DESIGN AND TECHNOLOGY

Paper 0445/11
Design

Key Messages

- Candidates are required to outline the manufacture of only one part of their final design 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 the most popular question, followed by Question 2 and then Question 3.

Comments on specific questions

Question 1

Candidates appeared to understand fully the requirements of this design need for the storage of outdoor boots and it was clearly one with which they were familiar in their normal day-to-day experiences. Suggested outcomes were often quite bulky but there was evidence of original thinking with boots arranged to make maximum use of the space available.

(a) Candidates were able to identify functional points required of the boot storage unit in addition to those outlined in the question.

(b) Few candidates had difficulty showing two ways in which boots could be held in place.

(c) Responses to this part of the 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. Credit was awarded for the quality of communication techniques, so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Credit was also awarded for the suitability of ideas and successful candidates explained their thinking and added detail as they progressed.

(d) The majority of candidates evaluated effectively each of their design ideas in turn and then identified the chosen idea with reasons for the choice given. It is important that candidates carry out the evaluations in the space provided and not alongside their design ideas in **part (c)**. 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 credit.

(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 awarded credit.

(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. Credit is awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and most appreciated that a moving feature of this type would need to be produced through the use of semi-resistant materials.

(a) Most candidates were able to suggest additional points to those identified in the question.

(b) The majority of candidates were familiar with methods of producing movement of this type and appropriate suggestions were given.

(c)

(d) See **Question 1 (c) – (f)**

(e)

(f)

(g) Candidates were generally able to outline a method of producing a prototype of the proposed moving feature in a school graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high credit 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 restricted the size and complexity of the final design solution to a manageable product.

(a) Additional points about the function of the play equipment apart from safety were identified by candidates.

(b) Most candidates were able to identify two examples of where safety needed to be considered.

(c)

(d) See **Question 1 (c) – (g)**

(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 design 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 the most popular question, followed by Question 2 and then Question 3.

Comments on specific questions

Question 1

Candidates appeared to understand fully the requirements of this design need for the storage of outdoor boots and it was clearly one with which they were familiar in their normal day-to-day experiences. Suggested outcomes were often quite bulky but there was evidence of original thinking with boots arranged to make maximum use of the space available.

(a) Candidates were able to identify functional points required of the boot storage unit in addition to those outlined in the question.

(b) Few candidates had difficulty showing two ways in which boots could be held in place.

(c) Responses to this part of the 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. Credit was awarded for the quality of communication techniques, so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Credit was also awarded for the suitability of ideas and successful candidates explained their thinking and added detail as they progressed.

(d) The majority of candidates evaluated effectively each of their design ideas in turn and then identified the chosen idea with reasons for the choice given. It is important that candidates carry out the evaluations in the space provided and not alongside their design ideas in **part (c)**. 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 credit.

(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 awarded credit.

(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. Credit is awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and most appreciated that a moving feature of this type would need to be produced through the use of semi-resistant materials.

(a) Most candidates were able to suggest additional points to those identified in the question.

(b) The majority of candidates were familiar with methods of producing movement of this type and appropriate suggestions were given.

(c)

(d) See **Question 1 (c) – (f)**

(e)

(f)

(g) Candidates were generally able to outline a method of producing a prototype of the proposed moving feature in a school graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high credit 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 restricted the size and complexity of the final design solution to a manageable product.

(a) Additional points about the function of the play equipment apart from safety were identified by candidates.

(b) Most candidates were able to identify two examples of where safety needed to be considered.

(c)

(d) See **Question 1 (c) – (g)**

(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 design 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 2 was the most popular question, followed closely by Question 1 and then Question 3.

Comments on specific questions

Question 1

Candidates appeared to understand the design requirements of a container for a bicycle puncture repair kit and this was clearly a situation with which they were familiar in their day to day experiences. Suggested outcomes were often quite bulky but there was evidence of original thinking with containers positioned on the bicycle frame so as to minimise the impact on the cyclist.

(a) Candidates were able to identify functional points required of the container in addition to those outlined in the question.

(b) Few candidates had difficulty showing two different ways by which the container could be attached to the bicycle.

(c) Responses to this part of the 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. Credit was awarded for the quality of communication techniques so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Credit was also awarded for the suitability of ideas and successful candidates explained their thinking and added detail as they progressed.

(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 credit.

(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 awarded credit.

(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. Credit is awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and it provided them with an opportunity to show their knowledge of display and packaging techniques/methods.

(a) Most candidates were able to suggest four additional points to those identified in the question.

(b) The majority of candidates were familiar with methods of displaying items of this type and appropriate suggestions were given.

(c)

(d) See **Question 1 (c) – (f)**

(e)

(f)

(g) Candidates were generally able to outline a method of producing a prototype of the proposed presentation box in a school graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high credit 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 would have been manageable in a camping environment.

(a) Additional points about the function of the LED portable lighting unit were identified by candidates.

(b) Most candidates were able to show two different appropriate circuit diagrams which could be used in the portable lighting unit.

(c)

(d)

(e) See **Question 1 (c) – (g)**

(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** & **A3**) and then go on to answer *either* **B4** *or* **B5** from **section B**. Question **B5** was the most popular of the optional questions for candidates. A small number of candidates did not follow the rubric instruction and omitted Question **A3**.

The standard of work was comparable to that of the previous year.

There are areas of the syllabus however, in which further improvements are needed. Candidates must be able to construct regular polygons given the length of side and/or the internal angle. The drawing of half elliptical curves given the major and minor axis is also an area that needs to be improved.

Comments on specific questions

Question A1

Logo

Many Candidates drew a Hexagon. Successful candidates drew an extension to the lower left at 120° internal angle and extended this line 80mm. This gave candidates the right and left hand corners of the hexagon. Drawing lines at 120° internal angles from each corner and 80mm long gave the correct size of Hexagon. The top line of the hexagon needed to be drawn parallel to the given base line. Candidates who constructed accurately the three missing sides of the hexagon used either compass arcs or 30°/60° set squares to construct the angles.

A Ø80 circle was drawn accurately on the given centre lines by nearly all candidates. The equilateral triangle 20 side representing the stem of the fruit was not always drawn equilateral or to the correct size and in line with the centre line given.

The sandwich shape was required to be drawn 90 × 90 as a right angled triangle. Most candidates used the given start lines.

Question A2

SAND-WHICH? signboard

Many candidates completed the left-hand vertical part of the outline of the signboard. Not all candidates repeated the angle of 45° accurately. The letter **W** was printed to the given format correctly by most candidates. Candidates who did not ‘crate’ the letter **S**, found this letter 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.

Question A3

Sandwich box

Not all candidates attempted this compulsory question, thereby losing the 10 marks available. Some candidates drew a solution that was in a pictorial projection other than isometric.

(a) Many candidates drew the two right angled ends of the triangle (120 × 120) from the given start point **X** and in isometric projection. Successful candidates drew the ghost outline of the main part of the box 70 wide to the ends they had drawn. The 90 wide front face could then be added to the 70 drawn width and the ends extended in the same plane by 10mm top and bottom. Ends R10 could be added to all four corners. Most candidates realised that these curves needed to be shown as parts of an ellipse. A window 120 × 50 could now be drawn centrally to the front face of the box.

(b) Many candidates added shading to the window. To score full credit, the shading had to be to the convention that represents transparency.

Question B4

Carrier for a sandwich and a drink can

This question was attempted by approximately a quarter of the candidates. Overall, candidates obtained a wide range of credit for their answers.

(a) It was necessary for candidates to draw a front elevation with the lower box 71 wide and 40 tall. The carry handle (divider) then needed to be added to a height of 55 above the drawn top of the lower box. The carry handle in this elevation should show a finger slot drawn on a centre line 15 from the top. The finger slot needed to be 9 deep × 40 long and centrally placed. The carry handle in this view should show the thickness of the 6mm card on the right-hand side and inside the left-hand curve of the finger slot.

