DESIGN AND TECHNOLOGY

Paper 0445/11

Design

Key messages

- Successful candidates tend to follow the design process as set out on the structured A3 answer sheets, showing that they can apply their design skills in an imaginative and creative way.
- The three questions present fairly open design situations; within these candidates can use any specific areas of knowledge and interest 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 that should be given to the 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

Candidates appeared to understand fully the requirements of this question and the design need was clearly one with which they were familiar in their normal day-to-day experiences. Suggested outcomes covered the full range of materials with all types of wood, metal and plastic included.

(a) Candidates were able to identify functional points required of the baby changing unit in addition to those outlined in the question. Successful responses to this introductory part of the question included: easy to clean; hygienic; stable in use; water proof; appropriate height; baby cannot fall off; storage for items; can be moved around house; bin for dirty nappies; etc.

(b) Few candidates had difficulty showing two types of storage system that might form part of such a baby changing unit and these included: shelves; drawers; boxes; divisions; hooks; clips; cupboards; pouches; recesses; etc.

(c) Responses to this part of the design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that all design detail was 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 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 a maximum of only three marks of the six available for evaluation.

(e) There was evidence of good quality drawing in the presentation of the proposed d and constructional detail was provided either as part of the main presentation or through or other surrounding smaller drawings. Candidates are free to choose their own drawing so long as all constructional detail is clear to the viewer and significant dimensions are inc Candidates are not required to outline manufacturing methods here as this is requested in the 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 package of this type would normally be fairly lightweight in construction. Most candidates acknowledged that the package needed to be easily opened with the contents visible and these features were highlighted in their answers.

(a) Most candidates were able to suggest additional points to those identified in the question and successful responses included: appeal to pupils; compact; colourful; include NEW TERM; lightweight; items located securely; easy to open package; etc.

(b) The majority of candidates were familiar with methods of making contents visible in packages and these included: clear sheet window; open window; grill; gauze; opening flap; bubble pack; etc.

(c) – (f) See **Question 1 (c) – (f)**.

(g) Candidates were generally able to outline a method of producing a prototype of the proposed stationery package 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

Although this was the least popular question, candidates who did attempt it were able to show their specialist interest in the Systems and Control option, as intended by the context of the design situation, with many focusing on electronically controlled outcomes.

(a) Additional points about the function of the automatic feeding system included: will not tip over; easy to clean; hygienic; cannot harm pets; easy to fill; adjustable timing; food easily accessible; will not frighten pets; etc.

(b) Most candidates were able to identify two safe power sources and those sketched included: clockwork motor; rubber motor; solar power; battery power; low voltage supply; etc. Where candidates drew two types of battery then they had to be clearly different for the award of full marks.

(c) – (g) See **Question 1 (c) – (g)**

DESIGN AND TECHNOLOGY

Paper 0445/12

Design

Key messages

- Successful candidates tend to follow the design process as set out on the structured A3 answer sheets, showing that they can apply their design skills in an imaginative and creative way.
- The three questions present fairly open design situations; within these candidates can use any specific areas of knowledge and interest 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 that should be given to the 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

Candidates appeared to understand fully the requirements of this question and the design need was clearly one with which they were familiar in their normal day-to-day experiences. Suggested outcomes covered the full range of materials with all types of wood, metal and plastic included.

(a) Candidates were able to identify functional points required of the baby changing unit in addition to those outlined in the question. Successful responses to this introductory part of the question included: easy to clean; hygienic; stable in use; water proof; appropriate height; baby cannot fall off; storage for items; can be moved around house; bin for dirty nappies; etc.

(b) Few candidates had difficulty showing two types of storage system that might form part of such a baby changing unit and these included: shelves; drawers; boxes; divisions; hooks; clips; cupboards; pouches; recesses; etc.

(c) Responses to this part of the design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that all design detail was 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 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 a maximum of only three marks of the six available for evaluation.

(e) There was evidence of good quality drawing in the presentation of the proposed d and constructional detail was provided either as part of the main presentation or through or other surrounding smaller drawings. Candidates are free to choose their own drawing so long as all constructional detail is clear to the viewer and significant dimensions are inc Candidates are not required to outline manufacturing methods here as this is requested in the 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 package of this type would normally be fairly lightweight in construction. Most candidates acknowledged that the package needed to be easily opened with the contents visible and these features were highlighted in their answers.

(a) Most candidates were able to suggest additional points to those identified in the question and successful responses included: appeal to pupils; compact; colourful; include NEW TERM; lightweight; items located securely; easy to open package; etc.

(b) The majority of candidates were familiar with methods of making contents visible in packages and these included: clear sheet window; open window; grill; gauze; opening flap; bubble pack; etc.

(c) – (f) See **Question 1 (c) – (f)**.

(g) Candidates were generally able to outline a method of producing a prototype of the proposed stationery package 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

Although this was the least popular question, candidates who did attempt it were able to show their specialist interest in the Systems and Control option, as intended by the context of the design situation, with many focusing on electronically controlled outcomes.

(a) Additional points about the function of the automatic feeding system included: will not tip over; easy to clean; hygienic; cannot harm pets; easy to fill; adjustable timing; food easily accessible; will not frighten pets; etc.

(b) Most candidates were able to identify two safe power sources and those sketched included: clockwork motor; rubber motor; solar power; battery power; low voltage supply; etc. Where candidates drew two types of battery then they had to be clearly different for the award of full marks.

(c) – (g) See **Question 1 (c) – (g)**

DESIGN AND TECHNOLOGY

Paper 0445/13

Design

Key messages

- Successful candidates tend to follow the design process as set out on the structured A3 answer sheets, showing that they can apply their design skills in an imaginative and creative way.
- The three questions present fairly open design situations; within these candidates can use any specific areas of knowledge and interest 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 that should be given to the 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

Candidates appeared to understand fully the requirements of this question and the design need was clearly one with which they were familiar in their normal day-to-day experiences. Suggested outcomes covered the full range of materials with all types of wood, metal and plastic included.

(a) Candidates were able to identify functional points required of the small picnic table in addition to those outlined in the question. Successful responses to this introductory part of the question included: easy to clean; stable in use; weather proof; portable/lightweight; fold flat; appropriate height; retain items in place, etc.

(b) Few candidates had difficulty showing two types of construction method that might be suitable for a picnic table and these included: wooden frames; welded tubular frames; push together frames; folding carcases; hinged sections; detachable parts; etc.

