gauge circuit is made up of potential dividers was not widely recognised. The purpose of the voltmeter in registering a change was also not given in many cases.

(e) (i) The two logic gates used in the circuit were correctly identified in the majority of responses.

(ii) Totally correct explanations for the working of the circuit were rare. The role of NOT gate **D** was correctly given as providing a logic 1 signal to AND gate **A**. The second mark for stating that as soon as gate **A** has a positive output gate **B** has one of the inputs held low so cannot give a positive output was rarely awarded.

(iii) The transistor circuit was partially correct in a number of cases but the full mark for the question rarely awarded. In a minority of cases an emitter follower circuit was used with the lamp being placed between the emitter and 0V rail.

DESIGN AND TECHNOLOGY

Paper 0445/05

School Based Assessment

General comments.

The vast majority of work submitted was well structured and covered the assessment criteria. Some of the work submitted was very innovative with many candidates producing well manufactured, high quality, functional outcomes. The work that Centres do in preparing their candidates for moderation and the care and attention over the administrative tasks required to accurately complete documentation is appreciated.

The majority of projects chosen were appropriate, many candidates selected interesting and challenging briefs. Most candidates selected a brief that allowed them to demonstrate appropriate manipulative skills and show an understanding of materials and their characteristics in relation to their use.

An increasing number of candidates make very good use of clients or 'experts' to give specific information relating to the particular need. They also help when developing the specification and assist in the testing and evaluation of the final product.

Whilst much of the work submitted was detailed and concise; some candidates produced an exceptionally large amount of generic and often unnecessary research material that will not help them produce a detailed specification or aid them in designing. Candidates should be encouraged to focus their research on the specific design brief and make fuller use of the space available on each sheet.

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

Some Centres included individual candidate assessment sheets with supporting comment. These were helpful for Moderators to see how and where marks were awarded. Centres are reminded that both the MS1 form and the Coursework Assessment Summary Form 0445/05/CW/S/10 should be carefully completed and submitted with the sample. Centres should also indicate where mark changes arising from internal moderation have occurred.

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

Some projects had limited evidence in the folder of the manufactured product. A photographic record of the key stages of making is important to give evidence to support the Centre marks for the Product Realisation. This record of making should not be seen as a substitute for planning for production, which should be carried out prior to the actual making.

To access the highest mark range for Testing and Evaluation, candidates should also have photographic evidence of the product in use.

Comments on specific headlines

1. Identification of a need or opportunity with a brief analysis leading to a Design Brief

Candidates generally completed this section well. Most explained the need fully, using photographs where appropriate, and described the user group before producing a clear and detailed design brief. A number of Centres were lenient in awarding marks in this section, a brief statement is not enough to access the middle or higher mark ranges. To access the higher mark range, candidates must analyse the need in detail and consider the requirements of possible users.

2. Research into the Design Brief resulting in a Specification

Work in this section has improved over the last few assessment sessions. Most candidates produced focused and relevant research. A significant number of candidates however, produce very large amounts of information on materials, processes etc., the majority of which is not related to the brief. Research should include information on the appropriate materials for the particular brief and include an explanation as to why they are suitable.

When candidates analyse existing products, they should highlight the particular design strengths and weaknesses and use this information when generating a specification and when designing.

It is important that candidates obtain information which will guide their designing. This will include essential information such as the details and dimensions of items to be stored or fitted into the product.

When including anthropometric data, candidates should only select those particular anthropometric features that apply to their brief. A number of candidates gathered the views of potential users through the use of well-structured and carefully worded questionnaires.

To achieve the higher mark range in this section, candidates must include all relevant information such as important sizes and only include research that is related to their brief. Specifications were generally detailed and justified; most candidates included the specific details of the requirements for their product.

3. Generation and exploration of Design Ideas

Work in this section continues to improve. Many candidates produced well-presented, innovative and creative design proposals. To access the higher mark range, candidates must produce a wide range of different, well-annotated possibilities. They must clearly evaluate their ideas with reference to the specification.

4. Development of Proposed Solution

Candidates are required to show from their evaluation of their initial design ideas, their thinking and their decision-making regarding the development of a final idea; including details of materials and construction methods, through trialling, testing and modelling. A number of candidates made very good use of 2D and 3D modelling and computer aided images to develop their design proposal.

5. Planning for Production

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. Most candidates produced detailed plans for production. Many produced a logical sequence of the stages of manufacture, including detailed cutting lists and approximate time allocations. Some candidates added modifications to their planning when changes occurred during manufacture.

To achieve the higher mark range candidates must produce an effective sequence of operations and a fully dimensioned and detailed drawing of their product. A good measure of the quality of a working drawing is whether there is sufficient detail for the product to be manufactured by a third party.

6. Product Realisation

Most candidates use their time effectively and complete the manufacture of a practical outcome. There were many examples of outstanding, high quality manufactured products presented.

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 emphasize particular features and 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 candidate's work.

7. Testing and Evaluation

Some candidates achieved high marks by testing the product in its intended environment and producing detailed evaluations of successes and possible weaknesses. Most made clear reference to the specification. Many candidates went on to recommend modifications and possible improvements based on their evaluation. It is important to have photographic evidence in this section. A number of candidates included third party evaluations from clients or potential users of the product which is to be encouraged.

Centres tend to be slightly lenient when assessing this section. 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.