(b) Many candidates drew a 71 × 71 square for the plan. In this view, the thickness of card needed to be shown 3 thick to the inside of the 71 square. The divider also needed to be shown 3 thick and fitting tightly as a diagonal. The finger slot would appear as hidden detail in this view and in projection with its position in the Front Elevation.

(c) Successful candidates projected heights from the Front Elevation and widths from the Plan to get a true End Elevation. The carry handle in this view should show the thickness of the 6mm card on the left-hand side and inside the right-hand curve of the finger slot.

(d) The drink can was to be drawn in position **D** in all three views. In the plan view, two concentric circles of Ø66 and Ø54 needed to be drawn to scale and in the centre of the space **D**.

The can needed to be projected to the **FE** and **EE** to give an overall height of 50mm from the inside of the box. A tolerance of ± 3mm was allowed on the mark scheme to accommodate candidate responses.

The final requirement was to show a 12mm shoulder to the drink can on both the **FE** and the **EE**.

Question B5

Counter-top dispenser for paper napkins

This question was attempted by approximately three-quarters of the candidates. Overall, candidates obtained a wide range of credit for their answers.

(a) Many candidates managed to draw 5 connected panels with the centre panel 150 wide. The 120 tall back has side flaps attached to the lower outer edges that are 40 wide. Both side flaps have full length glue flaps consistent with those shown in the pictorial view. The base needed to be shown 40 deep and 150 wide attached to the lower part of the back. Two glue flaps are attached to the base as evident from the pictorial view. The front continues the 150 width from the base giving a height of 80. The front does not have any glue flaps. A half ellipse was to be drawn in the top edge of the front. The ellipse needed to have a depth of 40mm (half minor axis) and a length of

120mm (major axis). All glue tabs needed to be drawn 10mm wide and with angled ends (as in the pictorial view).

(b) The octagonal outline needed to be completed so that the octagon was symmetrical. The symbol added needed to have a napkin, a hand and some form of movement such as an arrow included. The symbol also needed to be in proportion to the available space.

To gain full credit, candidates needed to show the construction for the half ellipse. Where candidates had used a trammel, this needed to be attached to their sheet to gain full credit.

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** & **A3**) and then go on to answer *either* **B4** *or* **B5** from **section B**. Question **B5** was the most popular of the optional questions for candidates. A small number of candidates did not follow the rubric instruction and omitted Question **A3**.

The standard of work was comparable to that of the previous year.

There are areas of the syllabus however, in which further improvements are needed. Candidates must be able to construct regular polygons given the length of side and/or the internal angle. The drawing of half elliptical curves given the major and minor axis is also an area that needs to be improved.

Comments on specific questions

Question A1

Logo

Many Candidates drew a Hexagon. Successful candidates drew an extension to the lower left at 120° internal angle and extended this line 80mm. This gave candidates the right and left hand corners of the hexagon. Drawing lines at 120° internal angles from each corner and 80mm long gave the correct size of Hexagon. The top line of the hexagon needed to be drawn parallel to the given base line. Candidates who constructed accurately the three missing sides of the hexagon used either compass arcs or 30°/60° set squares to construct the angles.

A Ø80 circle was drawn accurately on the given centre lines by nearly all candidates. The equilateral triangle 20 side representing the stem of the fruit was not always drawn equilateral or to the correct size and in line with the centre line given.

The sandwich shape was required to be drawn 90 × 90 as a right angled triangle. Most candidates used the given start lines.

Question A2

SAND-WHICH? signboard

Many candidates completed the left-hand vertical part of the outline of the signboard. Not all candidates repeated the angle of 45° accurately. The letter **W** was printed to the given format correctly by most candidates. Candidates who did not ‘crate’ the letter **S**, found this letter 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.

Question A3

Sandwich box

Not all candidates attempted this compulsory question, thereby losing the 10 marks available. Some candidates drew a solution that was in a pictorial projection other than isometric.

(a) Many candidates drew the two right angled ends of the triangle (120 × 120) from the given start point **X** and in isometric projection. Successful candidates drew the ghost outline of the main part of the box 70 wide to the ends they had drawn. The 90 wide front face could then be added to the 70 drawn width and the ends extended in the same plane by 10mm top and bottom. Ends R10 could be added to all four corners. Most candidates realised that these curves needed to be shown as parts of an ellipse. A window 120 × 50 could now be drawn centrally to the front face of the box.

(b) Many candidates added shading to the window. To score full credit, the shading had to be to the convention that represents transparency.

Question B4

Carrier for a sandwich and a drink can

This question was attempted by approximately a quarter of the candidates. Overall, candidates obtained a wide range of credit for their answers.

(a) It was necessary for candidates to draw a front elevation with the lower box 71 wide and 40 tall. The carry handle (divider) then needed to be added to a height of 55 above the drawn top of the lower box. The carry handle in this elevation should show a finger slot drawn on a centre line 15 from the top. The finger slot needed to be 9 deep × 40 long and centrally placed. The carry handle in this view should show the thickness of the 6mm card on the right-hand side and inside the left-hand curve of the finger slot.

(b) Many candidates drew a 71 × 71 square for the plan. In this view, the thickness of card needed to be shown 3 thick to the inside of the 71 square. The divider also needed to be shown 3 thick and fitting tightly as a diagonal. The finger slot would appear as hidden detail in this view and in projection with its position in the Front Elevation.

(c) Successful candidates projected heights from the Front Elevation and widths from the Plan to get a true End Elevation. The carry handle in this view should show the thickness of the 6mm card on the left-hand side and inside the right-hand curve of the finger slot.

(d) The drink can was to be drawn in position **D** in all three views. In the plan view, two concentric circles of Ø66 and Ø54 needed to be drawn to scale and in the centre of the space **D**.

The can needed to be projected to the **FE** and **EE** to give an overall height of 50mm from the inside of the box. A tolerance of ± 3mm was allowed on the mark scheme to accommodate candidate responses.

The final requirement was to show a 12mm shoulder to the drink can on both the **FE** and the **EE**.

Question B5

Counter-top dispenser for paper napkins

This question was attempted by approximately three-quarters of the candidates. Overall, candidates obtained a wide range of credit for their answers.

(a) Many candidates managed to draw 5 connected panels with the centre panel 150 wide. The 120 tall back has side flaps attached to the lower outer edges that are 40 wide. Both side flaps have full length glue flaps consistent with those shown in the pictorial view. The base needed to be shown 40 deep and 150 wide attached to the lower part of the back. Two glue flaps are attached to the base as evident from the pictorial view. The front continues the 150 width from the base giving a height of 80. The front does not have any glue flaps. A half ellipse was to be drawn in the top edge of the front. The ellipse needed to have a depth of 40mm (half minor axis) and a length of

120mm (major axis). All glue tabs needed to be drawn 10mm wide and with angled ends (as in the pictorial view).

(b) The octagonal outline needed to be completed so that the octagon was symmetrical. The symbol added needed to have a napkin, a hand and some form of movement such as an arrow included. The symbol also needed to be in proportion to the available space.

To gain full credit, candidates needed to show the construction for the half ellipse. Where candidates had used a trammel, this needed to be attached to their sheet to gain full credit.

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** & **A3**) and then go on to answer *either* **B4** *or* **B5** from **section B**. Question **B4** and **B5** were equally popular optional questions for candidates. A small number of candidates did not follow the rubric instruction and omitted Question **A3**.

The standard of work was comparable to that of the previous year.