(c) Responses to this part of the design questions have improved considerably over recent examinations and the majority of candidates were able to draw three different ideas. Successful candidates used the whole space provided to produce clear drawings using appropriate techniques so that all design detail was 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 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 a maximum of only three marks of the six available for evaluation.

(e) There was evidence of good quality drawing in the presentation of the proposed d and constructional detail was provided either as part of the main presentation or through or other surrounding smaller drawings. Candidates are free to choose their own drawing so long as all constructional detail is clear to the viewer and significant dimensions are inc Candidates are not required to outline manufacturing methods here as this is requested in the 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 point of sale display of this type would normally be fairly light in structure. Many candidates acknowledged the waterproof nature of the mobile phone being displayed and highlighted this in their answers.

(a) Most candidates were able to suggest additional points to those identified in the question and successful responses included: attract attention of shoppers; compact; colourful; reflect 'lightweight' and/or 'waterproof' functions; include name of mobile phone; be stable in position; of appropriate height; etc.

(b) The majority of candidates were familiar with temporary joining methods suitable for use with lightweight materials and these included: slots and tabs; metal clips; split rivets; 'velcro'; rubber bands; slotted halving joints; etc.

(c)-(f) See **Question 1 (c) – (f)**

(g) Candidates were generally able to outline a method of producing a prototype of the proposed point of sale 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

Although this was the least popular question, candidates who did attempt it were able to show their specialist interest in the Systems and Control option, as intended by the context of the design situation, focusing on structural aspects of their knowledge base.

(a) Additional points about the function of the bicycle support system included: easy to attach bicycle; stable in use; does not damage bicycle; easy to store; fits all sizes of bicycle; bicycle cannot fall off; etc.

(b) Candidates were able to identify two places where the support system might be located in a garage and those sketched included; on a bench; on the floor; on a wall; from the ceiling/joists; sliding from cupboard; etc.

(c)- (g) See **Question 1 (c) – (g)**

DESIGN AND TECHNOLOGY

Paper 0445/21
Graphic Products

Key message

- The focus of this assessment is 'Graphic Products', so direct practical experience of cutting out and making Graphic Products would benefit all candidates taking this examination.

General comments

Most candidates completed all questions in **Section A** (**A1**, **A2** and **A3**) and then went on to answer either **B4** or **B5** from **Section B**. There were some candidates who did not follow this instruction, for example omitting question **A3**.

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

Candidates demonstrated competence in most areas of the syllabus. However, the accurate drawing of circles in isometric projection and the drawing of geometrical shapes in non-standard orientation appear to be less well practised.

Comments on specific questions

Question A1

Water Sports Centre Logo

Most candidates attempted this question.

(a) All candidates drew a right-angled triangle for the mainsail. Candidates who drew this triangle 80 x 80 and 10 from the mast and boat deck scored full marks.

(b) The drawing of the hull of the boat was achieved by many, although not always to the correct size. All candidates managed to add a radius to the hull; stronger answers demonstrated the construction of a radius blending into a straight line.

(c) Nearly all candidates drew an octagon with a 90A/F. The best solutions were where candidates constructed a complete octagon on the centre line 10 from the mast. The left-hand half was then firmed in to achieve the correct solution.

Question A2

'Centre' Lettering

This question was attempted by all candidates giving them the opportunity to show their expertise at lettering.

(a) The majority of candidates completed the signboard well.

(b) For the letter 'R', good solutions were provided by those candidates who 'crated' their response. Candidates who did not do this, found this letter challenging. Candidates needed to take care that their letters were correctly shaped and appropriately spaced and aligned.

Question A3

Marker Buoy

There were some good solutions to this question, but some candidates repeated the given orthograp views, instead of drawing the required isometric view. Other candidates did not draw the correct size o square hole or position it correctly on the 400 face. The circular base can be constructed by crating a correctly sized plan view and then applying the same dividing lines to the isometric view. The higher scoring solutions started at the upper surface of the circular base and then projected the 500 depth vertically to give the curve of the visible front face. The rectangular portion could then be drawn upwards from this reference surface.

To access all the marks, candidates were required to apply thick and thin lines to their solution. As a general rule, a thick line should be applied to the edge where only one producing side is visible.

Not all candidates attempted this compulsory question.

Question B4

Collection Box

A full range of marks was seen for this question.

The question required candidates to look carefully at the given pictorial view and the pre-printed 'start' drawing of the front of the box to determine the way in which this development was 'assembled'

(a) Many candidates drew six sides, but they were not always connected in the order given in the pictorial view. Further glue tabs were required. One tab needed to be on the base edge of the second sloping side as in the pictorial view. The best drawings showed all glue tabs to be of the same size and pattern as the one already given in the 'start' and three 'fold-in' flaps complete with radius ends. These 'fold-in' flaps needed to be placed as in the pictorial view. The given fold line convention was also required to indicate the folding in a minimum of 4 locations.

(b) Candidates generally drew an arrangement of a slot and a tuck-in tab. In the best responses, drawings were supplemented by clear notes.

Question B5

Greetings Card

Some candidates had clearly experienced the cutting out and making of a greetings card of this type and so were comfortable with how the flagpole and flag were cut and the surrounding area folded to enable the card to stand on a horizontal surface. The making of this type of 3D Graphic Product is highly recommended.

(a) Many candidates drew the outer rectangle correctly at 240 x 120 with the mast 140 from the right-hand side. Candidates needed to draw the mast in the correct position and protruding above the flag to access all marks.

A rectangular space of 40 wide and 20 wide drawn to the correct sides of the mast needed to be evident. An R30 semi-circle needed to be drawn on the centre lines given. Two 'wings' were then to be constructed 50 long from the semi-circle drawn.

It is important that the construction for the ellipse is left visible as this contributes to the marks awarded to this part of the question. Where 'trammels' have been used, the trammel must either be drawn on the question paper or firmly attached as evidence.

(b) A number of candidates drew the plan in projection from the front elevation showing the positions of the fold lines correctly. By bending the two sides back a 70 x 70 x 100 right angled triangle is constructed in the plan view.

(c) Many different solutions to this question were seen. The higher scoring solutions made appropriate use of tabs/tongues and tuck-in slots. Again, the best answers were supplemented with clear annotations.

