

# DESIGN AND TECHNOLOGY

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Paper 0445/11

Design

## Key Messages

- Candidates need to use specific, not generic terms when referring to design issues, materials and manufacturing techniques at all stages of their design responses.
- Clear links between one stage of the design process and the next are more likely to result in successful responses.

## General comments

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

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

## Comments on specific questions

### Question 1

This was, by far, the most popular question and the majority of candidates understood clearly the requirements of a unit for the tea making items shown.

- (a) Many candidates scored high marks on this starting point for the design process as they were able to identify four specific functional points required of the unit. Successful responses included easy to clean, waterproof, items easy to access/remove, hygienic, heatproof, teabags covered, etc. General responses such as 'durable' or 'lightweight' can be awarded marks only where the specific reason for the requirement is given.
- (b) Most candidates were able to identify places in a house where a unit of this type might be positioned. Appropriate responses included locations in different rooms in a house or in a cupboard, drawer or on a shelf, wall, etc.
- (c) The majority of candidates presented three ideas, and showed that they were able to be quite creative in their response to the design problem. Successful candidates enhanced their drawings with colour or other forms of highlighting and added annotations to provide information on the nature and detail of each design idea. Candidates are advised to show all information clearly by using all the space allocated for the answer for this part of the question.
- (d) Successful candidates identified both positive and negative aspects so that they could discriminate between all three of their design ideas in relation to the context of the question. This was often more effective where some of the comments related to the earlier raised functional points. High marks were scored where comments included valid judgements rather than just simple descriptions of each idea. Evaluation tables that simply ticked or awarded marks against each idea without adding meaningful comment could not be awarded maximum marks.
- (e) The level of response to this part of the question continues to show improvements over recent examinations. Successful candidates selected a drawing format appropriate to and large enough for the design being presented and then added constructional detail in the form of sketched and

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

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

## Question 2

This question, intended for those following the Graphic Products option, was answered by a very small number of candidates. Candidates appeared familiar with the requirements of the teabag packaging. Candidates following a graphics option needed to show more imagination and flair.

- (a) The majority of candidates identified four additional points about the function of the packaging and successful responses included appealing to customers, reflect 'tea', waterproof, airtight, hygienic, easy to open/close, etc.
- (b) Candidates, generally, had no difficulty showing two 3D shapes that would be suitable for packaging of this type including rectangular or square boxes, round, square or triangular tubes, flexible shapes, etc.
- (c) See **Question 1 (c) – (g)**
- (d)
- (e)
- (f)
- (g)

## Question 3

A small number of candidates answered this question. The requirements for the teabag dispenser were such that candidates could make use of their knowledge and experience of systems and control in an interesting way.

- (a) Most candidates had little difficulty identifying four additional points about the function of the device and these included hygienic, waterproof, easily accessible, easy to clean, tight fitting lid, must not damage teabags, etc.
- (b) Candidates responded quite well to the drawing of two different types of control system that would allow teabags to be dispensed one at a time and those identified included solenoid, flap, door, belt, turnbuckle, electric/stepper motor, ratchet, etc.
- (c) See **Question 1 (c) – (g)**
- (d)
- (e)
- (f)
- (g)

# DESIGN AND TECHNOLOGY

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Paper 0445/12

Design

## Key Messages

- Candidates need to use specific, not generic terms when referring to design issues, materials and manufacturing techniques at all stages of their design responses.
- Clear links between one stage of the design process and the next are more likely to result in successful responses.

## General comments

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

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

## Comments on specific questions

### Question 1

This was the most popular question. The majority of candidates understood clearly the requirements of a wall mounted clock for a garden and responded in a very positive way.

- (a) Many candidates scored high marks on this starting point for the design process as they were able to identify four additional specific functional points required of the clock. Successful responses included waterproof, digital or analogue format, access to batteries/mechanism, suit garden environment, easy to clean, positioned at appropriate height, etc. General responses such as 'durable' or 'lightweight' can be awarded marks only where the specific reason for the requirement is given.
- (b) Most candidates were able to show two methods of mounting the clock on a wall. Appropriate sketched responses included keyhole plate, batten system, hooks, wire/cord and screw/nail, etc.
- (c) The majority of candidates presented three ideas and showed that they were able to be quite creative in their response to the design problem. Successful candidates enhanced their drawings with colour or other forms of highlighting and added annotations to provide information on the nature and detail of each design idea. Candidates are advised to show all information clearly by using all the space allocated for the answer for this part of the question.
- (d) Successful candidates identified both positive and negative aspects so that they could discriminate between all three of their design ideas in relation to the context of the question. This was often more effective where some of the comments raised earlier, related to the functional points. High marks were scored where comments included valid judgements rather than just simple descriptions of each idea. Evaluation tables that simply ticked or awarded marks against each idea without adding meaningful comment could not be awarded maximum marks.
- (e) The level of response to this part of the question continues to show improvements over recent examinations. Successful candidates selected a drawing format appropriate to and large enough for the design being presented and then added constructional detail in the form of sketched and

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

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

### Question 2

This question, intended for those following the Graphic Products option, was answered by a reasonable number of candidates. Candidates appeared familiar with the requirements of the learning aid and some imaginative ideas were offered.

- (a) The majority of candidates identified four additional points about the function of the learning aid and successful responses included suitable size/shape for handling by child, interesting theme/colour, hours/minutes/seconds feature, safe for child to use, interactive, etc.
- (b) Candidates, generally, had no difficulty showing two methods of attaching hands to a toy clock including nut and bolt, spigot, screw, rivet, etc.
- (c) See **Question 1 (c) – (g)**
- (d)
- (e)
- (f)
- (g)

### Question 3

Only a small number of candidates answered this question. The requirements for the shopping centre clock were such that candidates could make use of their knowledge and experience of systems and control in an interesting way.

- (a) Most candidates had little difficulty identifying four additional points about the function of the clock and these included eye catching, interesting to view, safe for public, fenced off, correct height, move on hour, etc.
- (b) Candidates responded quite well to the drawing of two methods that could be used to change rotary to linear motion including cam and follower, rack and pinion, crank and slider, etc.
- (c) See **Question 1 (c) – (g)**
- (d)
- (e)
- (f)
- (g)

# DESIGN AND TECHNOLOGY

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Paper 0445/13

Design

## Key Messages

- Candidates need to use specific, not generic terms when referring to design issues, materials and manufacturing techniques at all stages of their design responses.
- Clear links between one stage of the design process and the next are more likely to result in successful responses.

## General comments

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

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

## Comments on specific questions

### Question 1

This was the most popular question and the majority of candidates understood clearly the requirements of a rack for the storage and opening of different sized envelopes.