There are areas of the syllabus however, in which further improvements are needed. Candidates must be able to draw circles in isometric projection given the diameter. Drawing three dimensional bar charts is also an area that needs to be improved.

Comments on specific questions

Question A1

Logo outline

(a) Many candidates drew a R40 semi-circle on the given centre lines. Most candidates then used the top of the semi-circle by extending it to the right to give the correct height.

(b) A triangle with its apex on the centre line of the semi-circle and with its base 50 from the apex could now be constructed.

(c) The addition of two 80 × 20 rectangles to the base of the triangle completed the logo shape.

(d) The application of thick lines to enhance the created letters **C, K** and **I** was needed to complete the logo.

Question A2

CLARK INSURANCE signboard

(a) Not all candidates completed the name **CLARK INSURANCE** correctly. Candidates should be advised to read the question carefully. The letter **A** was printed correctly by most candidates. Candidates who did not 'crate' the letter **R**, found this letter 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.

(b) Many candidates extended the two horizontal parts of the outline of the signboard. Not all candidates repeated the angle of 60° accurately to complete the symmetry of the outline.

Question A3

Collection Box

Not all candidates attempted this compulsory question, thereby losing the 10 marks available. Some candidates drew a solution that was in a pictorial projection other than isometric.

(a) Many candidates drew the rectangular part of the box to the correct length and width. Most candidates drew the height of the box correctly at 100 above the base. The semi-circular end proved very difficult for some candidates. The solution was for candidates to draw a semi-circle flat view of R40 and divide the radius up into 5mm spaced verticals. The same number of verticals needed to be drawn on each of the isometric radii. The heights of each of the verticals can now be transferred from the flat view to the isometric view to give plots of the semi-circle in isometric.

(b) The thickening of the outline of the letters **C, K** and **I** would give the effect of the letters being printed-on.

(c) A coin slot 30 × 5 needed to be drawn on the upper face 50mm from the square end of the box and with 15 either side (in a central position).

Question B4

Card Folder for customers' documents.

This question was attempted by approximately half of the candidates.

(a) Many candidates managed to draw 4 connected panels with three panels 140 high (280 to scale). The pocket 1 needed to be drawn 45 wide attached to the 90 wide left-hand back. The fold-over flaps to pocket 1 needed to be drawn on the left-hand half of the back so that they fold over the pocket 1 flap. The pocket 2 needed to be drawn attached to the 90 wide bottom of the right-hand back. This pocket needed to be 70 deep and have a glue flap attached to its right angled side. The inner side of pocket 2 needed to be drawn at an angle of 60° to the fold line.

(b) An arrow tab needed to be added centrally to each of the fold-over flaps to pocket 1. Slots in the fold-over part of pocket 1 must have the same length as the width of the arrow neck and be the same distance from the edge as the depth of the fold over flaps. This is important as the arrow tabs will not work effectively if they don't align correctly with slots.

(c) The pocket 2 fold-over flap needed to have **C, K** and **I** printed on it in an appropriate size and in the correct orientation.

Question B5

Sales data

This question was attempted by approximately half of the candidates. Overall, candidates obtained a wide range of credit for their answers.

(a) Many candidates managed to draw a circle and divide it into 6 sectors. Successful candidates realised that the sales added up to 18 000 and by dividing by 50 the sales converted into angles that could be drawn with graphic equipment, i.e. 120°, 60°, 90°, 30°, 45° and 15°. To be complete, the pie chart needed to have labels to identify each sector and its relative portion size (quantity).

(b) (i) Candidates who read the question clearly, drew a simple bar chart for the TOTAL number of customers each day, over the five days of the week. The resulting illustration was a rising chart from Monday to Friday with a dip on Thursday. The space given, allowed a scale of 1:10 in millimetres.

(ii) Only a few candidates drew a *three-dimensional* bar chart. Many drew the bar chart in two-dimensions only. Successful candidates drew five bars representing corporate customers and five bars representing the domestic customers. Candidates had to consider the quantities and the space available to choose a suitable scale for the chart. To gain full credit, the columns needed to be labelled domestic, corporate and with the five days of the week.

DESIGN AND TECHNOLOGY

Paper 0445/31
Resistant Materials

Key messages

- To perform well on this paper, candidates need to use technical terms accurately. This is particularly important when naming tools and materials and describing processes and techniques.
- Candidates need to provide clearly drawn sketches and supportive written notes when attempting questions that begin with the statement: *Use sketches and notes to....*
- Candidates need to make sure that their ideas are clear and accurate so that the Examiner can understand what they are trying to communicate.
- Candidates must understand that resistant materials are not *cheap.* Answers stated as 'cheap' will not be awarded credit. It could be valid to state that a material is '*cheaper'* when making comparative judgements.

General comments

Section A

This section tests a very wide area of knowledge concerned with materials, tools and processes used when working with wood, metal and plastic. Some candidates did not demonstrate an all-round knowledge and understanding and performed less well on this section than on ***Section B***.

Section B

This section always has a number of questions with large mark allocations requiring a combination of clear and accurate sketches supported by detailed written notes. Careful reading of the questions is needed before answering. In some cases, candidates provided information not asked for in the question, which could not be given any credit. **Questions 11** and **12** were the most popular choice and there were many excellent answers to those questions requiring clear sketches and informative notes: 11**(e)** and 12**(c)**.

Comments on specific questions

Section A

Question 1

The most popular correct answers included that aluminium was lightweight and that it would not corrode. Vague statements such as 'strong' and 'cheap' were common incorrect answers.

Question 2

Only a minority of candidates could give the specific name for three different files that would be used when shaping the three parts of the mild steel. Many candidates gained at least minimal credit but very few gained full credit. Candidates should be familiar with the technical names of files.

Question 3

There were no variations of answers accepted for parts **(a)** and **(b)**: corrosive and toxic respectively.

Question 4

There were many excellent, accurate sketches of a rebate provided by candidates.

Question 5

Only a minority of candidates were able to name both the smoothing plane and the marking gauge. However, although unable to give the names of the tools, some candidates did recognise a specific use for one or both of them and were rewarded.

Question 6

(a) Many candidates named the tool used to cut sheet metal as a chisel. However, this was too vague and therefore only 'cold chisel' was awarded credit. Some candidates stated names such as bevel-edge chisel that would be used with wood.

(b) The most common correct alternative used to cut sheet metal was a hacksaw. Some alternative correct answers included tinsnips, guillotine, shears and piercing saw.

Question 7

Most candidates recognised that the plastic chair would be lighter to move around, that it would be more resistant to outdoor use and that it would be more comfortable due to its moulded shape.

Question 8

The majority of candidates named at least one suitable adhesive that could be used to join the pieces of manufactured board: the most common being PVA and epoxy resin. Trade names such as 'Araldite' and 'Cascamite' were also appropriate.

Question 9

(a) There were many correct answers naming a pencil, rule, try square or marking knife. However, many candidates incorrectly named a marking gauge which is used along the grain. A cutting gauge could have been used to mark line A across the grain.

(b) Most candidates named an appropriate tool to remove the waste. Use of a tenon saw, coping saw, vibro saw were good answers. The jig saw was not appropriate and those candidates who stated 'saw' were not rewarded as this was considered too imprecise.

Question 10

Many candidates were able to state the exact micrometer reading and gain maximum credit, sometimes without showing any 'working out'. Partial credit was given for a breakdown of 18.00 followed by 0.50 then finally 0.21.

Section B

Question 11

(a) (i) Many candidates stated correctly that manufactured boards were cheaper than solid wood, that they were more stable and were available as wide boards. However, there were many misconceptions; the most common being that they are lighter in weight, that they are easier to cut and that they are stronger.

(ii) The most common disadvantage was that manufactured boards were less attractive. Some excellent answers referred specifically to the need to cover the unsightly edges.