DESIGN AND TECHNOLOGY

Paper 0445/22

Graphic Products

Key message

- The focus of this assessment is 'Graphic Products', so direct practical experience of cutting out and making Graphic Products would benefit all candidates taking this examination.

General comments

Most candidates completed all questions in **Section A** (**A1**, **A2** and **A3**) and then went on to answer either **B4** or **B5** from **Section B**. There were some candidates who did not follow this instruction, for example omitting question **A3**.

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

Candidates demonstrated competence in most areas of the syllabus. However, the accurate drawing of circles in isometric projection and the drawing of geometrical shapes in non-standard orientation appear to be less well practised.

Comments on specific questions

Question A1

Water Sports Centre Logo

Most candidates attempted this question.

(a) All candidates drew a right-angled triangle for the mainsail. Candidates who drew this triangle 80 x 80 and 10 from the mast and boat deck scored full marks.

(b) The drawing of the hull of the boat was achieved by many, although not always to the correct size. All candidates managed to add a radius to the hull; stronger answers demonstrated the construction of a radius blending into a straight line.

(c) Nearly all candidates drew an octagon with a 90A/F. The best solutions were where candidates constructed a complete octagon on the centre line 10 from the mast. The left-hand half was then firmed in to achieve the correct solution.

Question A2

'Centre' Lettering

This question was attempted by all candidates giving them the opportunity to show their expertise at lettering.

(a) The majority of candidates completed the signboard well.

(b) For the letter 'R', good solutions were provided by those candidates who 'crated' their response. Candidates who did not do this, found this letter challenging. Candidates needed to take care that their letters were correctly shaped and appropriately spaced and aligned.

Question A3

Marker Buoy

There were some good solutions to this question, but some candidates repeated the given orthograp views, instead of drawing the required isometric view. Other candidates did not draw the correct size o square hole or position it correctly on the 400 face. The circular base can be constructed by crating a correctly sized plan view and then applying the same dividing lines to the isometric view. The higher scoring solutions started at the upper surface of the circular base and then projected the 500 depth vertically to give the curve of the visible front face. The rectangular portion could then be drawn upwards from this reference surface.

To access all the marks, candidates were required to apply thick and thin lines to their solution. As a general rule, a thick line should be applied to the edge where only one producing side is visible.

Not all candidates attempted this compulsory question.

Question B4

Collection Box

A full range of marks was seen for this question.

The question required candidates to look carefully at the given pictorial view and the pre-printed 'start' drawing of the front of the box to determine the way in which this development was 'assembled'

(a) Many candidates drew six sides, but they were not always connected in the order given in the pictorial view. Further glue tabs were required. One tab needed to be on the base edge of the second sloping side as in the pictorial view. The best drawings showed all glue tabs to be of the same size and pattern as the one already given in the 'start' and three 'fold-in' flaps complete with radius ends. These 'fold-in' flaps needed to be placed as in the pictorial view. The given fold line convention was also required to indicate the folding in a minimum of 4 locations.

(b) Candidates generally drew an arrangement of a slot and a tuck-in tab. In the best responses, drawings were supplemented by clear notes.

Question B5

Greetings Card

Some candidates had clearly experienced the cutting out and making of a greetings card of this type and so were comfortable with how the flagpole and flag were cut and the surrounding area folded to enable the card to stand on a horizontal surface. The making of this type of 3D Graphic Product is highly recommended.

(a) Many candidates drew the outer rectangle correctly at 240 x 120 with the mast 140 from the right-hand side. Candidates needed to draw the mast in the correct position and protruding above the flag to access all marks.

A rectangular space of 40 wide and 20 wide drawn to the correct sides of the mast needed to be evident. An R30 semi-circle needed to be drawn on the centre lines given. Two 'wings' were then to be constructed 50 long from the semi-circle drawn.

It is important that the construction for the ellipse is left visible as this contributes to the marks awarded to this part of the question. Where 'trammels' have been used, the trammel must either be drawn on the question paper or firmly attached as evidence.

(b) A number of candidates drew the plan in projection from the front elevation showing the positions of the fold lines correctly. By bending the two sides back a 70 x 70 x 100 right angled triangle is constructed in the plan view.

(c) Many different solutions to this question were seen. The higher scoring solutions made appropriate use of tabs/tongues and tuck-in slots. Again, the best answers were supplemented with clear annotations.

DESIGN AND TECHNOLOGY

Paper 0445/23

Graphic Products

Key message

- The focus of this assessment is 'Graphic Products', so direct practical experience of cutting out and making Graphic Products would benefit all candidates taking this examination.

General comments

Most candidates completed all questions in **Section A** (**A1**, **A2** and **A3**) and then went on to answer either **B4** or **B5** from **Section B**. There were some candidates who did not follow this instruction.

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

Candidates demonstrated competence in most areas of the syllabus. However, the accurate drawing of circles in isometric projection and the drawing of geometrical shapes in non-standard orientation appear to be less well practised.

Comments on specific questions

Question A1

Water Sports Centre Logo

Most candidates attempted this question.

(a) All candidates drew a right-angled triangle for the foresail. Candidates who drew this triangle 80 x 80 and 10 from the mast and 20 from the boat deck scored full marks.

(b) The drawing of the hull of the boat was achieved by many but not always to the correct size. All candidates managed to add a radius to the hull; stronger answers demonstrated the construction of a radius blending into a straight line.

(c) Nearly all candidates drew a hexagon with a 90A/C. The best solutions were where candidates constructed a complete hexagon on the centre line 48 from the mast and orientated the hexagon with one corner 20 from the boat deck.

Question A2

'Sports' Lettering

This question was attempted by all candidates giving them the opportunity to show their expertise at lettering.

(a) The majority of candidates completed the signboard well.

(b) For the letter 'R', good solutions were provided by those candidates who 'crated' their response. Candidates needed to take care that their letters were correctly shaped and appropriately spaced and aligned.

Question A3

Mooring Post

Some candidates repeated the given orthographic views rather than the required isometric view. Althou there were some good solutions, many candidates did not draw the correct size square hole or position it correctly on the 800 face. The circular top can be constructed by 'crating' a correctly sized plan view and then applying the same dividing lines to the isometric view. The best solutions started at the top surface of the circular portion and then projected the 900 depth vertically to give the curve of the visible front face on the square base. The 800 square portion could then be drawn downwards from this reference surface.