- (a) Many candidates scored high marks on this starting point for the design process as they were able to identify four additional specific functional points required of the rack. Successful responses included stores sizes separately, addresses visible, positioned on wall/floor/desk, easy to place/remove envelopes, etc. General responses such as 'durable' or 'lightweight' can be awarded marks only where the specific reason for the requirement is given.
- (b) Most candidates were able to show two methods of opening envelopes. Appropriate sketched responses included paper knife, scissors, sharp blade, guillotine, steam/peel open, etc.
- (c) The majority of candidates presented three ideas and showed that they were able to be quite creative in their response to the design problem. Successful candidates enhanced their drawings with colour or other forms of highlighting and added annotations to provide information on the nature and detail of each design idea. Candidates are advised to show all information clearly by using all the space allocated for the answer for this part of the question.
- (d) Successful candidates identified both positive and negative aspects so that they could discriminate between all three of their design ideas in relation to the context of the question. This was often more effective where some of the comments raised earlier related to the functional points. High marks were scored where comments included valid judgements rather than just simple descriptions of each idea. Evaluation tables that simply ticked or awarded marks against each idea without adding meaningful comment could not be awarded maximum marks.
- (e) The level of response to this part of the question continues to show improvements over recent examinations. Successful candidates selected a drawing format appropriate to and large enough for the design being presented and then added constructional detail in the form of sketched and written annotations. Candidates are reminded of the need to add overall and some detail dimensions for the award of maximum marks.

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

## Question 2

This question, intended for those following the Graphic Products option, was answered by a large number of candidates. Candidates appeared familiar with the requirements of the presentation box. Those following a graphics option needed to show more imagination and flair.

- (a) The majority of candidates identified four additional points about the function of the presentation box and successful responses included: suitable size/shape for handling, interesting theme/colour, items easy to access, protects items from damage, suitable for easy storage, etc.
- (b) Candidates, generally, had no difficulty showing two methods of strengthening the edge of card including fold over, several thicknesses/layers, laminating, add wire spiral, add rod/strip in pocket, addition of slide on strengthening piece, etc.
- (c) See **Question 1 (c) – (g)**
- (d)
- (e)
- (f)
- (g)

## Question 3

Only a small number of candidates answered this question. The requirements for the embossing device were such that candidates could make use of their knowledge and experience of systems and control in an interesting way.

- (a) Most candidates had little difficulty identifying four additional points about the function of the device and these included easy to use by anyone, register for paper, reference to amount of effort required, suggested size/weight/material, does not damage paper, etc.
- (b) Candidates responded quite well to the drawing of two mechanisms that could be used to move two surfaces together and apart including lever, cam, slider, screw, rack and pinion, spring return, pneumatic cylinder, etc.
- (c) See **Question 1 (c) – (g)**
- (d)
- (e)
- (f)
- (g)

# DESIGN AND TECHNOLOGY

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Paper 0445/21  
Graphic Products

## Key Message

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

## General Comments

Candidates were required to complete all questions in **section A (A1, A2 and A3)** and then go on to answer **either B4 or B5** from **section B**. The most popular of the optional questions for candidates was **Question B4**. 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 an estimated two point perspective from given elevations of a simple shape. The construction of arcs to touch given points and the drawing of half elliptical curves (given the major and minor axis) are also areas that need to be improved on.

## Comments on specific questions

### **Question A1**

*Logo*

Many Candidates drew a castle outline. Successful candidates drew a castle outline to the correct size with 10 x 10 crenulations centrally and equally spaced. The gateway with a semi-circular top was drawn by many candidates. Some candidates misread the instruction to draw the semi-circle  $\varnothing 20$  and set their compasses to this size. This resulted in an archway that was too wide. Many candidates drew the side walls accurately to size (30 x 30), giving a location point for the R120 arc.

Candidates were required to locate the Centre of the arc, by describing an arc of R120 from the apex point and from the corner of each of the side walls.

### **Question A2**

*THE CASTLE signboard*

The letter **A** 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**

*Two-point perspective view of the play castle*

Many candidates did not attempt this compulsory question, thereby missing out on the 10 marks available. Some candidates drew a solution that was in an isometric projection rather than perspective. Candidates who made this error scored a restricted number of marks.

Many candidates interpreted the two first angle orthographic views correctly and located the given start point **A**. Many candidates drew one side at 140mm to the right of **A** in the direction of **VP2** and one side 100mm to the left of **A** in the direction of **VP1**.

Successful candidates drew a door with a hexagonal top centrally on the 140 side and a door with a 90° apex centrally on the 100 side.

Doors drawn to the correct height and width scored additional marks.

To be a true perspective drawing, horizontal lines had to converge on **VP1** or **VP2**.

#### Question B4

##### *Knight's Helmet*

This question was derived from an actual 'Graphic Product' sold in a Castle Museum.

A classroom exercise to cut-out and make the helmet from card would be most beneficial to future candidates' understanding of this Graphic Product.

This question was attempted by a large majority of the candidates. Overall, candidates gained a wide range of marks for their answers.

- (a) It was necessary for candidates to draw an ellipse with a half major axis of 90 and a minor axis of 150 centrally on the given centre lines. Many candidates failed to show evidence of sufficient construction of the ellipse. Candidates who use a trammel to construct the ellipse must either draw the trammel on the exam paper or attach it securely to the exam paper.

The headband had to be drawn with a lower radius of R15 touching a vertical line 35 above the centre of the minor axis.

Two triangular eyes were needed to be evident. The eyes were to be 15 x 35 right angle triangles drawn centrally 30 apart in the correct location on the mask.

The top radius of R 80 needed to be drawn on the given centre lines making a tangent with the headband.

- (b) A 110 x 20 rectangle was required to be drawn centrally in the space shown.
- (c) Successful candidates responded to this part of the question by illustrating a method of slots and tabs or hooks to provide an adjustable headband.

#### Question B5

##### *Model Castle cut-out and make*

This question was also derived from a real 'Graphic Product' designed for children.

This question was attempted by a minority of the candidates. Overall, candidates gained a wide range of marks for their answers.

- (a) (i) Many candidates managed to draw an equilateral triangle on the given start lines and projected a front elevation of the tower 60 high in a position above the triangle. Whilst many candidates drew a second elevation, this was not always projected from the triangular plan and therefore not to the correct dimension of 43/44 wide. The clock needed to be drawn centrally on the elevation above the plan as a Ø26 circle. Crenulations 10 high were needed to be drawn on both views. On the side elevation, the spacing and width needed to be projected from the plan so that they were equally spaced etc. On the front elevation, the crenulations were to be drawn 10 wide and 10 spaced.
- (ii) Two full size elevations of the square tower were required to be drawn in the space provided. The towers had to be 100 tall and with sides of 30 wide. Crenulations were to be drawn on both towers



10 x 10. One tower had to show a 25 x 10 door centrally placed, with the other tower showing a window 20 x 10 centrally placed and 10 below the crenulations.

