

DESIGN AND TECHNOLOGY

Paper 0445/11

Design

Key Messages

- Successful candidates applied their design skills in an imaginative and creative way by following the design process as set out on the A3 answer sheets.
- The questions presented fairly open design situations, each one focusing on one of the three optional areas in the syllabus. Candidates are encouraged to use any specific areas of knowledge and interest they have developed throughout the period of their study.

General comments

The spaces provided on the answer sheets and the mark allocations were intended to give candidates a guide as to the amount of time they should devote to the different sections of their responses. Candidates tended to score well where they focused their answers on the precise stage of the design process as stated in the question they had chosen.

Question 1 was the most popular question with very few candidates attempting **Question 3**.

Comments on specific questions

Question 1

Candidates appeared to understand fully the requirements of this question and they were familiar with the storage of items such as car washing equipment, responding with relevant details throughout their answers.

- (a) Many candidates were able to identify four specific functional points required of the portable storage device in addition to those outlined in the question. Successful responses to this introductory part of the question included: easy to keep clean; weather/waterproof; lightweight; comfortable to carry; place to hang leather/cloth; spaces for each item; etc.
- (b) Most candidates were able to show two ways by which carrying handles could be made using either wood, metal or plastic and these included: cut out slot; added loops, drilled holes; straps; ledges/rebates; cast metal; bent material; etc.
- (c) Responses to this part of design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that all design details were clear to the viewer. Marks were awarded for the quality of communication techniques so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Marks were also awarded for the suitability of designs and the detail included.
- (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). Some candidates produced a table so that each design idea could be compared to the 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 can gain only limited 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 requested 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 should avoid the use of generic terms such as wood, metal and plastic as these cannot be marked positively.
- (g) Successful candidates identified one part of their proposed solution and outlined a simple step-by-step approach to the production of this part, identifying tools at each stage. It is important that the process is specific to the chosen product and not general in nature. Marks are awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and most appreciated that a freestanding promotional display of this type needed to be collapsible for despatch to shops.

- (a) Most candidates were able to suggest additional functional points to those identified in the question and successful responses included: attracts attention; compact; colourful; reflect 'DVD of the week'; include name of DVD; can be folded; easily assembled; etc.
- (b) The majority of candidates were familiar with methods by which card and other lightweight materials could be made to fold easily and these included: scoring; flexible tape; 'comb' joints; plastic hinges; rings; etc.
- (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 display in a School graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high marks when a description of the process was included.

Question 3

Candidates who attempted this question normally responded well and were able to show their specialist knowledge from the Systems and Control option, as intended by the context of the design situation.

- (a) Additional points about the function of the moving focal point included: safe for viewers; stable in use; not frightening to children; match garden surroundings; gentle movement, plant/tree theme; etc.
- (b) Candidates were generally able to identify two ways of creating movement from the wind including; sail; turbine; flap; fin; vortex; etc.
- (c))
- (d))
- (e)) See **Question 1 (c) – (g)**
- (f))
- (g))

DESIGN AND TECHNOLOGY

Paper 0445/12
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General comments

The spaces provided on the answer sheets and the mark allocations were intended to give candidates a guide as to the amount of time they should devote to the different sections of their responses. Candidates tended to score well where they focused their answers on the precise stages of the design process as stated in the question they had chosen.

Comments on specific questions

Question 1

Candidates appeared to understand fully the requirements of this question and they were familiar with the storage of small items such as cotton reels, responding with relevant details throughout their answers.

- (a) Many candidates were able to identify four specific functional points required of the storage system in addition to those outlined in the question. Successful responses to this introductory part of the question included: reels held securely; easy to put in/take out; able to see different colours; stored by different sizes; portable; stable when moving reels; etc.
- (b) Few candidates had difficulty showing two ways in which cotton reels could be held in place and these included: on dowels; in clips; held by elastic, in slots; separate sections; drawers; etc.
- (c) Responses to this part of design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that all design details were clear to the viewer. Marks were awarded for the quality of communication techniques so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Marks were also awarded for the suitability of designs and the detail included.
- (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). Some candidates produced a table so that each design idea could be compared to the 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 can be awarded only partial 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 requested 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 should avoid the use of generic terms such as wood, metal and plastic as these cannot be marked positively.
- (g) Successful candidates identified one part of their proposed solution and outlined a simple step by step approach to the production of this part, identifying tools at each stage. It is important that the process is specific to the chosen product and not general in nature. Marks are awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and most appreciated that novelty packaging of this type needed to be very child focused.

- (a) Most candidates were able to suggest additional functional points to those identified in the question and successful responses included: colourful; appeal to young children; moving part(s); hygienic; robust enough for daily use; easy to remove/replace toothpaste; etc.
- (b) The majority of candidates were familiar with methods used to enhance or add interest to card packaging and these included: interesting shapes; moving parts; bright colouring; children's characters; viewing windows; use of sound; etc.
- (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 packaging in a School graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high marks when a description of the process was included.

Question 3

Candidates who attempted this question were able to show their specialist knowledge from the Systems and Control option, as intended by the context of the design situation.

- (a) Additional points about the function of the coin sorting device included: simple to place coins in; large number of coins at one time; stacks sorted coins; accepts wide range of coins; sorted coins can be seen; etc.
- (b) Candidates were generally able to identify four varying features of coins including; weight; diameter; thickness; shape; metal type; value; colour; etc.
- (c))
- (d))
- (e)) See **Question 1 (c) – (g)**
- (f))
- (g))

DESIGN AND TECHNOLOGY

Paper 0445/13

Design

Key Messages

- Successful candidates applied their design skills in an imaginative and creative way by following the design process as set out on the A3 answer sheets.
- The questions presented fairly open design situations, each one focusing on one of the three optional areas in the syllabus. Candidates are encouraged to use any specific areas of knowledge and interest they have developed throughout the period of their study.

General comments

The spaces provided on the answer sheets and the mark allocations were intended to give candidates a guide as to the amount of time they should devote to the different sections of their responses. Candidates tended to score well where they focused their answers on the precise stage of the design process as stated in the question they had chosen.

Comments on specific questions

Question 1

The majority of candidates appeared to understand fully the context of this design situation, responding with relevant details throughout their answers.