To access all the marks, candidates needed to apply tone to their solution. As a general rule, tone is applied to show the effect of light coming from one direction (left or right). The effect should give a minimum of two shades of tone on adjacent faces.

Question B4

Collection Box

A full range of marks was seen for this question.

For this question care was needed to look at the given pictorial view and the pre-printed 'start' drawing of the front of the box to determine the way in which this development was 'assembled'.

(a) Many candidates drew six sides, but they were not always connected in the order given in the pictorial view. Further glue tabs were required. Two needed to be on the long edge of both sloping sides as in the pictorial view. The best drawings showed glue tabs to be of the same size and pattern as the one already given in the 'start' and three 'fold-in' flaps with radius ends. It was important that these 'fold-in' flaps were placed as in the pictorial view. The given fold line convention was required to be repeated to indicate the folding in a minimum of 4 locations.

(b) Candidates had few problems in drawing an arrangement of a slot and a tuck-in tab. Clear annotations were characteristic of the strongest answers.

Question B5

Greetings Card

Those candidates who had clearly experienced the cutting out and making of a greetings card of this type and were comfortable with how the flagpole and flag were cut and the surrounding area folded to enable the card to stand on a horizontal surface. The making of this type of 3D Graphic Product is highly recommended.

(a) Many candidates drew the outer rectangle correctly at 240 x 120 with the mast 140 from the right-hand side. Candidates needed to draw the mast in the correct position and protruding above the flag to access all marks.

A rectangular space of 40 wide and 20 wide drawn to the correct sides of the mast needed to be evident. An R40 semi-circle needed to be drawn on the centre lines given to the left of the mast.

It is important that the construction for the ellipse is left visible as this contributes to the marks awarded to this part of the question. Where 'trammels' have been used, the trammel must either be drawn on the question paper or firmly attached as evidence. Two 'wings' were then to be constructed 20 long and 10 wide from the ellipse drawn.

(b) A number of candidates drew the plan in projection from the front elevation showing the positions of the fold lines correctly. By bending the two sides back, a 70 and a 100 right-angled line is constructed in the plan view.

(c) Many different solutions to the questions were seen. The higher scoring solutions made use of an additional piece of card with cross-halving slots to hold the fold back parts at 90º. Clear explanatory notes characterised the stronger answers.

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 resistant materials.
- 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. 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. It is important that candidates pay attention to statements such as 'use sketches and notes' in order to access all the marks available.

Comments on specific questions

Section A

Question 1

Many candidates were awarded some marks for stating information such as the length of the bolt, the size or diameter of the screw thread and the type of head.

Question 2

Most candidates were able to name at least two or three of the standard sections correctly.

Question 3

Many candidates understood that a 45º angle was an important feature of the mitre square. Only the best candidates were able to complete the drawing fully.

Question 4

The best answers referred to veneers being used to cover cheaper manufactured boards and that they gave an impression of being a more expensive wood. Other candidates thought, incorrectly, that veneers added strength or protection to furniture.

Question 5

Only a minority of candidates were able to draw staggered nailing.

Question 6

(a) In general, the process was correctly named as injection moulding.

(b) Few candidates were able to name extrusion as the process used to manufacture the pla guttering. Many candidates thought that the guttering was produced by line bending.

Question 7

(a) Only the minority of candidates correctly named tin snips.

(b) Even if an incorrect name was given in **(a)** candidates could gain a mark for stating the correct use for tin snips. Many gave the correct use of cutting thin sheet although some answers referred to them being used inappropriately to cut wire.

Question 8

Many candidates completed the drawings of the countersunk and round head screws correctly. Only the better candidates also produced an accurate drawing of the raised head screw.

Question 9

Very few candidates knew the parts of the centre lathe.

Question 10

The vast majority of candidates stated correctly what each of the signs meant. *Earmuffs* or *headphones* needed to be accompanied by a statement relating to protection from noise to gain credit.

Section B

Question 11

(a) Many candidates gave appropriate reasons for the popularity of flat pack self-assembly furniture. The most common reasons were that it could be taken home and assembled easily and it was less expensive than ready assembled furniture owing to lower manufacturing costs.

(b) The stronger responses stated that flat pack self-assembly furniture is sometimes sold without a finish to reduce costs and give consumers the opportunity to provide a finish of their own choice. Many candidates thought, incorrectly, that it was to avoid damage to the finish during transportation.

(c) (i) Many candidates were aware of the suitability of MDF over solid wood for the trolley. Many answers referred to its greater stability and lower cost. Answers needed to say the cost was lower than for solid wood, rather than just low.

(ii) Many candidates correctly stated that MDF does not splinter like plywood, that it is cheaper than plywood and that it can be finished to a higher quality than plywood. Some candidates incorrectly stated that it was easier to shape.

(d) (i) There were some excellent answers to this question. There were two distinct parts: how the shape could be cut out and how the sawn edges made smooth. The question stated *Use sketches and notes...* but some candidates did not provide any sketches and therefore did not access all marks. The inside shape required a machine saw such as a band saw, Hegner or scroll saw. Many candidates named tenon and coping saws which would have only limited use due their respective backs.

The edges can be made smooth by a combination of files and glasspaper. The best answers included details about the cork rubber or cork block and stated various grades of glasspaper. Some answers referred to use of a smoothing plane which would be impractical.

(ii) Generally, candidates' awareness of safety precautions was good although there were some vague answers about the wearing of an apron or gloves.

(e) Many candidates provided excellent drawings of recognised KD (knock-down) fittings t one shelf to one side. The most popular was the modesty block. Dowel is often use construction and assembly of flat pack furniture but it is not a KD fitting.

(f) The few candidates who achieved full marks, showed three pieces of wood, with the rails over the stile, the correct grain direction and the fillets drawn on the rails. Most candidates achieved one or two marks.

Question 12

(a) Most candidates were able to state two items of research, the most common relating to the size and weight of the cycle or an identification of those parts of the cycle that could be supported.

(b) There were some excellent answers to this question. There were three distinct parts: marking out, cutting to length and squaring the ends. The best answers combined accurately named tools and equipment with clear sketches to demonstrate a good knowledge and understanding of these basic metal working processes.

(c) (i) The base to support the stand needed to be stable. Most answers showed stands that relied on weight rather than the use of three or four legs for stability. Most answers achieved at least one mark for the potential of a practical design.