- (b) The square tower and the triangular tower had to be assembled as shown in the question, and drawn in isometric projection in the space given. The location of the bottom corner of the square tower had been given. Candidates who used this starting point were successful in drawing the square tower first. The triangular tower could then be 'crated' from the plan of **Question (a) (i)**.

Candidates who 'crated' the triangular tower were able to draw an accurate isometric view of the triangular tower attached to the square tower.

For full marks, a door 30 x 35 was to be drawn on the square tower. The clock face needed to be evident centrally on the visible face of the triangular tower.

# DESIGN AND TECHNOLOGY

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Paper 0445/22  
Graphic Products

## Key Message

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

## General Comments

Candidates were required to complete all questions in **section A (A1, A2 and A3)** and then go on to answer **either B4 or B5** from **section B**. The most popular of the optional questions for candidates was **Question B4**. 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 an estimated two point perspective from given elevations of a simple shape. The construction of arcs to touch given points and the drawing of half elliptical curves (given the major and minor axis) are also areas that need to be improved on.

## Comments on specific questions

### Question A1

*Logo*

Many Candidates drew a castle outline. Successful candidates drew a castle outline to the correct size with 10 x 10 crenulations centrally and equally spaced. The gateway with a semi-circular top was drawn by many candidates. Some candidates misread the instruction to draw the semi-circle  $\varnothing 20$  and set their compasses to this size. This resulted in an archway that was too wide. Many candidates drew the side walls accurately to size (30 x 30), giving a location point for the R120 arc.

Candidates were required to locate the Centre of the arc, by describing an arc of R120 from the apex point and from the corner of each of the side walls.

### Question A2

*THE CASTLE signboard*

The letter **A** 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

*Two-point perspective view of the play castle*

Many candidates did not attempt this compulsory question, thereby missing out on the 10 marks available. Some candidates drew a solution that was in an isometric projection rather than perspective. Candidates who made this error scored a restricted number of marks.

Many candidates interpreted the two first angle orthographic views correctly and located the given start point **A**. Many candidates drew one side at 140mm to the right of **A** in the direction of **VP2** and one side 100mm to the left of **A** in the direction of **VP1**.

Successful candidates drew a door with a hexagonal top centrally on the 140 side and a door with a 90° apex centrally on the 100 side.

Doors drawn to the correct height and width scored additional marks.

To be a true perspective drawing, horizontal lines had to converge on **VP1** or **VP2**.

#### Question B4

##### *Knight's Helmet*

This question was derived from an actual 'Graphic Product' sold in a Castle Museum.

A classroom exercise to cut-out and make the helmet from card would be most beneficial to future candidates' understanding of this Graphic Product.

This question was attempted by a large majority of the candidates. Overall, candidates gained a wide range of marks for their answers.

- (a) It was necessary for candidates to draw an ellipse with a half major axis of 90 and a minor axis of 150 centrally on the given centre lines. Many candidates failed to show evidence of sufficient construction of the ellipse. Candidates who use a trammel to construct the ellipse must either draw the trammel on the exam paper or attach it securely to the exam paper.

The headband had to be drawn with a lower radius of R15 touching a vertical line 35 above the centre of the minor axis.

Two triangular eyes were needed to be evident. The eyes were to be 15 x 35 right angle triangles drawn centrally 30 apart in the correct location on the mask.

The top radius of R 80 needed to be drawn on the given centre lines making a tangent with the headband.

- (b) A 110 x 20 rectangle was required to be drawn centrally in the space shown.
- (c) Successful candidates responded to this part of the question by illustrating a method of slots and tabs or hooks to provide an adjustable headband.

#### Question B5

##### *Model Castle cut-out and make*

This question was also derived from a real 'Graphic Product' designed for children.

This question was attempted by a minority of the candidates. Overall, candidates gained a wide range of marks for their answers.

- (a) (i) Many candidates managed to draw an equilateral triangle on the given start lines and projected a front elevation of the tower 60 high in a position above the triangle. Whilst many candidates drew a second elevation, this was not always projected from the triangular plan and therefore not to the correct dimension of 43/44 wide. The clock needed to be drawn centrally on the elevation above the plan as a  $\varnothing 26$  circle. Crenulations 10 high were needed to be drawn on both views. On the side elevation, the spacing and width needed to be projected from the plan so that they were equally spaced etc. On the front elevation, the crenulations were to be drawn 10 wide and 10 spaced.
- (ii) Two full size elevations of the square tower were required to be drawn in the space provided. The towers had to be 100 tall and with sides of 30 wide. Crenulations were to be drawn on both towers 10 x 10. One tower had to show a 25 x 10 door centrally placed, with the other tower showing a window 20 x 10 centrally placed and 10 below the crenulations.

- (b) The square tower and the triangular tower had to be assembled as shown in the question, and drawn in isometric projection in the space given. The location of the bottom corner of the square tower had been given. Candidates who used this starting point were successful in drawing the square tower first. The triangular tower could be then be 'crated' from the plan of **Question (a) (i)**.

Candidates who 'crated' the triangular tower were able to draw an accurate isometric view of the triangular tower attached to the square tower.

For full marks, a door 30 x 35 was to be drawn on the square tower. The clock face needed to be evident centrally on the visible face of the triangular tower.

# DESIGN AND TECHNOLOGY

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Paper 0445/23  
Graphic Products

## Key Message

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

## General Comments

Candidates were required to complete all questions in **section A (A1, A2 and A3)** and then go on to answer *either B4 or B5* from **section B**. The most popular of the optional questions for candidates was **Question B5**. A small number of candidates would have not omitted **Question A3** if they had followed the rubric instruction.

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

Further improvements are needed in certain areas of the syllabus. Candidates must be able to draw an estimated two point perspective from given elevations of a simple shape. The construction of triangles in isometric projection by 'crating' and developments of irregular shaped surfaces are also areas that need to be improved on.

## Comments on specific questions

### Question A1

*Logo*

- Many candidates drew a half octagon by estimation. Candidates who used the correct construction of diagonal and arcs scored full marks.
- Most candidates drew a  $\varnothing 50$  semi circle. Some candidates misread the instruction and set their compasses bigger/smaller, and drew an incorrect size semi-circle on the given centre lines.
- Most candidates extended the given boiler but omitted the vertical line next to the cab.
- The chimney needed to be completed so that it was shown 15 wide and the same height as the train cab.
- The third wheel needed to be added by drawing a  $\varnothing 30$  circle in line with the other two wheels on the correct centre line, and touching the rear wheel circle and the train frame.

### Question A2

*THE LITTLE TRAIN signboard*

The letter **T** was printed to the given format 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.

### Question A3

*Two-point perspective view of the play house*

Many candidates missed out on the 10 marks available by not attempting this compulsory question. Some candidates drew a solution that was in an isometric projection rather than perspective. Candidates who made this error scored a restricted number of marks.