- (a) Many candidates were able to identify four specific functional points required of the model-making work station in addition to those outlined in the question. Successful responses to this introductory part of the question included: storage spaces for tools/paints/materials; easy to clean; flat cutting surface; will not damage furniture; lightweight; compact for storage; comfortable to carry; additional lighting etc.
- (b) Few candidates had difficulty showing two ways in which a work station could be made more compact for storage. Folding, adjusting or dismantling methods drawn included: hinging; sliding; slotting together; dowels; screws; KD fittings; etc.
- (c) Responses to this part of design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that all design details were clear to the viewer. Marks were awarded for the quality of communication techniques so drawings should be enhanced through the use of shading or colour and appropriate annotation added. Marks were also awarded for the suitability of designs and the detail included.
- (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). Some candidates produced a table so that each design idea could be compared to the 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 can be awarded only partial 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 requested 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 should avoid the use of generic terms such as wood, metal and plastic as these cannot be marked positively.
- (g) Successful candidates identified one part of their proposed solution and outlined a simple step by step approach to the production of this part, identifying tools at each stage. It is important that the process is specific to the chosen product and not general in nature. Marks are awarded for the appropriateness of the process.

Question 2

This question clearly appealed to those candidates following the Graphic Products option and most appreciated that a pet carrier of this type would normally be fairly light in structure.

- (a) Most candidates were able to suggest additional functional points to those identified in the question and successful responses included: lightweight; easy to carry; strong handles; easily assembled; easy to clean; ventilation for pet; waterproof; easy access to pet; window for pet; etc.
- (b) The majority of candidates were familiar with strengthening methods suitable for use with flat card and these included: corrugation; folding; laminating; ridges/tubes added; additional tape; etc.
- (c))
- (d)) See **Question 1 (c) – (f)**
- (c))
- (f))
- (g) Candidates were generally able to outline a method of producing a prototype of the proposed pet carrier in a School graphics studio. Some methods were based on the use of computer controlled systems and these could be awarded high marks when a description of the process was included.

Question 3

Candidates who attempt this question were able to show their specialist interest in the Systems and Control option, as intended by the context of the design situation. Most focused on mechanical aspects of their knowledge base.

- (a) Additional points about the function of the fruit picking device included: no damage to fruit; lightweight to hold; simple to operate; accepts a range of fruit shapes and sizes; adjustable in length; comfortable to hold; etc.
- (b) Candidates were generally able to identify two adjusting systems for long items and those sketched included; parts sliding in or on each other; tube in tube; twist to tighten/loosen; wing nuts; push-in sprung pins; etc.
- (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. Candidates would benefit from practical activities based on questions similar to those 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**. 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.

Candidates need to understand information given in one graphical format and be able to draw the same item correctly in another graphical format and also to scale. Drawing circles in isometric and the correct application of thick and thin lines to enhance a view are two other areas that need to be improved.

Comments on specific questions

Question A1

Swing Ticket

The drawing of a $\text{Ø}40$ circle to represent the head was done well by nearly all candidates. Most candidates completed the remaining part of the shirt tail by drawing a regular hexagon given that the distance across the corners is twice the given side of 30. The half regular octagon required candidates to treat the shirt width as the 'across flats' dimension. Candidates who did this constructed a square and then used the method of drawing arcs from the corners of the square to get the correct length of side.

Candidates that used mirror dimensions and angles constructed the missing part of the arm and the collar accurately.

Question A2

FASHION WORLD signboard

Many candidates completed the remaining part of the outline of the signboard. Not all candidates spelt the name WORLD correctly. Candidates should be advised to read the question carefully. The letter **L** 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, spacing of the letters was often somewhat arbitrary.

Question A3

Counter top Display Stand

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

- (a) Many candidates did not recognise that the given orthographic views were in 3rd Angle projection. This information should have given a clear message that the upright was square in section with a round spigot that fitted into a circular base. Successful candidates drew a front elevation of the side with the 60° and 45° cuts to use the true lengths in an isometric plane as part of their solution. Most candidates drew the upright to scale and square in section with a 20 x 25 rebate 40 from the circular base. For the base, it was also necessary to draw a semi circle Ø100 in plan to get the outer crating and divisions needed to accurately draw the circular base in isometric.
- (b) The question asked for thick and thin lines to be applied to the slot only. Thick lines should only be applied to a line where only one producing side of the edge can be seen. Edges where two producing sides are evident are left thin.

Question B4

FASHION WORLD gift bag

This question was derived from an actual 'Graphic Product' used in retail outlets.

A classroom exercise to cut-out and make the bag from 100g/m² paper, would be most beneficial to future candidates' understanding of this Graphic Product.

Overall, candidates gained a wide range of marks for their answers.

- (a) It was necessary for candidates to study the given pictorial view and especially the position of the glue flaps. The given view showed that the bag joined at the back left, giving a roll out of back, side, front, side (or side, front, side, back). The glue flaps also showed that the bottom was attached to the back or the right hand side. Candidates who obtained this information from the pictorial view drew one of two possible developments (nets) for the bag. The fold over flaps were to be drawn on top of the front and back only. Successful candidates managed to use the correct convention for a fold line
- (b) Many candidates printed the words FASHION WORLD to the correct height and width/spacing. A few candidates also managed to print the words on the correct face and in the correct orientation.
- (c) Successful candidates showed a possible method of attaching the cord handle to the reinforced fold-over flap area of the bag. Some solutions were not secure. The quality of communication seen from candidates for their solution varied considerably.

Question B5

Wrist watch display stand

This question was also derived from a real 'Graphic Product' used to display watches.

The working and order of the instruction in the question should lead the candidate to the correct response. Overall, candidates gained a wide range of marks for their answers.

- (a) Many candidates managed to draw a correct view from **A** with a base 80 wide and 10 thick. The upright was not always drawn with a tenon into the base. Many candidates drew the band to the left of the top of the upright with a width of 20 and a depth of 30. A large number of candidates omitted the hidden detail to show the 3mm thickness top and bottom of the band.

- (b) Candidates who projected the plan from the front elevation, managed to draw the band 75 long centrally on the upright. Many candidates drew an elliptical base 80 x 50 centrally to the plan. The more successful candidates identified where the outline was and was not visible in plan below the band.
- (c) Only a few candidates drew the semicircles of the ends of the band to show the 3 mm thickness correctly. The two ends were required to be drawn at 45 Centres. The better responses seen showed the upright visible through the band

DESIGN AND TECHNOLOGY

Paper 0445/22
Graphic Products

Key Message

- The focus of this assessment is Graphic Products. Candidates would benefit from practical activities based on questions similar to those 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**. 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.

Candidates need to understand information given in one graphical format and be able to draw the same item correctly in another graphical format and also to scale. Drawing circles in isometric and the correct application of thick and thin lines to enhance a view are two other areas that could be improved.

Comments on specific questions

Question A1

Swing Ticket

The drawing of a $\text{Ø}40$ circle to represent the head was done well by nearly all candidates. Most candidates completed the missing neckline by drawing a regular hexagon given that the distance across the corners is twice the given side of 30. The half regular octagon for the apron front required candidates to treat the body width as the 'across flats' dimension. Candidates who did this constructed a square and then used the method of drawing arcs from the corners of the square to get the correct length of side.