(b) There were many answers that gained some credit but only a minority gaining maximum credit. Some candidates simply screwed through the table top even though he question stated that the rail would be screwed to the underside. For maximum credit, candidates had to show the head of the screw 'hidden', indicate the length of the screw so that it did not protrude through the table top and add details about a clearance or pilot hole. Those answers that used some form of KD fitting, additional wooden block or metal bracket also achieved maximum credit.

(c) (i) Few candidates described the use of a dowel jig accurately. Credit was given for alternative methods that could achieve a measure of accuracy, including the use of a try square and marking gauge.

(ii) Only a minority of candidates showed an accurate sketch of a through mortise and tenon joint. The most common construction was a stub mortise and tenon which would have limited strength. There were some innovative constructions using additional blocks of wood attached to the end.

Some candidates showed a dowel joint even though the question asked for an alternative to a dowel joint. Candidates need to be clear about the difference between the terms 'permanent' and 'temporary' when discussing types of construction.

(iii) While many candidates attempted to show some form of KD fitting, sometimes the sketch was not accurate and sometimes it was shown in the wrong position. The most common correct answers included a modesty block and a scan fitting.

(d) The vast majority of candidates recognised that an electric sander would provide a more even finish and that it would be quicker than sanding by hand.

(e) Many candidates provided excellent instructions for assembling the parts of the table. The best answers showed a clear logical sequence accompanied by quality sketches and useful written notes.

Question 12

(a) (i) Most candidates named either polystyrene or acrylic as a suitable plastic for the vacuum formed tray.

(ii) Vacuum forming is a relatively quick process once the mould or former has been made. It cannot be described as an 'easy' process, but does provide repetitive accuracy for batch production and there is little waste material.

(b) Many candidates described the following features of the mould: draft angle (sloping sides), rounded corners and air holes.

(c) There were some excellent answers to this question. Candidates were able to recall their first-hand practical experience of this important process. There was often a clear sequence to the stages involved, detailed sketches and excellent technical annotation. However, some candidates spent considerable time and effort giving information on the production of the mould. The question did not ask for this and subsequently no credit could be awarded.

(d) Many candidates recognised that the designer had produced large, colourful, safe shapes to handle.

Some candidates referred to the variety of shapes to provide interest.

(e) Some candidates chose to produce the round shape on a wood turning lathe, either by faceplate or between-centres turning. The most common method was to mark out diagonals, cut to the shape of an octagon, then round off the shape using a sanding disc or use of files and glasspaper.

All three methods were acceptable.

(f) Many candidates did not answer this question correctly because they did not provide quality control checks that would be carried out '***when making***' the child's toy. The majority of answers related to a final evaluation of the product; for example, 'has it got a non-toxic finish?' 'will it break if dropped?'.

Good quality control checks made during production included the checking of sizes, a visual check of the surface finish or checking to feel if there were any cracks or splinters.

Question 13

Very few candidates attempted this question.

(a) Candidates must be familiar with specific properties of materials. The most common incorrect answers were 'strong' and 'cheap'. Good answers included that it could be easily machined, that it could be bent to shape and that it could take a surface finish.

(b) Most candidates recognised that a hacksaw would be used to cut the mild steel tube but were unable to name an appropriate file or show how the tube would be held while both processes were carried out.

(c) Knowledge and understanding of the brazing process was generally poor.

(d) (i) Few candidates stated correctly that the plastic coating would prevent the guitar from being scratched.

(ii) Some candidates demonstrated a practical knowledge of dip coating but some candidates incorrectly thought that the steel would be dipped into molten plastic.

(e) The majority of candidates were unable to show an accurate design for a jig that would satisfy both bullet points. However, some credit was gained for showing two drilled holes for location but securing the jig in use proved more difficult with some answers involving the use of cramps which would slow down the process and be awkward to apply.

(f) There were some innovative design modifications involving the use of elongated slots or a series of individual holes and the use of pegs, pins and nuts and bolts to secure in position. However, sometimes a lack of clarity of sketches meant that it was difficult to understand how the design would work.

DESIGN AND TECHNOLOGY

Paper 0445/32
Resistant Materials

Key messages

- To perform well on this paper, candidates need to use technical terms accurately. This is particularly important when naming tools and materials and describing processes and techniques.
- Candidates need to provide clearly drawn sketches and supportive written notes when attempting questions that begin with the statement: *Use sketches and notes to....*
- Candidates need to make sure that their ideas are clear and accurate so that the Examiner can understand what they are trying to communicate.
- Candidates must understand that resistant materials are not *cheap.* Answers stated as 'cheap' will not be awarded credit. It could be valid to state that a material is '*cheaper'* when making comparative judgements.

General comments

Section A

This section tests a very wide area of knowledge concerned with materials, tools and processes used when working with wood, metal and plastic. Some candidates did not demonstrate an all-round knowledge and understanding and performed less well on this section than on ***Section B***.

Section B

This section always has a number of questions with large mark allocations requiring a combination of clear and accurate sketches supported by detailed written notes. Careful reading of the questions is needed before answering. In some cases, candidates provided information not asked for in the question, which could not be given any credit. **Questions 11** and **12** were the most popular choice and there were many excellent answers to those questions requiring clear sketches and informative notes: 11**(e)** and 12**(c)**.

Comments on specific questions

Section A

Question 1

The most popular correct answers included that aluminium was lightweight and that it would not corrode. Vague statements such as 'strong' and 'cheap' were common incorrect answers.

Question 2

Only a minority of candidates could give the specific name for three different files that would be used when shaping the three parts of the mild steel. Many candidates gained at least minimal credit but very few gained full credit. Candidates should be familiar with the technical names of files.

Question 3

There were no variations of answers accepted for parts **(a)** and **(b)**: corrosive and toxic respectively.

Question 4

There were many excellent, accurate sketches of a rebate provided by candidates.

Question 5

Only a minority of candidates were able to name both the smoothing plane and the marking gauge. However, although unable to give the names of the tools, some candidates did recognise a specific use for one or both of them and were rewarded.

Question 6

(a) Many candidates named the tool used to cut sheet metal as a chisel. However, this was too vague and therefore only 'cold chisel' was awarded credit. Some candidates stated names such as bevel-edge chisel that would be used with wood.

(b) The most common correct alternative used to cut sheet metal was a hacksaw. Some alternative correct answers included tinsnips, guillotine, shears and piercing saw.

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Most candidates recognised that the plastic chair would be lighter to move around, that it would be more resistant to outdoor use and that it would be more comfortable due to its moulded shape.

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The majority of candidates named at least one suitable adhesive that could be used to join the pieces of manufactured board: the most common being PVA and epoxy resin. Trade names such as 'Araldite' and 'Cascamite' were also appropriate.

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(a) There were many correct answers naming a pencil, rule, try square or marking knife. However, many candidates incorrectly named a marking gauge which is used along the grain. A cutting gauge could have been used to mark line A across the grain.

(b) Most candidates named an appropriate tool to remove the waste. Use of a tenon saw, coping saw, vibro saw were good answers. The jig saw was not appropriate and those candidates who stated 'saw' were not rewarded as this was considered too imprecise.

Question 10

Many candidates were able to state the exact micrometer reading and gain maximum credit, sometimes without showing any 'working out'. Partial credit was given for a breakdown of 18.00 followed by 0.50 then finally 0.21.

Section B

Question 11

(a) (i) Many candidates stated correctly that manufactured boards were cheaper than solid wood, that they were more stable and were available as wide boards. However, there were many misconceptions; the most common being that they are lighter in weight, that they are easier to cut and that they are stronger.

(ii) The most common disadvantage was that manufactured boards were less attractive. Some excellent answers referred specifically to the need to cover the unsightly edges.