Many Candidates interpreted the two third angle orthographic views correctly and located the given start point **A**. Many candidates drew one side at 140mm to the right of **A** in the direction of **VP2** and one side 100mm to the left of **A** in the direction of **VP1**.

Successful candidates drew a window centrally on the 140 side and a door centrally on the 100 side.

Doors and windows drawn to the correct height and width scored additional marks.

To be a true perspective drawing, horizontal lines had to converge on **VP1** or **VP2**.

#### Question B4

*Tray for triangular crayons*

This question was derived from an actual 'Graphic Product' used to package crayons for children.

A classroom exercise to design and make the packaging from card would be most beneficial to future Candidates' understanding of this Graphic Product.

This question was attempted by a minority of candidates. Overall, candidates gained a wide range of marks for their answers.

- (a) It was necessary for candidates to draw the vacuum formed tray in isometric projection. From the information given, a 48 sided equilateral triangle has an apex height of 42 mm. This size was used by successful candidates to determine an overall size of 160/164 long by 80/82 wide for the tray. It was necessary to tessellate the arrangement of the crayons. The first and last crayon would have a 60° sloping recess. The tray had to show a 10 deep recess to conform to the information given in the question.
- (b) A scale 1:2 development of a card sleeve was required to be drawn in the space provided. Successful responses to this question showed a wrapper 80/82 tall with two long sides 40/42 wide. Two short sides were needed 25/26 wide. A long glue flap was necessary to secure the sleeve. A closure end was needed to be evident on one end with three flaps. Finally a finger cut-out was required on one of the large sides opposite the end closure to enable the tray to be extracted.

#### Question B5

*Display stand for small toys*

This question was also derived from a real 'Graphic Product' designed for children.

This question was attempted by a majority of the candidates. Overall, candidates gained a wide range of marks for their answers.

- (a) Many candidates managed to draw an end view of the assembled display stand. The stand was based on a regular hexagon and therefore its overall size needed to be drawn 100 high by 80 wide. Centrally placed, a 40 wide face should be drawn 40 high. Close inspection of the given pictorial view should have given candidates a full impression that the three back panels were 200 high and the two side forward panels sloped to the 80 high front.
- The display surface should be evident in this end view in hidden detail drawn at 30 high, with at least one fold-down flap drawn also in hidden detail.
- (b) The development at a scale of 1:2 should show 6 panels of the same width. The join needed to be shown between two of the highest panels. The lowest panel at 40 high should have 3 panels to one side and 2 panels on the other side. The two panels adjacent to the lowest panel each needed to be drawn with a slope. A glue flap should be drawn evident on one tall panel.
- (c) The display surface needed to be drawn as a regular hexagon of 40 side. Each side should have attached by a fold line, a tapered fold-down support flap. All the flaps needed to be drawn 30 deep parallel to the faces of the hexagon and identical in shape.

# DESIGN AND TECHNOLOGY

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**Paper 0445/31**  
**Resistant Materials**

## Key messages

- Candidates need to improve their communication skills. They must try to provide clearly drawn sketches when attempting questions that begin with the statement: *Use sketches and notes to....* In addition, notes should enhance and make clearer what they have drawn and not simply state the obvious.
- Candidates need to read the questions carefully and be clear about what the question is asking **before** attempting to answer.

## 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 needed to have an all-round knowledge and understanding to perform 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**

- (a) Many candidates named aluminium for the step ladder. Materials such as stainless steel and mahogany were not considered suitable.
- (b) The most common correct answers included lightweight, good strength to weight ratio and did not rust. Answers such as strong could not be rewarded unless accompanied by some further justification.

#### **Question 2**

Many candidates provided good responses to this question. The most common answers referred to tightening the blade and/or handle and also securing the work in a vice. Other correct responses included ensuring that the blade was sharp or otherwise in good condition, and that the blade was pointing the correct way.

#### **Question 3**

- (a) Many candidates correctly completed the drawing to show two parallel edges to achieve maximum marks. A few candidates drew a flat file instead of a hand file.

- (b) Although some candidates correctly labelled the safe edge, a number of candidates drew arrows that only pointed vaguely to an area of the file that could not be rewarded.

#### Question 4

There were a few correct responses to all four parts of this question. Some candidates correctly identified the bench shears or guillotine, but often provided no answer at all. Generally, candidates who had correctly identified the guillotine went on to give a specific use that was also correct. A few responses correctly identified the jack plane. Incorrect answers included plane, smoothing plane, trying plane and bench plane. However, many candidates were able to provide a specific use that gained a mark.

#### Question 5

- (a) Many candidates named vacuum forming and injection moulding correctly.
- (b) There were a few correct responses to this question, stating that the tapered shape was to enable the container to be easily removed from the mould.
- (c) A few responses showed the candidate had recognised that the fluting increased rigidity and strength of the container. Most candidates thought its primary purpose was to improve grip.

#### Question 6

Many candidates correctly indicated two important measurements. Candidates, who were not very careful or precise with the positioning of their arrow heads, and, in the absence of any notes, were not awarded a mark. Others, however, did include notes outlining exactly the measurements they meant.

#### Question 7

There were many correctly named marking out tools. Some candidates needed to read the question carefully. They responded with answers such as centre punch for the 1 mm thick mild steel, instead of naming a tool to draw the lines. Some candidates correctly named a chinagraph pencil as a means of drawing lines on 3 mm thick acrylic. Many mentioned a marker pen or felt tip, and a few referenced leaving the protective covering on the acrylic sheet and using a pen or pencil.

#### Question 8

A minority of candidates showed the folding bars being held in a vice. Few candidates showed the use of a mallet or a hammer with scrap wood to bend the sheet metal. Many candidates achieved one mark for correctly positioning a sheet of metal within the folding bars.

#### Question 9

- (a) The majority of candidates could not recognise the soft soldering technique.
- (b) Even fewer candidates were aware of applications of soft soldering.

#### Question 10

Some candidates provided two advantages of the polypropylene sun lounger over the one constructed of steel tube and fabric, with the most popular being its durability and resistance to corrosion. Some candidates focused on the different manufacturing processes involved in their production and could not be rewarded.

### Section B

#### Question 11

- (a) There were many correct answers to this question, including mortise and tenon, halving, dowel and bridle. Some candidates only showed one dowel and others referred to the use of screws or nailing.