Candidates that used mirror dimensions and angles constructed the missing part of the arm and the skirt accurately.

Question A2

FASHION WORLD signboard

Many candidates completed the remaining part of the outline of the signboard. Not all candidates spelt the name FASHION correctly. Candidates need to read the question carefully. The letter **H** was printed 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 often somewhat arbitrary.

Question A3

Counter top Display Stand

- (a) Some candidates did not recognise that the given orthographic views were in 3rd Angle projection. This information should have given a clear message that the upright was square in section with a round top portion. The circular spigot fitted into a square base. Successful candidates drew a front elevation of the side with the 60° cut to use the true lengths in an isometric plane as part of their solution. Most candidates drew the upright to scale and square in section with a 20 x 25 rebate 80 from the circular base spigot. For the circular top, it was also necessary to draw a semicircle Ø50 in plan to get the outer crating and divisions needed to accurately draw the circular top in isometric.
- (b) The question asked for thick and thin lines to be applied to the triangular slot only. Thick lines should only be applied to a line where only one producing side of the edge can be seen. Edges where two producing sides are evident are left thin.

Question B4

JEWELLERY BOX gift bag

This question was derived from an actual 'Graphic Product' used in retail outlets.

A classroom exercise to cut-out and make the bag from 100g/m² paper would be most beneficial to future candidates' understanding of this Graphic Product.

Overall, candidates had mixed success with their answers.

- (a) It was necessary for candidates to study the given pictorial view and especially the position of the glue flaps. The given view showed that the bag joined at the front on each side, giving a roll out of back, base, front (or front, base, back). The glue flaps also showed that the sides were attached to the back. Candidates who obtained this information from the pictorial view drew one of two possible developments (nets) for the bag. The fold over flaps were to be drawn on top of the sides only. Successful candidates managed to use the correct convention for a fold line.
- (b) Many candidates printed the words JEWELLERY BOX to the correct height and width/spacing. A few candidates also managed to print the words on the correct face and in the correct orientation.
- (c) Successful candidates showed a possible method of attaching the folded card 'handle' to the top of the bag. Some solutions were not secure. The quality of communication seen from candidates for their solution varied considerably.

Question B5

Wrist watch display stand

This question was also derived from a real 'Graphic Product' used to display watches.

The working and order of the instruction in the question should lead the candidate to the correct response. Overall, candidates gained a wide range of marks for their answers.

- (a) Many candidates managed to draw a correct view from **A** with a base 50 wide and 10 thick. The upright was not always drawn with a tenon into the base. Many candidates drew the band to the left of the top of the upright sitting on the top with the band having a width of 30 and a depth of 20. A large number of candidates omitted the hidden detail to show the 3mm thickness to the sides of the band.

- (b) Candidates who projected the plan from the front elevation, managed to draw the band 75 long centrally on the top surface of the folded upright. Many candidates drew an elliptical base 80 x 50 centrally to the plan in the correct orientation. The more successful candidates identified where the outline was and was not visible in plan below the band and the folded over upright. Only a few candidates drew the semicircles of the ends of the band to show the 3 mm thickness correctly.
- (c) The end elevation needed to show the overall 75 length of the band sitting centrally on the top of the 35 wide upright. The best responses showed the hidden detail of the thickness of the band and of the two tenons into the base.

DESIGN AND TECHNOLOGY

Paper 0445/23
Graphic Products

Key Message

- The focus of this assessment is Graphic Products. Candidates would benefit from practical activities based on questions similar to those 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**. 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.

Candidates need to understand information given in one graphical format and be able to draw the same item correctly in another graphical format and also to scale. Drawing circles in isometric and the correct application of thick and thin lines to enhance a view are two other areas that could be improved.

Comments on specific questions

Question A1

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The drawing of a $\text{Ø}40$ circle to represent the head was done well by nearly all candidates. Most candidates completed the missing neckline by drawing a regular hexagon given that the distance across the corners is twice the given side of 30. The half regular octagon for the apron front required candidates to treat the body width as the 'across flats' dimension. Candidates who did this constructed a square and then used the method of drawing arcs from the corners of the square to get the correct length of side.

Candidates that used mirror dimensions and angles constructed the missing part of the arm and the skirt accurately.

Question A2

FASHION WORLD signboard

Many candidates completed the remaining part of the outline of the signboard. Not all candidates spelt the name FASHION correctly. Candidates need to read the question carefully. The letter **H** was printed 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 often somewhat arbitrary.

Question A3

Counter top Display Stand

- (a) Some candidates did not recognise that the given orthographic views were in 3rd Angle projection. This information should have given a clear message that the upright was square in section with a round top portion. The circular spigot fitted into a square base. Successful candidates drew a front elevation of the side with the 60° cut to use the true lengths in an isometric plane as part of their solution. Most candidates drew the upright to scale and square in section with a 20 x 25 rebate 80 from the circular base spigot. For the circular top, it was also necessary to draw a semicircle Ø50 in plan to get the outer crating and divisions needed to accurately draw the circular top in isometric.
- (b) The question asked for thick and thin lines to be applied to the triangular slot only. Thick lines should only be applied to a line where only one producing side of the edge can be seen. Edges where two producing sides are evident are left thin.

Question B4

JEWELLERY BOX gift bag

This question was derived from an actual 'Graphic Product' used in retail outlets.

A classroom exercise to cut-out and make the bag from 100g/m² paper would be most beneficial to future candidates' understanding of this Graphic Product.

Overall, candidates had mixed success with their answers.

- (a) It was necessary for candidates to study the given pictorial view and especially the position of the glue flaps. The given view showed that the bag joined at the front on each side, giving a roll out of back, base, front (or front, base, back). The glue flaps also showed that the sides were attached to the back. Candidates who obtained this information from the pictorial view drew one of two possible developments (nets) for the bag. The fold over flaps were to be drawn on top of the sides only. Successful candidates managed to use the correct convention for a fold line.
- (b) Many candidates printed the words JEWELLERY BOX to the correct height and width/spacing. A few candidates also managed to print the words on the correct face and in the correct orientation.
- (c) Successful candidates showed a possible method of attaching the folded card 'handle' to the top of the bag. Some solutions were not secure. The quality of communication seen from candidates for their solution varied considerably.

Question B5

Wrist watch display stand

This question was also derived from a real 'Graphic Product' used to display watches.

The working and order of the instruction in the question should lead the candidate to the correct response. Overall, candidates gained a wide range of marks for their answers.

- (a) Many candidates managed to draw a correct view from **A** with a base 50 wide and 10 thick. The upright was not always drawn with a tenon into the base. Many candidates drew the band to the left of the top of the upright sitting on the top with the band having a width of 30 and a depth of 20. A large number of candidates omitted the hidden detail to show the 3mm thickness to the sides of the band.