(b) There were many answers that gained some credit but only a minority gaining maximum credit. Some candidates simply screwed through the table top even though he question stated that the rail would be screwed to the underside. For maximum credit, candidates had to show the head of the screw 'hidden', indicate the length of the screw so that it did not protrude through the table top and add details about a clearance or pilot hole. Those answers that used some form of KD fitting, additional wooden block or metal bracket also achieved maximum credit.

(c) (i) Few candidates described the use of a dowel jig accurately. Credit was given for alternative methods that could achieve a measure of accuracy, including the use of a try square and marking gauge.

(ii) Only a minority of candidates showed an accurate sketch of a through mortise and tenon joint. The most common construction was a stub mortise and tenon which would have limited strength. There were some innovative constructions using additional blocks of wood attached to the end.

Some candidates showed a dowel joint even though the question asked for an alternative to a dowel joint. Candidates need to be clear about the difference between the terms 'permanent' and 'temporary' when discussing types of construction.

(iii) While many candidates attempted to show some form of KD fitting, sometimes the sketch was not accurate and sometimes it was shown in the wrong position. The most common correct answers included a modesty block and a scan fitting.

(d) The vast majority of candidates recognised that an electric sander would provide a more even finish and that it would be quicker than sanding by hand.

(e) Many candidates provided excellent instructions for assembling the parts of the table. The best answers showed a clear logical sequence accompanied by quality sketches and useful written notes.

Question 12

(a) (i) Most candidates named either polystyrene or acrylic as a suitable plastic for the vacuum formed tray.

(ii) Vacuum forming is a relatively quick process once the mould or former has been made. It cannot be described as an 'easy' process, but does provide repetitive accuracy for batch production and there is little waste material.

(b) Many candidates described the following features of the mould: draft angle (sloping sides), rounded corners and air holes.

(c) There were some excellent answers to this question. Candidates were able to recall their first-hand practical experience of this important process. There was often a clear sequence to the stages involved, detailed sketches and excellent technical annotation. However, some candidates spent considerable time and effort giving information on the production of the mould. The question did not ask for this and subsequently no credit could be awarded.

(d) Many candidates recognised that the designer had produced large, colourful, safe shapes to handle.

Some candidates referred to the variety of shapes to provide interest.

(e) Some candidates chose to produce the round shape on a wood turning lathe, either by faceplate or between-centres turning. The most common method was to mark out diagonals, cut to the shape of an octagon, then round off the shape using a sanding disc or use of files and glasspaper.

All three methods were acceptable.

(f) Many candidates did not answer this question correctly because they did not provide quality control checks that would be carried out '***when making***' the child's toy. The majority of answers related to a final evaluation of the product; for example, 'has it got a non-toxic finish?' 'will it break if dropped?'.

Good quality control checks made during production included the checking of sizes, a visual check of the surface finish or checking to feel if there were any cracks or splinters.

Question 13

Very few candidates attempted this question.

(a) Candidates must be familiar with specific properties of materials. The most common incorrect answers were 'strong' and 'cheap'. Good answers included that it could be easily machined, that it could be bent to shape and that it could take a surface finish.

(b) Most candidates recognised that a hacksaw would be used to cut the mild steel tube but were unable to name an appropriate file or show how the tube would be held while both processes were carried out.

(c) Knowledge and understanding of the brazing process was generally poor.

(d) (i) Few candidates stated correctly that the plastic coating would prevent the guitar from being scratched.

(ii) Some candidates demonstrated a practical knowledge of dip coating but some candidates incorrectly thought that the steel would be dipped into molten plastic.

(e) The majority of candidates were unable to show an accurate design for a jig that would satisfy both bullet points. However, some credit was gained for showing two drilled holes for location but securing the jig in use proved more difficult with some answers involving the use of cramps which would slow down the process and be awkward to apply.

(f) There were some innovative design modifications involving the use of elongated slots or a series of individual holes and the use of pegs, pins and nuts and bolts to secure in position. However, sometimes a lack of clarity of sketches meant that it was difficult to understand how the design would work.

DESIGN AND TECHNOLOGY

Paper 0445/33
Resistant Materials

Key messages

- To perform well on this paper, candidates need to use technical terms accurately. This is particularly important when naming tools and materials and describing processes and techniques.
- Candidates need to provide clearly drawn sketches and supportive written notes when attempting questions that begin with the statement: *Use sketches and notes to....*
- Candidates need to make sure that their ideas are clear and accurate so that the Examiner can understand what they are trying to communicate.
- Candidates must understand that resistant materials are not *cheap.* Answers stated as 'cheap' will not be awarded credit. It could be valid to state that a material is '*cheaper'* when making comparative judgements.

General comments

Section A

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

Section B

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

Comments on specific questions

Section A

Question 1

Many candidates stated three items of information including length, quantity, gauge and the material from which the screw would be made. The gauge was often referred to as 'diameter' which was awarded credit. There were many vague answers such as 'type' and 'size' that were not credited.

Question 2

Most candidates named the tools correctly and gave a specific use. There were incorrect names such as 'wire cutters' for the tinsnips and 'hammer' for the mallet.

Question 3

Most candidates named correct tools to mark the line, **(a)** and to make an indentation, **(b)**.

The most common answers given were scriber, (sometimes named as a 'scribe') and centre punch respectively.

Question 4

The majority of candidates were able to correctly select piece **B** as the stronger of the two in part **(a)** and give a reason relating to the direction of the grain in part **(b)**.

Question 5

Frame, carcase and stool are the terms used to describe specific categories of construction used when making items of wooden furniture. Candidates should be able to identify these before being able to select a specific construction, for example, mortise and tenon joint or finger joint, within each category.

Question 6

Many candidates described a situation for using a marking knife rather than a pencil; the most common answer being to mark a line that would be sawn or chiselled. Some excellent answers referred to the knife cutting the wood fibres and providing a guide for the saw or chisel. However, some candidates stated that incorrectly that it could be seen more clearly.

Question 7

Many candidates recognised that there would be more processes involved in making the wooden chair compared to the single process, injection moulding, for the plastic chair. Some candidates did add that the initial set up cost of the mould would be recovered by volume production. Some candidates mistakenly stated that plastic was 'cheap'.

Question 8

Approximately half of all candidates named the chuck and knurling tool correctly for tools **A** and **B** respectively.

Question 9

There were many good design features describing how the kettle would be used. The most common answers referred to the lightweight materials, the comfortable handle, effective pouring spout, easy to open lid and the see-through sides to see the water level.

Question 10

(a) The most common benefit of using beech for the handle of the kitchen utensil was that it would insulate from the heat. Stainless steel was used because it would not corrode and it could be easily cleaned.

(b) Most candidates provided one permanent method of joining the beech handle to the stainless steel blade: the use of epoxy resin or 'Araldite'. The second method, that of using rivets, was less well known.

Section B

Question 11

This question was very well answered by many candidates who were able to relate to their first-hand practical experiences of working with acrylic.

(a) Many candidates gained at least half credit for giving a reason why acrylic was suitable for the holder. The most common correct answers included easily shaped, a variety of colours and that it could be self-finished.

(b) The majority of candidates recognised that the surface of acrylic could be protected by means of a paper or plastic sheet or to make sure it was covered with protective vice jaws when held in a vice.

(c) (i) Many candidates achieved high credit for completing the development (net) accurately.

(ii) Most candidates recognised that a scriber would leave a permanent mark or 'scratch' in the surface of the acrylic.

(d) (i) Many candidates achieved at least half credit for naming a suitable saw. The most common correct answers included a coping saw, vibro saw, Hegner saw or its equivalent. However, a hacksaw, tenon saw and jig saw were inappropriate.