- (b) (i) PVA was the most common correct answer this question. The gluing time was often incorrect. Some candidates offered synthetic resin as an alternative to PVA, usually with the correct gluing time.
- (ii) Although many candidates correctly named sash cramps, some incorrectly suggested G-cramps or corner cramps as being suitable for the job.
- (iii) There were many relevant checks that could be undertaken when clamping the frame, such as clamps being tight, scrap wood to protect the frame, excess glue being removed and checking for squareness were the most common correct answers.
- (c) There were many good answers to this question with candidates either showing an angled wedge of wood as a support for the frame sides or the table of the drilling machine rotated at an angle. Some candidates incorrectly showed the timber positioned horizontally with the drill held at an angle. Many candidates achieved at least one or two marks for showing the drilling table and a method of clamping.
- (d) A minority of candidates provided good answers to this question with some carefully drawn sketches. Many candidates were able to gain at least one mark for showing a wooden former without being able to extend this with details of how the rod would be held while the bend was made.
- (e) The quality of methods of fitting shown was generally not of the standard expected. A few candidates created a refined and stylish way to fit the holder against the wall without screwing through the front of the frame. Marks were awarded for practical solutions that included details of sizes and materials used. Few used methods that were completely hidden from view. Occasionally, there were some very good responses that used keyhole type fittings at the back of the frame that simply slotted over the heads of screws sited in the wall, or some form of hidden bracket fitted to the back of the holder.
- (f) The majority of candidates needed to grasp the key features of this question. The hardwood frame would need to be taken apart and a temporary joint used, and that the bent metal rods would need to be made up of three separate pieces with a temporary joint. There were a minority of innovative, well thought out answers. Many candidates simply reduced the sizes of the parts so that they could fit in the box.

### Question 12

- (a) Many candidates provided at least one or two appropriate reasons for initially making a card model of the bird table, with the most common answers being to check the sizes, appearance and to avoid costly mistakes when using pine and plywood.
- (b) There were some excellent answers showing a mortise and tenon joint correctly proportioned and a dowel joint with a minimum of two dowels. Some methods were inappropriate, such as a butt joint glued with contact adhesive
- (c) (i) The best answers stated that the cutting gauge was more accurate, that it cut into the fibres of the wood to leave a more permanent line or that the line could not be rubbed off.
- (ii) Only a few candidates answered this question well. The best method of removing the waste wood to produce the bevel was to secure the wood in the vice and use a smoothing or jack plane. Many answers incorrectly referred to the use of saws, chisels and files.
- (d) There were many good answers naming appropriate tools / items of equipment for each of the processes. However, some candidates suggested the use of a marking gauge rather than a knife for the marking out and a hacksaw was suggested for sawing off the waste wood.
- (e) (i) Very few candidates could actually name a specific type of nail with many incorrect guesses including 'countersunk' and 'screw'.
- (ii) The most common correct answer was PVA with some candidates adding 'exterior' to this. Some candidates gave synthetic resin which was also an excellent choice. For many candidates, their knowledge of adhesives did not seem to extend beyond epoxy resin.

- (iii) While many candidates recognised that the gaps in the corner of the base were to allow rainwater and/or waste to be removed, many candidates had the misconception that the purpose of the gaps was to avoid injury to the birds or to allow the birds easy access.
- (f) Most candidates were able to identify one problem when designing products for outdoor use and gave a description of how it could be overcome. Most correct answers referred to problems associated with wet weather as well as fungal and/or insect attack.
- (g) Many candidates realised that the top of the support needed to be shaped to fit beneath the roof and received one mark. Some candidates used nailing to reinforce the joint, whilst some used dowels and a significant number suggested the use of screws. Very few candidates suggested any form of block or extra support to reinforce the roof.

### Question 13

- (a) (i) Most candidates scored highly for this question. A few candidates drew the net in the incorrect orientation and some did not show the rectangular cut-out for the photograph.
- (ii) Many candidates achieved high marks, with the most common correct answers being that the benefit of a template was for repetitive accuracy and for increased speed in the marking out process.
- (b) (i) There were many good answers to this question, including keeping the work low in the vice whilst cutting and some referred to moving the saw slowly and carefully. Some good answers included scrap wood either side of the acrylic for extra support.
- (ii) Many candidates gained one or two marks for showing the acrylic clamped with scrap wood underneath as a sacrificial bed. For a third mark, candidates needed to refer to either the speed of the drill, the correct cutting angle of the drill bit or the use of a pilot drill.
- (c) Some candidates gave two correct answers to this question, but most managed only one. The most common correct answer made reference to the use of wet and dry paper. Few mentioned the use of polish or a polishing mop. A significant number of candidates described how they would use emery cloth or glasspaper.
- (d) There were mixed responses to this question. Some candidates showed the use of a strip heater, line bender or hot air gun, although, a few candidates stated that they would heat the acrylic in an oven to soften it. Many showed a round bar or former to bend the bar around and gained one mark, but failed to describe how the acrylic would be held or cramped to retain its shape until it was cool. A few mentioned the wearing of gloves if holding the hot acrylic whilst it cooled.
- (e) Responses to this question often required more detail regarding construction or sizes to score highly. Several candidates had offered ideas that were neither workable nor practical given the thickness of the acrylic; for example, screwing a backing piece onto the 4 mm thick acrylic using hinges.

# DESIGN AND TECHNOLOGY

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Paper 0445/32  
Resistant Materials

## Key messages

- Candidates need to improve their communication skills. They must try to provide clearly drawn sketches when attempting questions that begin with the statement: *Use sketches and notes to....* In addition, notes should enhance and make clearer what they have drawn and not simply state the obvious.
- Candidates need to read the questions carefully and be clear about what the question is asking **before** attempting to answer.

## 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 needed to have an all-round knowledge and understanding to perform 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**

- (a) Many candidates named aluminium for the step ladder. Materials such as stainless steel and mahogany were not considered suitable.
- (b) The most common correct answers included lightweight, good strength to weight ratio and did not rust. Answers such as strong could not be rewarded unless accompanied by some further justification.

#### **Question 2**

Many candidates provided good responses to this question. The most common answers referred to tightening the blade and/or handle and also securing the work in a vice. Other correct responses included ensuring that the blade was sharp or otherwise in good condition, and that the blade was pointing the correct way.

#### **Question 3**

- (a) Many candidates correctly completed the drawing to show two parallel edges to achieve maximum marks. A few candidates drew a flat file instead of a hand file.

- (b) Although some candidates correctly labelled the safe edge, a number of candidates drew arrows that only pointed vaguely to an area of the file that could not be rewarded.

#### Question 4

There were a few correct responses to all four parts of this question. Some candidates correctly identified the bench shears or guillotine, but often provided no answer at all. Generally, candidates who had correctly identified the guillotine went on to give a specific use that was also correct. A few responses correctly identified the jack plane. Incorrect answers included plane, smoothing plane, trying plane and bench plane. However, many candidates were able to provide a specific use that gained a mark.