- (b) Candidates who projected the plan from the front elevation, managed to draw the band 75 long centrally on the top surface of the folded upright. Many candidates drew an elliptical base 80 x 50 centrally to the plan in the correct orientation. The more successful candidates identified where the outline was and was not visible in plan below the band and the folded over upright. Only a few candidates drew the semicircles of the ends of the band to show the 3 mm thickness correctly.
- (c) The end elevation needed to show the overall 75 length of the band sitting centrally on the top of the 35 wide upright. The best responses showed the hidden detail of the thickness of the band and of the two tenons into the base.

DESIGN AND TECHNOLOGY

Paper 0445/31
Resistant Materials

Key messages

- To perform well on this paper, particularly **Section A**, candidates need to have a sound practical knowledge and understanding of working with a variety of resistant materials.
- This knowledge is best gained through the practical activities of designing and making.
- Candidates need to focus on the key requirements of each question and, in particular, provide details of tools, materials, fittings and fixings when this is stated.

General comments

Section A

This section tests a very wide area of knowledge concerned with materials, tools and processes used when working with wood, metal and plastic. It is essential that candidates have a sound practical knowledge and understanding of working with these resistant materials. Some candidates did not have this all round knowledge and understanding.

Section B

This section always has a number of questions requiring a combination of clear and accurate sketches supported by detailed written notes. Where questions state *use sketches and notes* it is important that candidates provide both. It may be possible to answer the question simply by providing written notes alone but there will be marks allocated to sketches also. Candidates need to read the question carefully to ensure that they are giving the required information in their response.

Comments on specific questions

Section A

Question 1

- (a) Many candidates recognised the mitre square.
- (b) Fewer candidates were able to state a use. Some candidates mistakenly thought that it was used to measure angles rather than to draw or set angles.

Question 2

- (a) Very few candidates were able to name the planishing process.
- (b) Although many candidates did not have knowledge of the planishing process, some candidates were able to give one or two reasons for its purpose, the most popular being that it made the copper harder or that it made it more attractive.

Question 3

Most candidates gained some credit in this question and a few candidates were able to name all three standard metal sections. It is important that candidates know the accurate terms used to describe metal sections.

Question 4

The three basic centre lathe operations were not well known.

Question 5

Many candidates were able to show how the scan fitting would be used to join the rail and leg. There was evidence of good understanding of K-D fittings.

Question 6

Many candidates were able to complete the drawing to show a coping saw. It is important that drawings are as accurate and neat as possible - some candidates' drawings appeared to show a hacksaw.

Question 7

There were many good answers showing some form of 'dip' or recess into which a finger could be inserted to make for easier removal of the DVD case.

Question 8

Many candidates correctly named cross filing. Some candidates confused this with draw filing which is used when finishing metal.

Question 9

The majority of candidates gained marks for a completed cross halving joint. The best drawings showed the two halves accurately drawn and of equal size.

Question 10

There were some excellent answers naming all three parts of the wood turning lathe. Other candidates achieved partial credit.

Section B

Question 11

(a) Many candidates provided a good sketch of a suitable joint, the most common being dowel and mortise and tenon. Candidates should try and draw the joint in the same orientation as the rail and leg shown in the Figure.

Most candidates named correctly the joint they had drawn.

(b)(i) Plywood and blockboard were the only acceptable manufactured boards for the roof of the rabbit hutch. MDF is not suitable for outdoor use.

(ii) Most candidates did understand that the reason for the sloping roof was to allow the rain to flow off the hutch.

(iii) The best method of fixing the roof to the hutch was by means of screws; either directly through the rails or by using wooden blocks to connect the two parts together. There was good use of K-D fittings. Some candidates screwed into the ends of the legs. This method gained only two marks as it is not good practice to screw into end grain. Other partially successful methods included the use of dowel without glue.

- (c) (i) Many candidates were able to draw and name a butt hinge or a piano hinge correctly. A back flap hinge was not suitable.
- (ii) Many candidates recognised that steel hinges would corrode when used outdoors.
- (d) (i) Most candidates were able to name two marking out tools used to mark out the recess for the hinge.
- (ii) This question proved challenging. It is not practical to use a tenon saw to make saw cuts before chiselling out the recess. Many candidates gained partial credit for using a chisel, but only a minority recognised that the chisel would be used in a horizontal and vertical manner to cut out the recess.
- (e) There were some innovative answers to this question. While a small 'turn button' was a popular method of securing the door in a closed position, many candidates took advantage of magnetic catches to secure the door. Almost all correct answers to prevent the doors from swinging inwards used an additional strip of wood attached to the inside of the hutch.

Question 12

- (a) (i) Most candidates named mild steel correctly for the bracket and rod. Steel was too vague an answer to gain credit.
- (ii) Many candidates provided good reasons for using a ferrous metal rather than a non-ferrous metal; the most popular being that it was hardwearing, cheaper or more durable.
- (iii) Many candidates stated a thickness that was not practical nor a standard size.
- (iv) As in part (iii) many candidates were not aware of standard sizes and were unable to state an appropriate diameter for the rod.
- (b) There were some good answers to this question. Most candidates recognised that it would be too difficult to drill when bent or that it could be unsafe.
- (c) (i) and (ii) Many candidates provided basic information about taps and dies to produce screw threads in the bracket and on the rod. Few answers provided sufficient technical detail to gain full credit. In a minority of answers there was some excellent detail about cutting the threads with a reverse action to cut the swarf.
- (d) The most popular method of preventing damage to the underside of the table involved the use of a 'pad' of wood. The best answers showed how the 'pad' could be attached to the end of the threaded rod.
- (e) The use of a 'bar' to increase leverage was the best modification to the threaded rod. Some partially correct answers involved the use of additional nuts attached to the end of the rod.
- (f) Most candidates showed some understanding of the brazing process. Marks were awarded for providing details of any of the main stages combined with accurate sketches. While most answers described the use of heat and brazing rod, details of preparation involved and the use of flux during the process were often lacking.

Question 13

- (a) The majority of candidates named appropriate processes and tools and equipment used to make the kitchen roll holder.
- (b) There were many good quality sketches showing a suitable joint to join the ends to the back of the kitchen roll holder. The most popular joints included the finger, half lap and dowel.

Most candidates named correctly the joint they had drawn.

- (c) Most candidates recognised that the disc needed to be of a smaller diameter than that of the hole to enable the roll to be changed.
- (d)(i) There were some excellent answers to this question. It is clear that many candidates have had practical experience of line bending to form acrylic. There were many good sketches showing a strip heater or line bender used to soften the plastic followed by the use of a former or bending jig around which the acrylic would be formed.
- (ii) Many candidates achieved some marks for this question. Some answers concentrated on clamping the disc to the body but without first describing how the disc would be made. Careful reading of each question is essential.
- (iii) Generally, candidates demonstrated a good understanding of safety precautions necessary when using acrylic cement. The most popular answers referred to good ventilation and the use of gloves to protect the skin.
- (e) Many candidates understood that the flexible property of acrylic was used to enable the ends to bent open to enable the roll to be changed.
- (f) The best answers concentrated on the expensive set up costs of tooling and the need therefore to manufacture in quantity to recover these costs. Some candidates were not familiar with these important factors.