(ii) Most candidates understood that to prevent the acrylic from cracking when drilled would require secure clamping, the use of scrap wood underneath and an appropriate drill speed.

(e) The vast majority of candidates gave two benefits of making a card model; the most common being to test the design and to use the model to find out if the bends would be accurate. Some candidates stated correctly that modelling could prevent future wastage of the actual material.

(f) Many candidates did not achieve maximum credit due to the use of inaccurate terminology. While the use of files and a scraper (sometimes the edge of a steel rule which is fine), was appropriate, many candidates referred to 'sandpaper' rather than the correct term 'wet and dry' or 'silicon carbide' paper. Candidates showed insufficient knowledge of a polishing wheel with a mop and appropriate polishing compound.

(g) There were many very good answers showing how the bend would be produced, with clear sketches showing a strip heater or line bender and the use of a former around which the shape could be bent. The main weakness with many answers was the omission of how the acrylic would be held in position while it cooled down.

Question 12

(a) Most candidates could not give two reasons for the suitability of hardwood for the back of the towel holder.

(b) There were some excellent answers to this question. Many candidates seemed familiar with aluminium: that it did not rust and that it was lightweight.

(c) Most candidates were able to provide a suitable clear finish for the rack; the most popular answer being varnish.

(d) (i) The vast majority of candidates were able name an appropriate saw that could be used to cut the hardwood to length; the most common correct answers being a tenon saw, band saw, vibro saw and Hegner saw.

(ii) There were many good answers showing the length of hardwood held by means of G cramp, often with scrap wood which had the dual function of protecting the surface of the wood and acting as a guide for a saw. It was not appropriate to hold the wood in a vice to cut through it.

(e) (i) Most candidates were able to sketch the end of the hardwood being sanded against a sanding disc.

(ii) Many candidates showed the wood secured in a vice while a jack plane was used to remove the waste. The best sketches showed the wood angled in the vice so that the edge being planed was horizontal.

(f) Many candidates disregarded the important term 'jig' and simply described how one bend would be produced using a vice. This type of answer gained only partial credit. Since the towel holder had three rails to be bent to shape it was essential to use a jig to ensure repetitive accuracy.

(g) Most of the solutions showing how the rail could be attached to the back and allowed to move were not awarded high credit. Often, candidates appeared to have a solution but did not show sufficient technical detail to demonstrate that it would function properly. Questions that require in the answer: 'Include details of materials, fittings and fixings used' do have an apportionment of marks specifically for this information. Candidates are advised to take this instruction into account when answering questions of this type in order to gain higher credit.

Question 13

This question was attempted by very few candidates.

(a) The best answers referred to the items of equipment to be stored, their sizes and quantity. Some answers correctly included the target market.

(b) The important word in this question was 'single' when asking for a single hinge to join the drawing board to the case. The only suitable hinge was a piano hinge which some candidates drew accurately.

(c) Candidates generally were familiar with constructions used with boxes or cabinets; the most common correct answers showing a lapped joint or a finger joint.

(d) Although the question stated that 'the edge of the base must not be visible', some candidates butted the 6 mm thick base up to the bottom edges of the case. The best methods used a groove or some form of rebate. Solutions that inserted the base with the use of adhesive and pins or screws gained only partial credit.

(e) Most methods given of securing the board to the case were not awarded high credit. The best answer would have been to use a pre-manufactured component such as a lock or hasp and staple.

(f) There were some very good answers describing how the hand hold would be cut out. The best answers involved the drilling of a hole through which a coping saw blade could be inserted, the shape cut out and then smoothed using files and glass paper.

(g) There were some innovative designs showing how the drawing board could be held at three different angles. Some solutions used bent metal rods and wooden strips mounted on the underside of the drawing board against which the rods would be positioned. Other solutions involved the use of grooves into which wooden or metal rods could be secured.

DESIGN AND TECHNOLOGY

Paper 0445/42
Systems and Control

Key Messages

- Candidates must ensure that the rubric is followed and that only one question in ***Section B*** is answered. In a lot of cases, a question had been started and not completed before the candidate had moved on to another question. Problems could be avoided by reading the questions carefully before making the choice of which one to answer. Time saved could then be spent on providing a fuller response to the chosen question.

- In the majority of cases, handwriting was clear and legible. However, there were a few papers that were very difficult to decipher. Candidates should be reminded that clear written responses and annotation to diagrams are very important.

- It is important that responses are produced only in the allocated response area for the question. If more space is required, extra sheets can be attached to the booklet.

General Comments

The majority of candidates this year had attempted to answer all of the ***Section A*** questions; however there was a slight increase in the number who had not responded to individual parts within the questions.

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.

Responses to the questions in ***Section B*** showed that in general, candidates were well prepared and had a good level of understanding.

The structures question was again the least popular choice from ***Section B*** while the electronics question proved to be the most popular; all parts to this question had been attempted by all candidates. The structures and mechanisms based questions both had parts that were not attempted by all candidates.

Comments on Specific Questions

Section A

Question 1

The names of the two component symbols were well known with only a few errors. In a minority of responses the LDR symbol was confused with a thermistor and the motor with a meter.

Question 2

The required parallel connections were generally added correctly; in some cases both series and parallel connections were shown; these gained no credit.

Question 3

(a) Knowledge of switch terminology was sound with the majority of candidates knowing that the switch was single pole double throw.

(b) Naming the normally open and normally closed connections was not carried out with the same accuracy as shown in part **(a)**.

Question 4

There were a number of responses where the natural structure given was too general to gain credit. Candidates should be advised to look for a specific part of a structure, whether manufactured or natural and not to go for the overall item.

Question 5

Showing the force that each material was best at resisting was completed accurately by more than half of the candidates. There were a few responses that included more than one tick on each row; these gained no credit.

Question 6

This question was very well answered with a high number of candidates gaining full credit. Those that did not gain full credit had generally not used two methods as required by the question.

Question 7

Candidates need to improve their knowledge of this area of the syllabus as there were a number of imprecise answers seen for this question. The reduction in friction was the most widely recognised advantage. This was followed by the reduced need for lubrication. A number of responses stated that there is no need for lubrication; this is not strictly true as the roller bearings will often be 'sealed for life' types, dispensing with the need for extra lubrication. Credit was given if an understanding was shown.

Question 8

(a) The area of dwell on the cam was clearly shown in many responses; there were a few that had either chosen the rise and some who had extended their indication beyond the correct area on the lower half of the cam.

(b) Rotary movement for the cam was recognised in the majority of responses; there was some confusion over the movement of the follower; this should have been reciprocating movement.

Question 9

The position of the effort was widely recognised along with the fulcrum. The load position was frequently placed along the crank rather than on the chain ring teeth.

Question 10

(a) A large majority of candidates knew that the wheelbarrow is a class 2 lever.

(b) Higher achieving candidates gave good explanations for the increase in efficiency when the load is at the front of the barrow.

Section B

Question 11

(a) There were few of the candidates that answered this question who understood fully how a dial indicator gauge can be used to measure deflection. There was some confusion with the strain gauge as the instrument to be used. Those that had drawn a dial gauge generally placed it centrally but did not indicate a method of support for the gauge. Very few could show or describe how the gauge operates.

(b) (i) The term 'factor of safety' was only explained well by high achieving candidates. Other responses referred in general terms to the strength of a structure. The relationship between maximum strength and intended design load was not clearly explained in most cases.

(ii) This part was not well answered, the majority of responses centred on weather conditions, few had considered the maximum number of vehicles on the bridge at any given time.

(c) The calculation of reactions on the bridge was carried out accurately in a number of cases. Credit was awarded for the working leading up to each of the reactions.

(d) Of the three fastening methods shown the nut and bolt was commonly recognised as being a temporary method of fastening but reasons for using the other methods were not clearly presented. Both are permanent methods and the welded joint gives a flush surface.