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#### Section B

#### Question 11

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- (b) (i) PVA was the most common correct answer this question. The gluing time was often incorrect. Some candidates offered synthetic resin as an alternative to PVA, usually with the correct gluing time.
- (ii) Although many candidates correctly named sash cramps, some incorrectly suggested G-cramps or corner cramps as being suitable for the job.
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- (ii) Many candidates gained one or two marks for showing the acrylic clamped with scrap wood underneath as a sacrificial bed. For a third mark, candidates needed to refer to either the speed of the drill, the correct cutting angle of the drill bit or the use of a pilot drill.
- (c) Some candidates gave two correct answers to this question, but most managed only one. The most common correct answer made reference to the use of wet and dry paper. Few mentioned the use of polish or a polishing mop. A significant number of candidates described how they would use emery cloth or glasspaper.
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- (e) Responses to this question often required more detail regarding construction or sizes to score highly. Several candidates had offered ideas that were neither workable nor practical given the thickness of the acrylic; for example, screwing a backing piece onto the 4 mm thick acrylic using hinges.

# DESIGN AND TECHNOLOGY

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**Paper 0445/33**  
**Resistant Materials**

## Key messages

- Candidates need to improve their communication skills. They must try to provide clearly drawn sketches when attempting questions that begin with the statement: *Use sketches and notes to....* In addition, notes should enhance and make clearer what they have drawn and not simply state the obvious.
- Candidates need to read the questions carefully and be clear about what the question is asking **before** attempting an answer.

## 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 named at least one nail from the list but only a minority named all three correctly.

#### **Question 2**

Many candidates named the correct manufacturing processes but were less sure about the specific plastics used to make the plastic products.

#### **Question 3**

The biscuit joint is a relatively 'new' method of construction that candidates should be familiar with.

#### **Question 4**

The majority of candidates correctly identified which of the two chucks would be used to hold the metal sections.

### Question 5

Many candidates could not recognise a ferrous and non-ferrous alloy. This is very basic knowledge within a Resistant Materials syllabus.

### Question 6

- (a) Some candidates could name the hole saw.
- (b) Slightly more candidates provided a benefit of using the hole saw than could name it. The most common answer being that it could cut large diameter holes.

### Question 7

- (a) Many candidates understood what was meant by the corrosive symbol.
- (b) Fewer candidates gave the correct meaning of the 'ear protection required' symbol. Many incorrect answers referred to loud noises and wearing headphones or ear muffs.

### Question 8

Most candidates correctly named the half-round and square files.

### Question 9

The majority of candidates gained one mark for showing how a try square could be used on the outside of the table legs and rails. This would have limited accuracy. The better method was to measure the diagonal distances. Very few candidates showed this method.

### Question 10

Many candidates named injection moulding for the drawer handle when made from polypropylene, but fewer named casting or die casting when it was made from aluminium.

## Section B

### Question 11

This question was the least popular of the three optional **Section B** questions. To answer this question well, candidates needed a good understanding of specific areas of the syllabus including shaping mild steel rod, woodturning and laminating.

- (a) The majority of candidates could not provide a property of beech for the lorry. The best correct answers referred to it being hardwearing, straight-grained and tough.
- (b) (i) A minority of candidates achieved three marks for this question. There were three distinct stages in bending the steel to shape: use of a vice to hold the metal, some type of rod or former used and the method of force: either a hammer with scrap wood or a wooden mallet.
  - (ii) Most candidates showed some form of 'stopper' and gained one mark, but few gave accurate or appropriate details of the material and how it would be joined to the steel handle.
  - (iii) Many candidates were unable to name an epoxy resin such as 'Araldite' correctly.
  - (iv) A minority of candidates described how the epoxy resin came in two parts, and that these were mixed in equal quantities and applied with a spatula to the hole and handle.
- (c) (i) No candidate was able to name 'between-centres' turning.
  - (ii) Some candidates recognised that the corners were removed to make turning easier or that it could prevent splitting.



- (iii) A small number of candidates named a gouge or a scraper. The most common correctly named tool was a chisel.
- (iv) Some candidates incorrectly named a rule as the tool used to check the diameter of the round shape. There were some excellent answers naming calipers, including a vernier.
- (d) Many candidates achieved at least one mark for showing a screw in the correct position. A small number of answers gained maximum marks. There were some excellent answers indicating that the diameter of hole in the wheel would need to allow the screw to rotate freely and the accurate positioning of washers.
- (e) A small number of candidates demonstrated any real understanding of the laminating process. However, candidates were still able to achieve marks for showing some type of former and a method of clamping the veneers together.
- (f) (i) Most candidates named paint or varnish correctly as a suitable finish for the wooden lorry.  
(ii) Most reasons given related to a finish providing a more attractive or appealing quality to the lorry. Some answers referred to the educational use of colour. Those answers that simply stated 'to protect' were awarded no marks as this was too vague.

### Question 12

This question was the most popular of the three optional **Section B** questions. To answer this question well, candidates needed a good understanding of wood working techniques and processes.

- (a) Most candidates were able to name at least one or two appropriate tools/equipment that could be used for each of the processes listed when the bars were made from hardwood.
- (b) Candidates' knowledge of metalworking tools/equipment was generally low. The most appropriate tool for marking out was a scribe; for sawing to length a hacksaw; and for cleaning the surfaces an emery cloth. Candidates need to learn thoroughly the names of tools and equipment used for a variety of basic techniques and processes.
- (c) Most candidates were able to provide a clear sketch of a suitable construction, the most common being the mortise and tenon and dowel joints. Although the butt joint was acceptable, it needed to be nailed and glued to gain two marks.
- (d) To ensure maximum accuracy when drilling holes in identical positions in two bars, the bars needed to be taped or clamped together. The use of some form of drilling jig was also an excellent method. There were numerous excellent answers incorporating these methods. Those answers that included the use of a marking gauge were awarded one mark as this could have resulted in a degree of accuracy.
- (e) The best answers showed a chamfered end to the dowel or saw cuts along the length of the dowel. Many candidates simply 'scratched' the dowel or made a pointed end to match the end of the drilled hole.
- (f) (i) There were many correct answers naming a jack or smoothing plane.  
(ii) There was a wide variation in the quality of the sketches showing the wooden bar held in a vice in the correct position to be planed. It is important that additional notes provided, enhance the answer and give the Examiner information that might not be clear from the sketch alone.  
(iii) Many candidates recognised that the wooden bar would not be held as securely as in a vice and that this was a disadvantage of using a bench stop.
- (g) Most candidates understood why designers use paint in the design of children's toys. The most popular answer related to making the toy more attractive or appealing. Many answers referred to paint making the toy smooth which is not correct. Many answers referred to paint protecting the toy without actually stating what the wood was being protected from.

- (h) There were many excellent ideas for modifying the design of the toy to accommodate the mallet. Many included an additional box while others drilled holes for the mallet. There were some innovative modifications involving use of metal or plastic clips and hooks. The weakest part of many candidates' answers involved providing details of the sizes, specifically named materials and constructions for which two marks were available.