(ii) Most answers provided at least some technical details but this did vary in accuracy.

(d) The most popular method of providing adjustment and locking depended on the use of pre-drilled holes and a peg to insert to lock in position. This received only partial credit since the question stated that the stem could be*...adjusted and locked at **any** height...* The best answers showed the use of a bolt located through a slot in the upright and tightened by means of a nut welded or brazed onto the outside of the upright.

(e) (i) Paint was the most common correct choice of finish for the stand. Other correct answers included dip/powder coating, galvanising and chrome plating.

(ii) The best answers referred to the need to degrease the surfaces, the use of files or steel wool followed by emery cloth. Some candidates included accurate information about the different grades of emery cloth. Some candidates misread the question and provided irrelevant information about the application of the finish.

Question 13

(a) Most candidates gave good reasons for using acrylic for the puzzle pieces, including colour, attractiveness and easy to work.

(b) Many candidates concentrated their efforts on the sequence of the cuts rather than *how the puzzle pieces would be cut out*. Better answers named correctly the tenon saw, coping saw or band saw. The jig saw is not appropriate. The best answers included full details of the process: for example, when using the tenon saw, details such as clamping the work down and using the straight edge of scrap wood as a guide; when using a Hegner saw, details such as covering the saw line with masking tape to diffuse the heat from the blade.

(c) The most common correct joints included lapped and mitre joints. Butt joints needed to be pinned and glued for maximum marks. Joints such as dovetail and finger (comb) were not considered appropriate owing to the width of the wooden frame.

(d) (i) Many candidates named polystyrene correctly but a considerable number of candi d polythene which is unsuitable.

(ii) Many candidates gave three excellent considerations when making the former for vacuum fo These included draft angles, rounded corners and edges, smooth surfaces and air vent holes.

(iii) There were some outstanding answers to this question. Generally, candidates attempting **Question 13** demonstrated an excellent practical knowledge of the vacuum forming process. There were some answers providing excellent sketches and technically accurate written notes.

(e) (i) Most candidates chose tray B correctly.

(ii) Most candidates gave good reasons for their choice of tray B. The most common reasons included the ability for many trays to be produced from one mould, repetitive accuracy and cost effectiveness compared to the processes involved in the manufacture of the wooden tray A.

(f) Many answers concentrated on the addition of a lid to retain the puzzle pieces safely. Some designs showed hinged lids while others opted for a sliding lid in a groove. The best answers gave some significant detail, e.g. an important size such as the width of the groove or the name of the hinge used.

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 resistant materials.
- 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. 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. It is important that candidates pay attention to statements such as 'use sketches and notes' in order to access all the marks available.

Comments on specific questions

Section A

Question 1

Many candidates were awarded some marks for stating information such as the length of the bolt, the size or diameter of the screw thread and the type of head.

Question 2

Most candidates were able to name at least two or three of the standard sections correctly.

Question 3

Many candidates understood that a 45º angle was an important feature of the mitre square. Only the best candidates were able to complete the drawing fully.

Question 4

The best answers referred to veneers being used to cover cheaper manufactured boards and that they gave an impression of being a more expensive wood. Other candidates thought, incorrectly, that veneers added strength or protection to furniture.

Question 5

Only a minority of candidates were able to draw staggered nailing.

Question 6

(a) In general, the process was correctly named as injection moulding.

(b) Few candidates were able to name extrusion as the process used to manufacture the pla guttering. Many candidates thought that the guttering was produced by line bending.

Question 7

(a) Only the minority of candidates correctly named tin snips.

(b) Even if an incorrect name was given in **(a)** candidates could gain a mark for stating the correct use for tin snips. Many gave the correct use of cutting thin sheet although some answers referred to them being used inappropriately to cut wire.

Question 8

Many candidates completed the drawings of the countersunk and round head screws correctly. Only the better candidates also produced an accurate drawing of the raised head screw.

Question 9

Very few candidates knew the parts of the centre lathe.

Question 10

The vast majority of candidates stated correctly what each of the signs meant. *Earmuffs* or *headphones* needed to be accompanied by a statement relating to protection from noise to gain credit.

Section B

Question 11

(a) Many candidates gave appropriate reasons for the popularity of flat pack self-assembly furniture. The most common reasons were that it could be taken home and assembled easily and it was less expensive than ready assembled furniture owing to lower manufacturing costs.

(b) The stronger responses stated that flat pack self-assembly furniture is sometimes sold without a finish to reduce costs and give consumers the opportunity to provide a finish of their own choice. Many candidates thought, incorrectly, that it was to avoid damage to the finish during transportation.

(c) (i) Many candidates were aware of the suitability of MDF over solid wood for the trolley. Many answers referred to its greater stability and lower cost. Answers needed to say the cost was lower than for solid wood, rather than just low.

(ii) Many candidates correctly stated that MDF does not splinter like plywood, that it is cheaper than plywood and that it can be finished to a higher quality than plywood. Some candidates incorrectly stated that it was easier to shape.

(d) (i) There were some excellent answers to this question. There were two distinct parts: how the shape could be cut out and how the sawn edges made smooth. The question stated *Use sketches and notes...* but some candidates did not provide any sketches and therefore did not access all marks. The inside shape required a machine saw such as a band saw, Hegner or scroll saw. Many candidates named tenon and coping saws which would have only limited use due their respective backs.

The edges can be made smooth by a combination of files and glasspaper. The best answers included details about the cork rubber or cork block and stated various grades of glasspaper. Some answers referred to use of a smoothing plane which would be impractical.

(ii) Generally, candidates' awareness of safety precautions was good although there were some vague answers about the wearing of an apron or gloves.

(e) Many candidates provided excellent drawings of recognised KD (knock-down) fittings u one shelf to one side. The most popular was the modesty block. Dowel is often use construction and assembly of flat pack furniture but it is not a KD fitting.

(f) The few candidates who achieved full marks, showed three pieces of wood, with the rails over the stile, the correct grain direction and the fillets drawn on the rails. Most candidates achieved one or two marks.

Question 12

(a) Most candidates were able to state two items of research, the most common relating to the size and weight of the cycle or an identification of those parts of the cycle that could be supported.

(b) There were some excellent answers to this question. There were three distinct parts: marking out, cutting to length and squaring the ends. The best answers combined accurately named tools and equipment with clear sketches to demonstrate a good knowledge and understanding of these basic metal working processes.