DESIGN AND TECHNOLOGY

Paper 0445/32
Resistant Materials

Key messages

- To perform well on this paper, particularly **Section A**, candidates need to have a sound practical knowledge and understanding of working with a variety of resistant materials.
- This knowledge is best gained through the practical activities of designing and making.
- Candidates need to focus on the key requirements of each question and, in particular, provide details of tools, materials, fittings and fixings when this is stated.

General comments

Section A

This section tests a very wide area of knowledge concerned with materials, tools and processes used when working with wood, metal and plastic. It is essential that candidates have a sound practical knowledge and understanding of working with these resistant materials. Some candidates did not have this all round knowledge and understanding.

Section B

This section always has a number of questions requiring a combination of clear and accurate sketches supported by detailed written notes. Where questions state *use sketches and notes* it is important that candidates provide both. It may be possible to answer the question simply by providing written notes alone, but there will be marks allocated to sketches also. Candidates need to read the question carefully to ensure that they are giving the required information in their response.

Comments on specific questions

Section A

Question 1

- (a) Many candidates were able to state the purpose of seasoning correctly. Good answers referred to seasoning helping to reduce shrinkage and warping.
- (b) Most correct answers named kiln, but oven was also accepted.

Question 2

Most candidates were able to complete the drawing of a tenon saw. Questions of this type do require accuracy to achieve full credit.

Question 3

- (a) and (b) Many candidates were able to label **either** the tang or safe edge of the file correctly; only the best candidates could label both.

Question 4

Many candidates achieved partial credit but few were able to give all three pieces of information needed when buying woodscrews. Candidates could have chosen: quantity, length, head, material and gauge. Correct terminology is very important and often, candidates' answers such as 'diameter' were too vague.

Question 5

Many candidates achieved partial credit but few were able to name all three parts of the injection moulding machine.

Question 6

There were many excellent completed drawings of a finger (comb) joint. Although not necessary, some candidates enhanced their drawings with colour.

Question 7

- (a) The majority of candidates could not name the Surform tool.
- (b) Many candidates thought that the purpose of the Surform tool was to make surfaces flat. The correct use of the tool is the quick removal of waste wood.

Question 8

- (a) Only a small minority of candidates correctly named a specific material for the handle of the saucepan. Many recognised that a thermosetting plastic would be suitable, but named urea formaldehyde rather than phenol formaldehyde. Answers that named a hardwood were rewarded.

Most candidates gave a sensible reason for their choice of material, the most popular answer being its property to insulate from heat.

- (b) Many candidates correctly named aluminium or stainless steel for the body of the saucepan and recognised its property of conducting heat well.

Question 9

Many candidates gained at least one mark for providing a drawing of a butt hinge. The number and position of the holes in the hinge were important to the accuracy of the drawing.

Question 10

- (a) Very few candidates named the centre lathe operation of knurling.
- (b) Even if candidates were not able to name knurling in part (a), most of them were able to state that its purpose was to improve grip on a surface.

Section B

Question 11

- (a) Many candidates were able to give two advantages of using a manufactured board rather than solid wood for the toy, the most popular correct answers referring to its stability, lower cost and being available in wide boards. There were some popular misconceptions that manufactured boards are lighter in weight and easier to work.
- (b) Most candidates understood why painted finishes would be applied to the toy, the most popular being to preserve and protect the wood and to make the appearance attractive to children.

- (c) (i) Many candidates achieved some credit for this question. There were some very good drawings of housing, dowel and mortise and tenon joints. For maximum marks, drawings should be in the correct orientation and show good proportion.
- (ii) The vast majority of candidates named correctly the joint that they had drawn.
- (iii) The most popular correct answer was PVA. Sometimes accurate trade names were given and these were acceptable. Contact adhesives would not be appropriate for this application.
- (iv) This was not well answered. Answers for PVA or the equivalent ranged from 20 seconds to one day. Candidates are advised to take note of the approximate drying times of adhesives they use in practical situations.
- (d) There were some outstanding answers to this question. Many candidates understood the processes of marking out, cutting out and smoothing the edges of the finished shape. The best answers also included clear and accurate drawings of the tools and equipment used.
- (e) This question tested a specific area of the syllabus, that of between-centres turning using a wood turning lathe. Many candidates did not appear to have experience of using a lathe for wood turning, so could not answer the question well.

The essential details for wood turning include the following stages: how the wood is prepared before it is mounted on the lathe, how the wood is set up and the tee rest adjusted and tightened ready for use and finally, how the wood would be shaped on the lathe.

- (f) There were three stages that candidates should have described in their sketches and notes: how the wood would be secured, details of the sides planed to the correct angle and the use of glasspaper to smooth the surfaces. Most candidates gained credit for the last of the three points. Sawing off the waste was not considered to be appropriate in terms of the candidates own experience.

Question 12

- (a) (i) Most candidates stated two items of research, the most popular being the number and type or sizes of leaflet to be held. Where candidates gave 'size' as an answer it was not acceptable to then give the length of the leaflet, for example, followed by the thickness of the leaflet as two completely different items of research.
- (ii) Most candidates recognised the need for testing the design of the holder or checking the sizes as the main reasons for making a model. Some candidates correctly explained that making a model could help identify design faults and therefore prevent expensive material from being wasted.
- (b) (i) Most candidates completed an accurate development (net) of the leaflet holder.
- (ii) Most candidates named two marking out tools used on acrylic..
- (c) There were some outstanding answers to this question with many candidates showing a good practical understanding of the processes. The acrylic was generally removed by means of a Hegner saw or the equivalent, or a coping saw. Smoothing the cut edges was carried out using files, scrapers and wet and dry (silicone carbide) paper.
- (d) Appropriate details for marking out were generally not provided. The use of dividers and a scribe were essential. Many candidates did not consider that the slot was only 2 mm wide and described the use of a drilled hole followed by sawing. All that was needed was to drill several holes and then file the slot open.
- (e) There were some excellent answers to this question. Candidates seem very knowledgeable about the line bending process. Clear, detailed sketches provided most of the information required supported by relevant notes. Those candidates who did not achieve the highest marks did not provide details of a jig or former around which the acrylic would be bent or how the acrylic would be retained in position while it cooled down.