### Question 13

This question required candidates to have a good basic knowledge and understanding of processes associated with acrylic.

- (a) (i) All the candidates who answered this did not read the question carefully and named a tool used as a straight edge. The question asked for a tool that 'could be used against a straight edge to mark line A'. The best answers would have been chinagraph pencil, felt tip or permanent marker and scribe.
- (ii) A small number of candidates named dividers. Compasses were not practical.
- (b) The best answers provided three clear stages involved in producing the hole: drill a small hole, insert the blade of a coping saw and remove most of the waste, file the sawn edges to achieve the round shape. Most candidates achieved at least one mark for one correct stage.
- (c) The question asked candidates to describe HOW each tool/item of equipment would be used and not what it was used for. For example, the scraper would be dragged across the surface to remove scratches made by the saw cut; the wet and dry paper would be wetted and rubbed backwards and forwards along the edge. Candidates need to read the questions carefully.
- (d) Many candidates simply 'stuck' the end of the rod to the acrylic. A minority of candidates did include a tube, bracket or 'cup' into which the rod could be located.
- (e) Many candidates confused ergonomics with anthropometrics. Only a minority of good answers referred to ease of access in terms of handling or visual selection. No candidate recognised the possible use of the holes as hand holds.
- (f) There were some very good answers showing bent acrylic devices that could fit onto the rails, slide along and support the DVDs. However, these were in a minority. Often, low quality sketches disadvantaged candidates, as potentially successful solutions lacked sufficient clarity to be understood.
- (g) The most common correct advantage of using wood rather than acrylic related to the strength and durability of wood, and that it could be considered easier to work.

# DESIGN AND TECHNOLOGY

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Paper 0445/42  
Systems and Control

## Key Messages

- Responses only to be made in the space allocated on the paper. If more space is needed, extra sheets should be used and attached to the booklet.
- It is important that candidates do not provide additional answers for responses that require either a single answer or a set number of answers. This could result in the Examiner not being able to give credit to a correct response.
- Candidates must ensure that the rubric is followed and that only one question in **Section B** is answered. In many cases, candidates had started a question before going on to complete another. It is important that candidates are advised to read through the question carefully before starting a response.

## General Comments

The standard of drawing shown in those questions requiring a graphic response was generally very good. There were a few instances where candidates had not made full use of the space available, and it was hard to make out the detail on the resulting small drawings.

Where a drawing had to be labelled, for example **Question 6**, the leaders from the label to the drawing should be clearly placed. In a number of cases, it was unclear which part the leader was pointing to and as a result no mark was awarded.

In **Section A**, the majority of candidates had attempted all of the questions. There were a few questions where candidates did not go quite far enough with their response to justify a mark being awarded. It is important for candidates to read carefully what is required and to avoid repeating part of the question as their answer. All of the questions in **Section A** proved accessible to candidates with **Question 8** on mechanisms proving to be the most challenging.

The electronics question was the most popular in **Section B**, with the structures question providing the fewest responses. In many cases the answers given were carefully considered and showed clear understanding of the specialist area.

## Comments on Specific Questions

### **Section A**

#### **Question 1**

The majority of candidates gained marks on this question by naming suitable natural frame structures. Those who did not gain marks had either used shell structures or manufactured structures as their examples. In some cases marks were not awarded as the example chosen included both shell and frame structures.

#### **Question 2**

A large number of responses correctly gave the cantilever beam.

### Question 3

- (a) The force acting at **X** could have been bending, compression or torsion; the majority of candidates stated 'compression' to gain the mark. Of the other two forces acting on the structure shear force at point **Y** was frequently not given correctly.
- (b) Many responses included a ferrous metal such as stainless steel or an unsuitable non-ferrous metal such as copper.
- (c) The mark was awarded for any suitable thermoplastic material. Acrylic and PVC would not have been suitable for this application, so gained no mark.

### Question 4

- (a) This question was well answered by many candidates with connecting lines being correctly drawn. The LED and symbol were generally correct but the non-polarised capacitor was commonly joined to the polarised symbol.
- (b) A number of responses were too vague to be awarded a mark. Candidates gained the mark, if they referred to how a polarised component is connected in a circuit.

### Question 5

- (a) Knowledge of how a relay operates was generally very good. The majority of candidates mentioned the electromagnetic field caused. Fewer candidates gained the mark for describing the moving contact.
- (b) A number of candidates gave 'electromagnet' as their answer. This was not allowed, as it was the main component of the relay given in part (a). Candidates who chose another application such as solenoid or transformer gained the mark.

### Question 6

- (a) The fulcrum and effort were generally identified correctly but in a number of cases the load was either unclearly marked or applied to lever **B**.
- (b) Most candidates gained the mark for identifying lever **B** as a first order lever; however, very few gave the full definition of 'a pair of first order levers'.

### Question 7

Two valid reasons for using compound levers were only identified by the more able candidates. A higher number of responses gained a single mark for giving one reason.

### Question 8

- (a) The crankshaft was correctly identified in most cases. A few candidates recognised the connecting rod. In many cases the mechanism was incorrectly identified as a cam and follower.
- (b) A number of candidates who had used 'cam and follower' in part (a) used it again for part (b) and gained the marks. A number of candidates appeared not to have read the conversion of motion required was rotary to reciprocating.

## Section B

### Question 9

- (a) (i) The mark for showing a method of preventing the roof timbers from moving was generally gained by showing a tie beam in position. A few responses showed any fixing method for the tie beam. A mark was gained in a few cases by showing a central strut under the join in the timbers.
- (ii) Use of either a tie rod or a buttress was acceptable. A few candidates chose to show a buttress against the outside of the wall.

- (b) (i)** In a few responses, marks were lost through giving an application for a composite material rather than the name of the material. Of the correct answers given, GRP and concrete were the most popular.
- (ii)** Precise reasons for using composites were rarely found. In many cases, a single mark was awarded for a generic reason such as 'to make it stronger'.
- (c) (i)** In most cases, the strut and tie were correctly identified.
- (ii)** The majority of answers to this were correct.
- (iii)** Those who had the correct answer to the previous part, generally gained a mark here.
- (iv)** About half of the responses correctly identified the wing as a frame structure.
- (d) (i)** This part of the question was not well answered. The clue to the correct joist size was that four joists were shown in the drawing in a distance of 1.8 m. This gave three spaces of 600 mm between centres for the joists. There was only one joist size in the table at 600mm spacing that would span 3 m.
- (ii)** A number of candidates had shown a suitable method of supporting the shelves, but lack of detail of construction and material used prevented more than one mark being awarded.
- (e)** There were a few really good solutions to the problem. As with the previous part, marks were lost through failure to provide detail. Candidates should be advised to use notes as an explanation to supplement detail given in the drawing.
- (f)** The concept of safe working load was not fully understood by the majority of candidates. The fact that it is far less than the maximum breaking load was rarely mentioned. Marks were gained by stating that the safe load was the normal maximum load. Few responses referred to the safety factor.