(c) (i) The base to support the stand needed to be stable. Most answers showed stands that relied on weight rather than the use of three or four legs for stability. Most answers achieved at least one mark for the potential of a practical design.

(ii) Most answers provided at least some technical details but this did vary in accuracy.

(d) The most popular method of providing adjustment and locking depended on the use of pre-drilled holes and a peg to insert to lock in position. This received only partial credit since the question stated that the stem could be*...adjusted and locked at **any** height...* The best answers showed the use of a bolt located through a slot in the upright and tightened by means of a nut welded or brazed onto the outside of the upright.

(e) (i) Paint was the most common correct choice of finish for the stand. Other correct answers included dip/powder coating, galvanising and chrome plating.

(ii) The best answers referred to the need to degrease the surfaces, the use of files or steel wool followed by emery cloth. Some candidates included accurate information about the different grades of emery cloth. Some candidates misread the question and provided irrelevant information about the application of the finish.

Question 13

(a) Most candidates gave good reasons for using acrylic for the puzzle pieces, including colour, attractiveness and easy to work.

(b) Many candidates concentrated their efforts on the sequence of the cuts rather than *how the puzzle pieces would be cut out*. Better answers named correctly the tenon saw, coping saw or band saw. The jig saw is not appropriate. The best answers included full details of the process: for example, when using the tenon saw, details such as clamping the work down and using the straight edge of scrap wood as a guide; when using a Hegner saw, details such as covering the saw line with masking tape to diffuse the heat from the blade.

(c) The most common correct joints included lapped and mitre joints. Butt joints needed to be pinned and glued for maximum marks. Joints such as dovetail and finger (comb) were not considered appropriate owing to the width of the wooden frame.

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(iii) There were some outstanding answers to this question. Generally, candidates attempting **Question 13** demonstrated an excellent practical knowledge of the vacuum forming process. There were some answers providing excellent sketches and technically accurate written notes.

(e) (i) Most candidates chose tray B correctly.

(ii) Most candidates gave good reasons for their choice of tray B. The most common reasons included the ability for many trays to be produced from one mould, repetitive accuracy and cost effectiveness compared to the processes involved in the manufacture of the wooden tray A.

(f) Many answers concentrated on the addition of a lid to retain the puzzle pieces safely. Some designs showed hinged lids while others opted for a sliding lid in a groove. The best answers gave some significant detail, e.g. an important size such as the width of the groove or the name of the hinge used.

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 resistant materials.
- 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. 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. It is important that candidates pay attention to statements such as 'use sketches and notes' in order to access all the marks available.

Comments on specific questions

Section A

Question 1

(a) Many candidates named the tool correctly as a micrometer.

(b) In general, those candidates who identified the micrometer were also able to give a specific use. Some credit was given to answers that included the word *measuring*.

Question 2

Candidates need to be familiar with important pre-manufactured components such as hinges. In this question, most candidates could not complete the drawing of a back flap hinge correctly.

Question 3

The three most common correctly identified faults were: the hanging bars being too thin and the need to replace these with a thicker section; the spade falling off the end of the bars and the need to have some form of 'stop' at the end of the bars; the size of the fixing hole and the need to drill a smaller hole to take a screw. Answers needed to describe the faults clearly, rather than simply saying *hanging bars* or *fixing hole*.

Question 4

The majority of candidates were able to complete the drawing of a hasp and staple although the quality of communication was variable.

Question 5

(a) Only a minority of candidates were able to name a die and tap.

(b) Those who answered part **(a)** correctly, generally went on to state the correct purpose of both.

Question 6

(a) There were some good answers naming plastic coating or powder coating as a suitable finish for the pliers. Rubber was also accepted. It is important in a question such as this that candidates consider carefully the specific conditions or situation in which the product will be used.

(b) Some candidates correctly named *oil* as a suitable finish or that *no finish* would be applied. Some candidates stated that the chopping board would only be *sanded* which was also an acceptable answer. The application of varnish was unsuitable.

(c) Only a few candidates could name clear lacquer or enamelling as an appropriate finish for the copper bracelet.

Question 7

The majority of candidates could not name horizontal paring as the method of chiselling.

Question 8

Very few candidates could complete the drawing of a handsaw. Many drew backsaws such as a tenon saw. Some credit was, however, awarded to those drawings that showed a saw without a back.

Question 9

Many candidates gained at least one mark for providing an accurate description of the injection moulding process from the diagram provided.

Question 10

Many candidates correctly named a ball pein hammer; fewer candidates named the cold chisel.

Section B

Question 11

(a)(i) Many candidates were able to give two properties of beech, the most common being that it was hard, tough, close-grained or that it finished well.

(ii) Many candidates were able to give two good reasons for the use of plastic in the manufacture of children's toys, the most common being its attractive colours and its ability to be moulded into complex shapes.

(b) Most candidates achieved some marks for this question. Various methods were acceptable, including the use of screws, nuts and bolts, star washers and metal axle rods. For maximum marks there had to be some combination of securing the wheel, allowance for movement through the use of 'spacers' or washers and the use of clearance holes. Good quality of communication is important in questions of this type. It was difficult to understand some design sketches.

(c) Many candidates achieved some marks for this question. To gain maximum marks full details were required. There were two parts to this question: marking out the shape and cutting it out using a combination of drills and saws. Only a few candidates realised that the large hole in the cab would be drilled before the cab was cut to size.

(d) There were some innovative designs showing how the train and trailer could be connected without using metal components. The use of dowel pegs was common.

(e) This question tested a specific area of the syllabus, that of between-centres turning on a wood turning lathe. Many candidates did not perform well on this question and described how a bowl could be produced using the sanding disc. Candidates need to be aware and have practical experience of using a lathe for wood turning, as well as using the sanding disk attachment on the lathe.

The two bullet points gave candidates the opportunity to describe how the 30x30 beech section would be prepared for turning: that it would be marked out, the edges removed, a saw cut made in one end and how it would be set up on the lathe. The second bullet point focused candidates on the operation of turning the wood itself: the use of gouges or scrapers, the use of calipers for checking the diameter and how the wood would be finished.

Question 12

(a) Most candidates completed an accurate development (net) of the menu stand.

(b) (i) There were several saws that could be used to cut the acrylic including: sheet saw, hacksaw and tenon saw.