Question 13

- (a) (i) Most candidates were able to provide sensible reasons why the magnifying glass needed to be adjustable.
- (ii) Most candidates understood that the base needed to be heavy to prevent it being knocked over easily.
- (iii) Many candidates gave the reason for the tray being horizontal as to prevent the objects from falling off.
- (b) (i) Most candidates named a wing nut correctly.
- (ii) Most candidates who named a wing nut in part (i) gave the benefit of it being tightened by hand without the need for additional tools.
- (c) (i) Most candidates were able to name appropriate tools to mark out the mild steel blank. Most candidates provided details of the drilling process. Where candidates failed to achieve the highest marks was on the shaping of the rounded corners. It was not necessary to hacksaw off the corners but simply to file them round.
- (ii) There were some innovative answers to this question. Candidates who described the use of a template were awarded partial credit. Those answers that referred to making the first shaped blank then taping it to the second blank received full credit.
- (d) There were several ways of joining the tray to the support, including riveting, brazing and welding. No candidates gave traditional riveting but some did suggest pop riveting which would have only limited success. Brazing was described by some candidates but details were often lacking. Although welding would not normally be carried out by candidates, this method was accepted since many candidates could have seen the process carried out in their Centres. However, it is not sufficient to simply state 'welding' without some relevant details of the process, whether it is the electric arc method or by means of oxyacetylene welding being carried out.
- (e) Generally, candidates did achieve some marks for this question. Most solutions providing height adjustment involved the support being able to move up and down inside a length of tube. The method of locking in different positions was most commonly achieved by means of some form of screw or bolt that would tighten against the support. Very often candidates did not address the final part of the question: 'Name any materials and fittings used'. It is essential that candidates provide these details as there are marks awarded specifically for these.

DESIGN AND TECHNOLOGY

Paper 0445/33
Resistant Materials

Key messages

- To perform well on this paper, particularly **Section A**, candidates need to have a sound practical knowledge and understanding of working with a variety of resistant materials.
- This knowledge is best gained through the practical activities of designing and making.
- Candidates need to focus on the key requirements of each question and, in particular, provide details of tools, materials, fittings and fixings when this is stated.

General comments

Section A

This section tests a very wide area of knowledge concerned with materials, tools and processes used when working with wood, metal and plastic. It is essential that candidates have a sound practical knowledge and understanding of working with these resistant materials. Some candidates did not have this all round knowledge and understanding.

Section B

This section always has a number of questions requiring a combination of clear and accurate sketches supported by detailed written notes. Where questions state *use sketches and notes* it is important that candidates provide both. It may be possible to answer the question simply by providing written notes alone, but there will be marks allocated to sketches also. Candidates need to read the question carefully to ensure that they are giving the required information in their response.

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DESIGN AND TECHNOLOGY

Paper 0445/41

Paper 41

Key messages

- For this paper, candidates would benefit from hands-on experience of processes, components and project work.
- Candidates are encouraged to provide clear annotated sketches and to use appropriate technological language as a way of making communication clear.

General comments

In the 'Mechanisms' section there was clear evidence of good teaching, preparation and practical application of knowledge. Similarly, in the 'Electronics' question many responses were characterised by good levels of knowledge and understanding. Candidates' knowledge and understanding of 'Structures' was not as strong in the compulsory questions. All candidates were able to access the paper in the given time.

Comments on specific questions

Section A

Question 1

Very few candidates correctly identified the use of ribs or webs to reinforce a structure.

Question 2

Only the stronger candidates were able to identify the tie or strut in the diagram of a structure shown.

Question 3

Some candidates were able successfully to sketch a simply loaded beam showing areas of tensile, compressive forces and the neutral axis.

Question 4

Most candidates were able to draw a sketch of a reinforced concrete beam.

Question 5

Many candidates were able to give appropriate reasons for preferring LEDs to filament bulbs, with responses including the use of coloured LEDs, their compactness, their robustness and their longevity.

Question 6

- (a) Many candidates were able to explain the difference between electrolytic and ceramic capacitors and the need to connect electrolytic capacitors according to their polarity.
- (b) This part proved more challenging and few candidates were able to explain the use of the variable resistor to alter the frequency (pitch) of the speaker output sound.
- (c) Most candidates were able to identify that a 9 V battery is made up of six 1.5 V cells.

Question 7

- (a) Very few candidates identified the Snail Cam.
- (b) Most candidates were able to identify the motion conversion from rotary to reciprocating / linear motions.

Question 8

Few candidates were able to identify the fixed and moving pivots shown in the diagram of the windscreen wiper mechanism.

Question 9

- (a) Most candidates were able to identify an appropriate modelling technique for modelling a mechanism, such as card / paper fasteners; CAD; construction kits.
- (b) Most candidates identified the benefits of modelling a mechanism in terms of testing, trialling different gear ratios and avoiding wasting resistant materials by ensuring designs worked before manufacturing them.

Question 10

Most candidates were able to read the graphs to produce appropriate values of *C* and *R*.

Section B

Question 11

- (a) (i) Most candidates correctly identified the LDR as a light sensor.
- (ii) Some candidates were able to explain the specific purpose of the variable resistor as a means of adjusting the sensitivity of the circuit.
- (iii) Many candidates were able to identify the diode as a way of protecting the transistor from back EMF generated by the relay coils.
- (b) (i) Although most candidates were able to identify the use of a thermistor as a temperature sensor, fewer were able to sketch the component. The second part was rarely answered correctly, with very few candidates identifying the use of probes or pads as moisture sensing devices and few being able to sketch them.
- (ii) Not many candidates were able to explain how a membrane switch is constructed.
- (iii) Very few candidates identified the use of a relay to latch on the circuit.
- (c) Some candidates were able to explain the use of a Darlington Pair to improve the sensitivity of the circuit.
- (d) (i) Very few candidates were able to sketch a circuit for an OR logic circuit.
- (ii) This part was answered well, with most candidates able to complete the truth table for an OR gate.

Question 12

- (a) Many candidates correctly identified the motion conversions for the system shown. Most candidates correctly explained that the mechanism transferred motion from one plane to another through 90°.
- (b) (i) Most candidates were able to identify the bevel gear system used by the hand drill.

- (ii) Few candidates were able to explain that the upper gear in the frame of the drill was to stabilise the system and to facilitate the smooth running of the system by ensuring that the driver gear wheel was always in mesh with the driven gear wheel.
- (iii) Most candidates identified the way in which the velocity ratio of the system was dependent upon the size of the driver to driven gears to increase the output speed of the drill chuck compared to the slower speed of the driver gear.
- (c) Few candidates were able to explain how the turning moment of the cranked handle meant less effort would be needed by the operator due to the mechanical advantage of the system.
- (d)(i) Most candidates calculated the gear ratio for the mechanism successfully.
 - (ii) Many candidates were able to calculate the speed of the driven gear.
- (e)(i) Candidates were generally able to sketch the components of a worm gear system; weaker candidates did not label the parts and directions of motion correctly.
 - (ii) Few candidates were able to explain the fact that the worm is effectively a one toothed gear and as such means that the gear ratio will always be very high which makes for a big speed reduction.
 - (iii) Many candidates were able to give appropriate examples of the use of worm gears.