#### Question 10

- (a) (i)** Those candidates who counted the two threads and used the given pitch were generally correct.
- (ii)** This part was well answered.
- (iii)** In most cases, the pawl was correctly drawn for one mark. The ratchet on some was facing the wrong direction and a few had drawn it as a gear with no 'lean' to the teeth.
- The third mark was for indicating which direction the ratchet was free to rotate in; a number of candidates had failed to do this.
- (iv)** About half of the candidates answering the question identified the locking lever as being a second class lever.
- (b) (i)** The majority of candidates correctly identified the rack and pinion mechanism.
- (ii)** Rotary motion was correctly identified in most cases but there was then some confusion between linear and reciprocating as the converted motion for the second mark.
- (iii)** The reduction in friction was a common factor used along with reduction in wear. A few candidates referred to the fact that the bearing will support both axial and radial loads.
- (iv)** Responses should have referred to the reduction in maintenance for the bearing. A number of candidates gave responses that would have been valid for the previous part, and referred to functional aspects such as the faster operating speed available.
- (c) (i)** Reduction in belt slip was the response most frequently seen followed by the belt being held in a fixed position on the pulley. The increased surface area in contact did not feature in many responses.

- (ii) The reduction in speed was noted in the majority of responses. Most of these responses failed to mention that the torque of the output pulley would increase.
- (iii) The calculation was generally very well done with most responses containing all of the steps taken to get to the answer. In this type of question, a correct answer on its own will gain full marks but those who go through each stage have the benefit of picking up some marks even if the final answer is incorrect.
- (iv) Most candidates chose to illustrate a direct drive through spur gears or a chain drive. A further valid method that could have been used is a friction drive. This was not seen in many responses.

#### Question 11

- (a) Those candidates who were confident in their knowledge of units generally gained full marks for this part. There were a number of responses where guesswork had been used, resulting in loss of marks.
- (b)(i) The SPDT switch symbol was correctly identified in most cases.
  - (ii) The difference in switch action being looked for was in the permanent/momentary nature of the two switches. A number of responses only got as far as mentioning the physical movement needed to operate the switch. This was too vague to be awarded any marks.
- (c)(i) There were three marks available for this part; the rise in voltage, the maximum voltage and the fall in voltage, with one mark for each. Most responses gained a mark for the maximum voltage but only a few candidates gained marks for accurate rise and fall curves.
  - (ii) Most candidates gained a mark for increasing the capacitor value as a correct method of increasing delay time. Benefit of doubt was given to those who put 'increase the resistance' as their second method. To be fully accurate, the resistance should have been identified as R1.
  - (iii) Only those who understood the operation of a bipolar transistor gained the mark for this by giving an answer of around 0.6V.
- (d)(i) The OR gate was correctly identified in a large majority of responses.
  - (ii) Apart from some confusion with a NOR or AND gate truth table most gained the marks on this part.
  - (iii) On most responses, the first gate was correctly connected. The connection of the second gate as an inverter or NOT gate was not carried out well. A common error was to connect the output of gate one to a single input of gate two, leaving the other input unconnected.
- (e)(i) The concept of latching a signal was unfamiliar to many candidates. For both marks, the momentary nature of the triggering signal should have been mentioned.
  - (ii) Understanding of how the relay was held on after being triggered, initially by a voltage from two sources was needed to gain the first mark. What happened after the sensor(s) had returned to normal was needed for the second mark.
  - (iii) The protective function of the diode was widely recognised; the component being protected was frequently not identified as the transistor.
  - (iv) The calculation was accurately completed by the majority of candidates with correct units being used in most cases.

# DESIGN AND TECHNOLOGY

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**Paper 0445/05**  
**School Based Assessment**

## General comments

The majority of work submitted was well structured and covered the assessment criteria. Some of the work submitted was of a very high standard and contained very innovative design proposals, with many candidates producing well manufactured, high quality and functional outcomes.

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

There are an increasing number of candidates who make excellent use of Computer Aided Design in the development of ideas, presentation drawings and working drawings.

Centres are reminded that joint projects cannot be submitted for this qualification. It is very difficult to clearly identify an individual's contribution to the project.

An increasing number of candidates identified clients or 'experts' to give specific information relating to the particular need. The client can give useful information for research and the development of a specification and assist in the testing and evaluation of the final product.

More candidates are submitting detailed and concise research information. Some candidates produced an exceptionally large amount of generic and often unnecessary material that will not help them produce a detailed specification or aid them in their design. Candidates should be encouraged to focus their research on the specific design brief and make use of all the space available on each sheet.

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

Some Centres included individual candidate assessment sheets with supporting comment. These were helpful for Moderators to see how and where marks were awarded.

Centres are reminded that both the MS1 form and the Coursework Assessment Summary Form 0445/05/CW/S/10 are carefully completed and submitted with the sample.

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

Candidates should also include photographic evidence of the testing of the product in use.

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

After internal moderation, some Centres 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.

## **Comments on specific headlines**

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

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

### **2. Research into the Design Brief resulting in a Specification**

Most candidates produced focused and relevant research. A significant number of candidates produce large amounts of information on materials, processes etc., the majority of which has limited or little relevance to the brief. Research should include information on the appropriate materials for the particular brief and include an explanation as to why they are suitable.

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

It is important that candidates obtain information which will guide their designing, and include essential information, for example, a project relating to storage should include dimensional details of the items to be stored.

A number of candidates gathered the views of potential users through the use of well-structured and carefully worded questionnaires.

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**

Some of the work presented was inspirational. Many candidates produced well-presented, innovative and creative design proposals. The majority of Centres assess this section accurately and in line with CIE standards. To access the higher mark range, candidates must produce a wide range of different, well-annotated possibilities. They must also clearly evaluate their ideas with reference to the specification.

### **4. Development of Proposed Solution**

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

### **5. Planning for Production**

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

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

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**

There were many examples of outstanding, high quality manufactured products presented. Most candidates used a number of good quality photographs to show full details of their product. Many gave photographic evidence of key stages of manufacture of the product to emphasize particular features and the quality of making.



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

Centres were generally accurate in awarding marks commensurate with the quality of work produced.

## **7. Testing and Evaluation**

There has been significant improvement in this section. Many candidates achieved high marks by providing evidence of testing the product in its intended environment and producing a detailed evaluation of successes and possible weaknesses. Most candidates evaluated against the specification.

After identifying the strengths and weaknesses of their realisation, candidates are required to recommend modifications and possible improvements based on their evaluation, in order to achieve the highest mark range.

It is important to have photographic evidence in this section.

A number of candidates included third party evaluations from clients or potential users of the product which is to be encouraged.