(e) (i) A number of valid reasons for using wood as a construction material were offered. Candidates should be reminded that when using terms such as strength it is important to qualify the term, in this instance, the wood requires strength in tension and compression as well as resistance to bending. A number of responses gained credit for referring to the sustainable nature of timber.

(ii) This part was not well answered; a number of candidates realised that the beam will support more weight when on its edge, few mentioned that the beam can safely span a greater distance.

(iii) A wide range of correctly identified timber defects were encountered.

(f) The majority of candidates knew that a strut resists compression and a tie resists tension.

Question 12

(a) (i) This question was popular and most candidates who attempted it gained credit for identifying the three pivot points correctly.

(ii) This part was generally well answered with most correct responses referring to grease being thicker in consistency and not running off the joint.

(iii) A significant number of candidates did not gain credit on this part. Of those who did gain credit, rather more recognised reciprocating motion than recognised oscillating motion.

(iv) The reason given for reduced mechanical advantage was in many cases imprecise. Candidates would benefit from developing their knowledge in this area. There were a few who gained credit for frictional losses but not many who included the losses due to energy being converted to heat.

(b) (i) Benefits of a chain drive were well known to candidates though few mentioned the continued high performance in poor weather conditions.

(ii) The available number of gear ratios was given correctly by the majority of candidates.

(iii) A number of responses divided the rear sprocket teeth by the chain ring teeth, instead of the other way around.

(iv) Candidates were generally able to give one correct reason why ball bearings are used but a correct second reason was rarely found. Easy replacement of the bearings or their ability to deal with thrust could both have been stated in the explanation.

(v) Each of the functions of the gear change mechanism regularly appeared in the responses. Rather more stated that the mechanism guides the chain than gave chain tensioning as a function.

(c) (i) Types of power source were well known to candidates and a high number gained full credit.

(ii) Weight reduction was a common response to reducing energy requirements but very few mentioned changing the material to one which is lighter as a means of achieving the weight loss.

(d) Some excellent sketches were seen in the illustration of alternative uses for the ratchet and pawl. A small number of candidates had copied the given drawing; no credit was given for this.

Question 13

(a) (i) This was a well answered opening part to the electronics based question. Very few errors were seen in identifying the components, though there was some confusion between the diode and light emitting diode.

(ii) There were a high number of candidates who gained full credit for the component values giving the longest time delay. However, some candidates would benefit from further developing their knowledge in this area. Candidates should be advised to convert all of the values into a common multiple; this makes it easy to see which the highest and lowest value is.

(iii) Most candidates gained full credit for this question; those that did not had generally identified pin 1 correctly but the other pin was wrongly labelled.

(b) (i) The purpose of VR1 in adjusting sensitivity was generally understood.

(ii) This calculation was accurately carried out in most cases. Very few candidates only gained minimal credit; those who had substituted into the formula correctly had also arrived at the correct answer.

(iii) This question requiring knowledge of transistor use was not well answered by candidates. The transistor symbol was correctly drawn in many cases and the transistor base correctly connected, but the majority of responses showed the emitter connected to the IC pin 2. Very few responses showed a pull up resistor between the collector pin and the +9V rail. This is needed otherwise the IC will immediately re-trigger.

(c) (i) Higher achieving candidates gained full credit for drawing the graph of the output pulse. In most cases, the amplitude was correctly drawn; a 0.25V tolerance was given on this. The length of pulse was in some cases incorrect.

(ii) Very few candidates related the mismatch in output time to the tolerance in components.

(d) This question provided good differentiation between candidates. There were a lot of responses that showed who gained credit for correctly showing the setting dial in the correct position against mA. Credit was lost by a number of candidates for connecting the multimeter in parallel rather than in series. The other error that lost credit was in connecting the meter so that a negative reading would be given.

(e) (i) A large majority of candidates gained credit for naming the NOR gate.

(ii) A slightly lower number than in part **(i)** correctly completed the truth table.

(iii) The description given should have included two relevant points about the effect of joining NOR gate inputs. The most frequent response was that the output would be opposite to the input, this was awarded half credit. The remaining credit could have referred to the fact that the inputs are forced to the same logic level when they are joined to that the resulting gate is a NOT gate or inverter. Rather fewer candidates gained all of the available credit.

DESIGN AND TECHNOLOGY

Paper 0445/43
Systems and Control

Key Messages

- Candidates must ensure that the rubric is followed and that only one question in ***Section B*** is answered. In a lot of cases, a question had been started and not completed before the candidate had moved on to another question. Problems could be avoided by reading the questions carefully before making the choice of which one to answer. Time saved could then be spent on providing a fuller response to the chosen question.

- In the majority of cases, handwriting was clear and legible. However, there were a few papers that were very difficult to decipher. Candidates should be reminded that clear written responses and annotation to diagrams are very important.

- It is important that responses are produced only in the allocated response area for the question. If more space is required, extra sheets can be attached to the booklet.

General Comments

The majority of candidates this year had attempted to answer all of the ***Section A*** questions; however there was a slight increase in the number who had not responded to individual parts within the questions.

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.

Responses to the questions in ***Section B*** showed that in general, candidates were well prepared and had a good level of understanding.

The structures question was again the least popular choice from ***Section B*** while the electronics question proved to be the most popular; all parts to this question had been attempted by all candidates. The structures and mechanisms based questions both had parts that were not attempted by all candidates.

Comments on Specific Questions

Section A

Question 1

The names of the two component symbols were well known with only a few errors. In a minority of responses the LDR symbol was confused with a thermistor and the motor with a meter.

Question 2

The required parallel connections were generally added correctly; in some cases both series and parallel connections were shown; these gained no credit.

Question 3

(a) Knowledge of switch terminology was sound with the majority of candidates knowing that the switch was single pole double throw.

(b) Naming the normally open and normally closed connections was not carried out with the same accuracy as shown in part **(a)**.

Question 4

There were a number of responses where the natural structure given was too general to gain credit. Candidates should be advised to look for a specific part of a structure, whether manufactured or natural and not to go for the overall item.

Question 5

Showing the force that each material was best at resisting was completed accurately by more than half of the candidates. There were a few responses that included more than one tick on each row; these gained no credit.

Question 6

This question was very well answered with a high number of candidates gaining full credit. Those that did not gain full credit had generally not used two methods as required by the question.

Question 7

Candidates need to improve their knowledge of this area of the syllabus as there were a number of imprecise answers seen for this question. The reduction in friction was the most widely recognised advantage. This was followed by the reduced need for lubrication. A number of responses stated that there is no need for lubrication; this is not strictly true as the roller bearings will often be 'sealed for life' types, dispensing with the need for extra lubrication. Credit was given if an understanding was shown.

Question 8

(a) The area of dwell on the cam was clearly shown in many responses; there were a few that had either chosen the rise and some who had extended their indication beyond the correct area on the lower half of the cam.

(b) Rotary movement for the cam was recognised in the majority of responses; there was some confusion over the movement of the follower; this should have been reciprocating movement.

Question 9

The position of the effort was widely recognised along with the fulcrum. The load position was frequently placed along the crank rather than on the chain ring teeth.

Question 10

(a) A large majority of candidates knew that the wheelbarrow is a class 2 lever.

(b) Higher achieving candidates gave good explanations for the increase in efficiency when the load is at the front of the barrow.

Section B

Question 11

(a) There were few of the candidates that answered this question who understood fully how a dial indicator gauge can be used to measure deflection. There was some confusion with the strain gauge as the instrument to be used. Those that had drawn a dial gauge generally placed it centrally but did not indicate a method of support for the gauge. Very few could show or describe how the gauge operates.