(ii) The most common machine saws named included the Hegner saw, scroll saw or band saw. Jig saw was not considered suitable due to the size of the acrylic being used.

(iii) Most candidates stated a sensible safety precaution that would be taken when using a machine saw.

(c) Finishing is an important process when working with acrylic. Many candidates showed a good practical understanding of this process. Information about the use of files, scrapers, wet and dry (silicone carbide) paper and the polishing wheel and use of compound were often included in answers.

(d) Many candidates gained some marks for this question. For maximum marks, candidates needed to describe the method of softening the plastic by means of strip heater or line bender, the use of a former to achieve the bends and a method of holding the plastic in position while it cooled.

Many candidates showed good planning skills with an accurate sequence of producing the bends.

(e) (i) The sliding bevel was used to draw the 'sloping' lines or bevel on the ends of the hardwood block. Most candidates showed some understanding of this technique.

(ii) There were two parts to this question: how the shape could be produced and how the surfaces would be prepared to take a finish. Many candidates described the use of a tenon saw to remove the waste but few included important details such as how the wood could be clamped securely or that the wood would need to be reversed and cut from two ends because the back of the tenon saw restricted the depth of saw cut. Other answers described the use of the band saw which was also appropriate. Any form of saw cut requires further action to remove the final waste. This could have been done by planing the wood which would be held securely in a vice. Final preparation to take a finish included the use of glasspaper with a cork block or cork rubber. Some candidates gave good details about the need to work with different grades of glasspaper and wiping off the dust before a finish could be applied.

Question 13

(a) Most candidates were able to complete the cutting list accurately.

(b) Most candidates achieved some marks for showing the cut lines and the positions for holes; fewer showed the tabs used to rivet the scoop together.

(c) Very few candidates demonstrated an understanding of the riveting process.

(d) (i) The property of nylon that makes it suitable for the wheels is that it is self-lubricating. This important property of nylon was not generally appreciated.

(ii) Most candidates named injection moulding correctly.

(e) (i) There were few correct answers to this question. Candidates needed to show a hole d
axle, a split pin inserted and bent around the axle, with the correct positioning of a washer.

(ii) Generally, candidates achieved some marks for this question. The most common soluti
showed a threaded axle with a nut and use of a washer.

DESIGN AND TECHNOLOGY

Paper 0445/41
Systems and Control

Key messages

- For this paper, candidates would benefit from hands-on experience of processes, components and project work.
- Responses need to use appropriate technological terminology and clear annotated sketches as appropriate.

General comments

All candidates were able to access the paper and a range of response styles and attainment was seen. There was evidence of good preparation by candidates for this paper in the way in which questions were selected and approached. In the 'Electronics' question there was clear evidence of good preparation and practical application of knowledge. Similarly, the 'Mechanisms' question prompted many responses that were characterised by good levels of knowledge and understanding. However, candidate knowledge and understanding of 'Structures' were not as strong.

Comments on specific questions

Section A

Question 1

Most candidates correctly identified tension as a stretching force and many were able to give an appropriate and specific example of compression forces acting in structures. Fewer candidates were able to identify torsion as a twisting force or specify an appropriate example of torsional forces.

Question 2

Most candidates were able to draw and label gussets in the given structure. The better responses were characterised by high-quality sketches.

Question 3

Only a few candidates could explain how folding sheet material increases its rigidity and its capability to support loading.

Question 4

This question was well answered. Most candidates could describe the energy conversions for a dry-cell battery and were able to give an appropriate and specific example. Similarly, candidates were generally able to give an appropriate example of the application of a solar cell. The last part was also well answered by many candidates, describing the energy conversion from kinetic energy (or mechanical energy) to electrical energy for a dynamo.

Question 5

Most candidates correctly identified the component as a transistor.

Question 6

Many candidates were able to describe the activation of the reed switch due to the magn of one of the reeds so that the circuit was made and the alarm activated.

Question 7

Nearly all candidates were able to identify an appropriate example of logic systems in common products, such as control systems for washing machines.

Question 8

Most candidates gave an appropriate example of linear motion, e.g. the opening on elevator doors. Though many candidates knew that rotary motion is described by a circular pathway, many struggled to describe this in a succinct way using appropriate technological terminology. Many candidates gave an appropriate example of oscillating motion, with the pendulum being a favoured response.

Question 9

(a) Many candidates correctly identified the third order lever.

(b) Many candidates correctly specified an appropriate example of a 3rd order lever.

Question 10

Many candidates gave appropriate examples of the use of a toothed pulley system such as the timing belt in a motor car engine.

Section B

Question 11

(a) (i) Most candidates correctly identified the parts of the ratchet and pawl system and were able to show the correct direction for the free rotation of the ratchet wheel.

(ii) Most candidates were able to give an appropriate example for a ratchet and pawl such as a fishing reel or on a crane winch.

(iii) This part was less well answered, with few candidates identifying a way of disengaging the pawl from the ratchet to facilitate release of the ratchet wheel, e.g. by allowing the pawl to be pushed out on an independent shaft.

(b) Most candidates were able to describe the conversion from rotary to linear motion for a screw thread.

(c) Most candidates were able to give reduced slip as an advantage of sprocket and chain mechanism.

(d) (i) This was well answered, with most candidates being able to calculate the velocity ratio for the given system.

(ii) Fewer candidates could go on to calculate the speed of the driven sprocket wheel.

(iii) Again, few candidates were able to determine the mechanical advantage for the system given its efficiency rating.

(e) (i) This part was not well answered, and not many candidates were able to sketch a plain bearing.

(ii) Most candidates were able to give an appropriate example of the use of ball bearings such as in a bicycle wheel hub.

(iii) Most candidates were able to state that lubrication can reduce friction but few were a how this is achieved by introducing a layer of lubricant between the two surfaces thu contact and lowering frictional forces.

Question 12

(a) Many candidates correctly identified light as the environmental change sensed by the LDR and were able to give an appropriate application such as a street lamp or a burglar alarm. Also, most candidates identified the thermistor as a temperature sensor. The last part was less well answered, with fewer candidates giving an appropriate use for the strain gauge, such as sensing structural deflection in girders.

(b) (i) Many candidates correctly sketched and labelled an LDR. Some sketches were of a very high standard and enhanced the responses given.