Question 13

- (a) Some candidates were able to show how the counterweight value would be calculated.
- (b)(i) Most candidates were able to identify the tensile forces acting on the cable
 - (ii) Very few candidates identified the torsional forces acting on the rods as the screws were tightened.
 - (iii) Most candidates sketched appropriate solutions for improving the stability of the storage unit.
 - (iv) Most responses were based on balance of the unit; fewer responses explained how it would be structurally better to centre the hole to avoid possible tearing of the beam under load.
 - (v) Few candidates were able to explain how elastic behaviour means that a member can fully recover from loading, returning to its original length once the load has been removed.
 - (vi) Very few candidates were able to identify the shear force experienced by the pin.
- (c) Most candidates were able to explain how the washer would spread the load over a larger area thus reducing stress damage to the surface of the shelf section of the storage unit.
- (d) Few candidates identified the use of tubing to replace solid metal bars to reduce the mass of the storage unit.
- (e)(i) Most candidates were able to sketch the 'I' beam structural section but fewer were able to identify how the outer parts of the section were able to cope with the maximum loading on a beam and thus the section is selected due to the advantageous loading to weight ratio.
 - (ii) Some candidates were able to identify an appropriate structural application for an 'I' beam in terms of joists, lintels etc. used in building work.

DESIGN AND TECHNOLOGY

Paper 0445/42
Systems and Control

Key messages

- For this paper, candidates would benefit from hands-on experience of processes, components and project work.
- Candidates are encouraged to provide clear annotated sketches and to use appropriate technological language as a way of making communication clear.

General comments

In the 'Mechanisms' section there was clear evidence of good teaching, preparation and practical application of knowledge. Similarly, in the 'Electronics' question many responses were characterised by good levels of knowledge and understanding. Candidates' knowledge and understanding of 'Structures' was not as strong in the compulsory questions. All candidates were able to access the paper in the given time.

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- (b) This part proved more challenging and few candidates were able to explain the use of the variable resistor to alter the frequency (pitch) of the speaker output sound.
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Section B

Question 11

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- (b) (i) Most candidates were able to identify the bevel gear system used by the hand drill.

- (ii) Few candidates were able to explain that the upper gear in the frame of the drill was to stabilise the system and to facilitate the smooth running of the system by ensuring that the driver gear wheel was always in mesh with the driven gear wheel.
- (iii) Most candidates identified the way in which the velocity ratio of the system was dependent upon the size of the driver to driven gears to increase the output speed of the drill chuck compared to the slower speed of the driver gear.
- (c) Few candidates were able to explain how the turning moment of the cranked handle meant less effort would be needed by the operator due to the mechanical advantage of the system.
- (d)(i) Most candidates calculated the gear ratio for the mechanism successfully.
 - (ii) Many candidates were able to calculate the speed of the driven gear.
- (e)(i) Candidates were generally able to sketch the components of a worm gear system; weaker candidates did not label the parts and directions of motion correctly.
 - (ii) Few candidates were able to explain the fact that the worm is effectively a one toothed gear and as such means that the gear ratio will always be very high which makes for a big speed reduction.
 - (iii) Many candidates were able to give appropriate examples of the use of worm gears.

Question 13

- (a) Some candidates were able to show how the counterweight value would be calculated.
- (b)(i) Most candidates were able to identify the tensile forces acting on the cable
 - (ii) Very few candidates identified the torsional forces acting on the rods as the screws were tightened.
 - (iii) Most candidates sketched appropriate solutions for improving the stability of the storage unit.
 - (iv) Most responses were based on balance of the unit; fewer responses explained how it would be structurally better to centre the hole to avoid possible tearing of the beam under load.
 - (v) Few candidates were able to explain how elastic behaviour means that a member can fully recover from loading, returning to its original length once the load has been removed.
 - (vi) Very few candidates were able to identify the shear force experienced by the pin.
- (c) Most candidates were able to explain how the washer would spread the load over a larger area thus reducing stress damage to the surface of the shelf section of the storage unit.
- (d) Few candidates identified the use of tubing to replace solid metal bars to reduce the mass of the storage unit.
- (e)(i) Most candidates were able to sketch the 'I' beam structural section but fewer were able to identify how the outer parts of the section were able to cope with the maximum loading on a beam and thus the section is selected due to the advantageous loading to weight ratio.
 - (ii) Some candidates were able to identify an appropriate structural application for an 'I' beam in terms of joists, lintels etc. used in building work.

DESIGN AND TECHNOLOGY

Paper 0445/43
Systems and Control

Key messages

- For this paper, candidates would benefit from hands-on experience of processes, components and project work.
- Candidates are encouraged to provide clear annotated sketches and to use appropriate technological language as a way of making communication clear.

General comments

In the 'Mechanisms' section there was clear evidence of good teaching, preparation and practical application of knowledge. Similarly, in the 'Electronics' question many responses were characterised by good levels of knowledge and understanding. Candidates' knowledge and understanding of 'Structures' was not as strong in the compulsory questions. All candidates were able to access the paper in the given time.

Comments on specific questions

Section A

Question 1

Very few candidates correctly identified the use of ribs or webs to reinforce a structure.

Question 2

Only the stronger candidates were able to identify the tie or strut in the diagram of a structure shown.

Question 3

Some candidates were able successfully to sketch a simply loaded beam showing areas of tensile, compressive forces and the neutral axis.

Question 4

Most candidates were able to draw a sketch of a reinforced concrete beam.

Question 5

Many candidates were able to give appropriate reasons for preferring LEDs to filament bulbs, with responses including the use of coloured LEDs, their compactness, their robustness and their longevity.

Question 6

- (a) Many candidates were able to explain the difference between electrolytic and ceramic capacitors and the need to connect electrolytic capacitors according to their polarity.
- (b) This part proved more challenging and few candidates were able to explain the use of the variable resistor to alter the frequency (pitch) of the speaker output sound.
- (c) Most candidates were able to identify that a 9 V battery is made up of six 1.5 V cells.

Question 7

- (a) Very few candidates identified the Snail Cam.
- (b) Most candidates were able to identify the motion conversion from rotary to reciprocating / linear motions.

Question 8

Few candidates were able to identify the fixed and moving pivots shown in the diagram of the windscreen wiper mechanism.