(b) (i) The term 'factor of safety' was only explained well by high achieving candidates. Other responses referred in general terms to the strength of a structure. The relationship between maximum strength and intended design load was not clearly explained in most cases.

(ii) This part was not well answered, the majority of responses centred on weather conditions, few had considered the maximum number of vehicles on the bridge at any given time.

(c) The calculation of reactions on the bridge was carried out accurately in a number of cases. Credit was awarded for the working leading up to each of the reactions.

(d) Of the three fastening methods shown the nut and bolt was commonly recognised as being a temporary method of fastening but reasons for using the other methods were not clearly presented. Both are permanent methods and the welded joint gives a flush surface.

(e) (i) A number of valid reasons for using wood as a construction material were offered. Candidates should be reminded that when using terms such as strength it is important to qualify the term, in this instance, the wood requires strength in tension and compression as well as resistance to bending. A number of responses gained credit for referring to the sustainable nature of timber.

(ii) This part was not well answered; a number of candidates realised that the beam will support more weight when on its edge, few mentioned that the beam can safely span a greater distance.

(iii) A wide range of correctly identified timber defects were encountered.

(f) The majority of candidates knew that a strut resists compression and a tie resists tension.

Question 12

(a) (i) This question was popular and most candidates who attempted it gained credit for identifying the three pivot points correctly.

(ii) This part was generally well answered with most correct responses referring to grease being thicker in consistency and not running off the joint.

(iii) A significant number of candidates did not gain credit on this part. Of those who did gain credit, rather more recognised reciprocating motion than recognised oscillating motion.

(iv) The reason given for reduced mechanical advantage was in many cases imprecise. Candidates would benefit from developing their knowledge in this area. There were a few who gained credit for frictional losses but not many who included the losses due to energy being converted to heat.

(b) (i) Benefits of a chain drive were well known to candidates though few mentioned the continued high performance in poor weather conditions.

(ii) The available number of gear ratios was given correctly by the majority of candidates.

(iii) A number of responses divided the rear sprocket teeth by the chain ring teeth, instead of the other way around.

(iv) Candidates were generally able to give one correct reason why ball bearings are used but a correct second reason was rarely found. Easy replacement of the bearings or their ability to deal with thrust could both have been stated in the explanation.

(v) Each of the functions of the gear change mechanism regularly appeared in the responses. Rather more stated that the mechanism guides the chain than gave chain tensioning as a function.

(c) (i) Types of power source were well known to candidates and a high number gained full credit.

(ii) Weight reduction was a common response to reducing energy requirements but very few mentioned changing the material to one which is lighter as a means of achieving the weight loss.

(d) Some excellent sketches were seen in the illustration of alternative uses for the ratchet and pawl. A small number of candidates had copied the given drawing; no credit was given for this.

Question 13

(a) (i) This was a well answered opening part to the electronics based question. Very few errors were seen in identifying the components, though there was some confusion between the diode and light emitting diode.

(ii) There were a high number of candidates who gained full credit for the component values giving the longest time delay. However, some candidates would benefit from further developing their knowledge in this area. Candidates should be advised to convert all of the values into a common multiple; this makes it easy to see which the highest and lowest value is.

(iii) Most candidates gained full credit for this question; those that did not had generally identified pin 1 correctly but the other pin was wrongly labelled.

(b) (i) The purpose of VR1 in adjusting sensitivity was generally understood.

(ii) This calculation was accurately carried out in most cases. Very few candidates only gained minimal credit; those who had substituted into the formula correctly had also arrived at the correct answer.

(iii) This question requiring knowledge of transistor use was not well answered by candidates. The transistor symbol was correctly drawn in many cases and the transistor base correctly connected, but the majority of responses showed the emitter connected to the IC pin 2. Very few responses showed a pull up resistor between the collector pin and the +9V rail. This is needed otherwise the IC will immediately re-trigger.

(c) (i) Higher achieving candidates gained full credit for drawing the graph of the output pulse. In most cases, the amplitude was correctly drawn; a 0.25V tolerance was given on this. The length of pulse was in some cases incorrect.

(ii) Very few candidates related the mismatch in output time to the tolerance in components.

(d) This question provided good differentiation between candidates. There were a lot of responses that showed who gained credit for correctly showing the setting dial in the correct position against mA. Credit was lost by a number of candidates for connecting the multimeter in parallel rather than in series. The other error that lost credit was in connecting the meter so that a negative reading would be given.

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DESIGN AND TECHNOLOGY

Paper 0445/05

School Based Assessment

General comments

There were many examples of outstanding work submitted this session. An increasing number of candidates identified appropriate and interesting design opportunities and generated clear and detailed briefs. The choice of brief is crucial; candidates need to be guided on selecting appropriate, challenging tasks that will enable them to have full access to the assessment criteria and sustain their interest.

Candidates should select a brief that will allow them to demonstrate appropriate manipulative skills showing an understanding of materials and their characteristics in relation to their use.

To achieve the higher mark ranges, the final product must be completed to a high standard of outcome with precision and accuracy and meet the requirements of their specification.

Some briefs and specifications submitted were too broad and generic, often leading to a lack of focused research and limited exploration of ideas and design development.

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

Many Centres included individual candidate assessment sheets; these were very 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 are carefully completed and submitted with the sample.

Some Centres, after internal moderation, insert a different total mark on the Coursework Assessment Summary Form. Please indicate on the form where any changes in marks to particular assessment criterion have been made.

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

A number of projects had very limited evidence of the manufactured product. A photographic record of the key stages of making is important to give evidence to support 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 have photographic evidence of the product in use.

Centres are reminded not to forward three-dimensional practical work or models with their sample.

Comments on specific headlines

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

Candidates generally complete this section well. Most explain the need fully, using photographs where appropriate, and describe the user group before producing a clear and detailed design brief. 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

Whilst most candidates produced focused and relevant research, a significant number produced very large amounts of information on materials, processes, etc. the majority of which has limited or no relevance to the brief. This research should focus on appropriate materials for the particular brief and include an explanation as to why they are suitable.

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, and details relating to the intended location for 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

Many candidates produced exceptionally well-presented, innovative and interesting design proposals. There were many examples of creative and inspirational work. To access the higher mark range, candidates must produce a wide range of well-annotated creative and innovative possibilities. They must clearly evaluate their ideas with reference to the specification.

Designs were generally well annotated and the quality of presentation was generally high.

There were a number of outstanding examples of where candidates used 2D and 3D modelling and computer aided images to explore design possibilities.

4. Development of Proposed Solution

A number of candidates selected one of their design ideas, produced working drawings and then produced plans for production. This does not comply with the requirement to show their decision-making regarding the final idea, materials and construction methods, through trialling, testing and modelling.

5. Planning for Production

Most candidates produced very detailed plans for production. Many produced a logical sequence of the stages of manufacture, including detailed cutting lists, approximate time allocations and appropriate Health and Safety considerations.

Working drawings were generally of a very good standard, with candidates producing high quality working drawings. Some candidates made very good use of Computer Aided Design software.

To achieve the higher mark range candidates must produce an effective sequence of operations and a fully dimensioned and detailed drawing of their product. 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

The vast majority of candidates completed 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 the manufacture of the product to emphasise the quality of making.

Centres must ensure that candidates include clear evidence of their practical outcome. Marks cannot be accepted for the practical realisation if there is no photographic evidence of the candidates work. Centres were generally accurate in awarding marks commensurate with the quality of work produced.

7. Testing and Evaluation

Many candidates achieved high marks by getting a user to test the product and producing detailed evaluations, making clear reference to the specification. Most candidates went on to recommend modifications and possible improvements based on their evaluation.

Many candidates made good use of photographs of the product, being used to highlight strengths and weaknesses.

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.