Question 9

- (a) Most candidates were able to identify an appropriate modelling technique for modelling a mechanism, such as card / paper fasteners; CAD; construction kits.
- (b) Most candidates identified the benefits of modelling a mechanism in terms of testing, trialling different gear ratios and avoiding wasting resistant materials by ensuring designs worked before manufacturing them.

Question 10

Most candidates were able to read the graphs to produce appropriate values of *C* and *R*.

Section B

Question 11

- (a) (i) Most candidates correctly identified the LDR as a light sensor.
- (ii) Some candidates were able to explain the specific purpose of the variable resistor as a means of adjusting the sensitivity of the circuit.
- (iii) Many candidates were able to identify the diode as a way of protecting the transistor from back EMF generated by the relay coils.
- (b) (i) Although most candidates were able to identify the use of a thermistor as a temperature sensor, fewer were able to sketch the component. The second part was rarely answered correctly, with very few candidates identifying the use of probes or pads as moisture sensing devices and few being able to sketch them.
- (ii) Not many candidates were able to explain how a membrane switch is constructed.
- (iii) Very few candidates identified the use of a relay to latch on the circuit.
- (c) Some candidates were able to explain the use of a Darlington Pair to improve the sensitivity of the circuit.
- (d) (i) Very few candidates were able to sketch a circuit for an OR logic circuit.
- (ii) This part was answered well, with most candidates able to complete the truth table for an OR gate.

Question 12

- (a) Many candidates correctly identified the motion conversions for the system shown. Most candidates correctly explained that the mechanism transferred motion from one plane to another through 90°.
- (b) (i) Most candidates were able to identify the bevel gear system used by the hand drill.

- (ii) Few candidates were able to explain that the upper gear in the frame of the drill was to stabilise the system and to facilitate the smooth running of the system by ensuring that the driver gear wheel was always in mesh with the driven gear wheel.
- (iii) Most candidates identified the way in which the velocity ratio of the system was dependent upon the size of the driver to driven gears to increase the output speed of the drill chuck compared to the slower speed of the driver gear.
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DESIGN AND TECHNOLOGY

Paper 0445/05
School Based Assessment

Key messages

- The main aim of this component is to develop in candidates an expertise in creative thinking and expressing it through their research, designing, planning and making skills.
- Projects should be well structured and allow candidates to access the assessment criteria.
- Candidates should be encouraged to produce concise and focused projects.

General comments.

The overall standard of work was comparable to previous years although there are an increasing number of very high standard and innovative projects submitted.

More candidates are identifying genuine needs, consulting well with potential users and are producing effective solutions that can be tested and fully evaluated.

Whilst most Centres fully complied with the requirements to forward the correct sample and accompanying documentation, it is important that both the MS1 form and the Coursework Assessment Summary Form 0445/05/CW/S/10 are carefully completed and submitted with the sample.

A wide range of interesting and creative work was presented for moderation; the majority of work seen was well structured and allowed candidates to fully access the assessment criteria.

Most projects were appropriate, with many having interesting and challenging briefs. Most candidates made good reference to the needs of potential users.

It is clear that Centres are giving guidance to candidates to produce more concise and focused project work. The majority of folders submitted were detailed and included appropriate coverage of the assessment criteria. A few folders were exceptionally large and contained research material not relevant to the task chosen. Candidates should also be encouraged to make full use of the space available on each sheet.

Comments on specific assessment criteria

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

This section requires candidates to make clear their intentions. Most candidates explained the need in some detail. Many candidates made good use of photographs to clearly identify the situation and create a detailed brief. To access the higher mark range for this section, candidates must consider the client or user group: Who the product is for? What specific groups will use it? How would it help? What difference will it make?

2. Research into the Design Brief resulting in a Specification

There has been continued improvement in this section. Research has been more focused and relevant and has helped in the formation of a detailed and justified specification. Many candidates include manufacturing methods in this section. This is best located in the development of the proposed solution section; different production methods can be proposed and decisions made as to the most suitable.

Some candidates would benefit from sifting through the research that they had gathered and only including information that is relevant.

Most candidates carry out an analysis of existing products. To achieve the higher mark ranges, candidates must analyse a range of similar products and identify the strong and/or weak design features. This will help in the generation of design proposals.

Whilst most specifications were clear and justified, some candidates focused on generic points such as 'must be cheap' or 'must be good for the environment' without further clarification or direct link to the product to be designed. No credit will be awarded for generic points.

It is important to understand that for the awarding of high marks it is the relevance and appropriateness of research that is important, not the amount of collected information.

3. Generation and exploration of Design Ideas

This section continues to improve. Most candidates used good quality, annotated sketches to explore a range of possibilities. Candidates who achieved the highest marks produced a number of discrete solutions and/or part solutions and evaluated them against relevant points of the specification.

The number of Centres making excellent and appropriate use of CAD in this section as well as in the development and planning of the final proposal has increased. There is also an increasing number of candidates who use 2D and 3D basic modelling to explore design ideas. This is encouraged both in this section and in the development of the proposed solution section.

To achieve the higher mark ranges candidates must produce a wide range of appropriate solutions with imaginative interpretation. A detailed evaluation of ideas is required, taking into consideration the requirements of the specification.

4. Development of Proposed Solution

There has been some improvement in this section. Some candidates produced very detailed developments, showing how decisions relating to the selection of materials and manufacturing processes were arrived at. They made reasoned refinements to their design, incorporating form and function requirements with material and manufacturing decisions.

A significant number of candidates did not show any decision-making. They stated a chosen material and in most cases made no reference to manufacturing. To achieve the high mark range, candidates must show evidence of the trialling or testing of alternatives and clearly indicate decisions made.

5. Planning for Production

Most candidates produced very detailed plans for production. The key stages of manufacture were clearly identified, and most candidates included detailed cutting lists, time allocations and Health and Safety considerations.

Working drawings were generally good, with some being outstanding. The best work submitted was fully dimensioned and would be suitable for a third party to manufacture the product.

CAD was used very effectively in this section.

6. Product Realisation

Candidates produced a wide range of interesting products; many were of an exceptionally high standard. It is clear that most candidates were fully engaged and enjoyed the experience of designing and making. Most candidates made good use of photographic evidence to clearly identify the important features of their product. Manufacturing details were also evident in a lot of folders and indicated the care and attention taken in the production of the practical outcome.

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

7. Testing and Evaluation

It is important that sufficient time is left to test and evaluate the practical outcome in the environment for which it was intended. Many candidates included photographic evidence of the product in use. Evaluations should make clear reference to the specification. The highest marks were awarded to candidates who went

on to use sketches and notes to recommend modifications and possible improvements based upon their evaluation. Some candidates included user evaluations of their product, which is to be recommended.

The assessment criteria require candidates to carry out objective testing with reference to the specification and user. They should use sketches and notes to produce detailed and meaningful conclusions leading to proposals for further development to access the higher mark range.