(ii) Most candidates were able to sketch the circuit symbol for the LDR.

(c) (i) Some candidates were able to sketch and label the LED component. Again, some sketches were very detailed and enhanced the quality and accuracy of the responses.

(ii) Most candidates explained the need for a series resistor to be connected to the LED to protect it from excessive current flow.

(iii) Most candidates were able to cite an appropriate use for LEDs such as power indicator signals for electrical equipment.

(d) (i) Most candidates were able to calculate the value of the series resistor but some candidates were confused over the value of the current and their answers were incorrect in terms of their decimal placement.

(ii) Most candidates were able to use the colour code table to determine the colour bands for the numerical value that they had calculated in part **(d) (i)**. However, very few candidates understood the term “nearest preferred value” and used this in the colour coding, e.g. for a numerical value of 450Ω the NPV resistor is 470Ω.

(e) (i) Many candidates correctly identified the AND gate from the truth table given.

(ii) Most candidates were able to draw the circuit symbol for the AND gate and show its input and output correctly.

Question 13

(a) Most candidates identified the specified structural components.

(b) Most candidates were able to explain how the bracing increased the rigidity and thus the ability to support loading and reduced the tendency for buckling / collapse.

(c) (i) Some candidates were able to identify the strength to weight ratio benefits of using tubing and a few identified a second benefit of ease of construction when using square section tubing for fixing to wall materials.

(ii) Few candidates were able to show the way in which a simply supported beam will sag so that the top of the beam section is in compression and the underside is in tension and that there is a neutral axis (unloaded material) running through the centre of the beam.

(d) Very few candidates were able to sketch a dial gauge (DTI) used to show deflection.

(e) Few candidates were able to show the operation of a strain gauge.

(f) (i) Few candidates were able to sketch a diagram of welding or to cite an appropriate e... use of welding in structural applications. Very few candidates identified the use of s... joining tent poles. Few candidates were able to give an appropriate and specific examp... use of nuts and bolts in a structure.

(ii) Few candidates were able to explain how using a washer will spread the load from the nut and reduce damage to the surface under pressure.

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.
- Responses need to use appropriate technological terminology and clear annotated sketches as appropriate.

General comments

All candidates were able to access the paper and a range of response styles and attainment was seen. There was evidence of good preparation by candidates for this paper in the way in which questions were selected and approached. In the 'Electronics' question there was clear evidence of good preparation and practical application of knowledge. Similarly, the 'Mechanisms' question prompted many responses that were characterised by good levels of knowledge and understanding. However, candidate knowledge and understanding of 'Structures' were not as strong.

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This question was well answered. Most candidates could describe the energy conversions for a dry-cell battery and were able to give an appropriate and specific example. Similarly, candidates were generally able to give an appropriate example of the application of a solar cell. The last part was also well answered by many candidates, describing the energy conversion from kinetic energy (or mechanical energy) to electrical energy for a dynamo.

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Section B

Question 11

(a) (i) Most candidates correctly identified the parts of the ratchet and pawl system and were able to show the correct direction for the free rotation of the ratchet wheel.

(ii) Most candidates were able to give an appropriate example for a ratchet and pawl such as a fishing reel or on a crane winch.

(iii) This part was less well answered, with few candidates identifying a way of disengaging the pawl from the ratchet to facilitate release of the ratchet wheel, e.g. by allowing the pawl to be pushed out on an independent shaft.

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(ii) Most candidates were able to give an appropriate example of the use of ball bearings such bicycle wheel hub.

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(a) Many candidates correctly identified light as the environmental change sensed by the LDR and were able to give an appropriate application such as a street lamp or a burglar alarm. Also, most candidates identified the thermistor as a temperature sensor. The last part was less well answered, with fewer candidates giving an appropriate use for the strain gauge, such as sensing structural deflection in girders.

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(iii) Most candidates were able to cite an appropriate use for LEDs such as power indicator signals for electrical equipment.

(d) (i) Most candidates were able to calculate the value of the series resistor but some candidates were confused over the value of the current and their answers were incorrect in terms of their decimal placement.

(ii) Most candidates were able to use the colour code table to determine the colour bands for the numerical value that they had calculated in part **(d) (i)**. However, very few candidates understood the term “nearest preferred value” and used this in the colour coding, e.g. for a numerical value of 450Ω the NPV resistor is 470Ω.

(e) (i) Many candidates correctly identified the AND gate from the truth table given.

(ii) Most candidates were able to draw the circuit symbol for the AND gate and show its input and output correctly.

Question 13

(a) Most candidates identified the specified structural components.

(b) Most candidates were able to explain how the bracing increased the rigidity and thus the ability to support loading and reduced the tendency for buckling / collapse.

(c) (i) Some candidates were able to identify the strength to weight ratio benefits of using tubing and a few identified a second benefit of ease of construction when using square section tubing for fixing to wall materials.

(ii) Few candidates were able to show the way in which a simply supported beam will sag so that the top of the beam section is in compression and the underside is in tension and that there is a neutral axis (unloaded material) running through the centre of the beam.

(d) Very few candidates were able to sketch a dial gauge (DTI) used to show deflection.

(e) Few candidates were able to show the operation of a strain gauge.

(f) (i) Few candidates were able to sketch a diagram of welding or to cite an appropriate exa use of welding in structural applications. Very few candidates identified the use of sle joining tent poles. Few candidates were able to give an appropriate and specific example use of nuts and bolts in a structure.

(ii) Few candidates were able to explain how using a washer will spread the load from the nut and reduce damage to the surface under pressure.

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.
- Responses need to use appropriate technological terminology and clear annotated sketches as appropriate.

General comments

All candidates were able to access the paper and a range of response styles and attainment was seen. There was evidence of good preparation by candidates for this paper in the way in which questions were selected and approached. In the 'Electronics' question there was clear evidence of good preparation and practical application of knowledge. Similarly, the 'Mechanisms' question prompted many responses that were characterised by good levels of knowledge and understanding. However, candidate knowledge and understanding of 'Structures' were not as strong.

Comments on specific questions

Section A

Question 1

Most candidates correctly identified tension as a stretching force and many were able to give an appropriate and specific example of compression forces acting in structures. Fewer candidates were able to identify torsion as a twisting force or specify an appropriate example of torsional forces.

Question 2

Most candidates were able to draw and label gussets in the given structure. The better responses were characterised by high-quality sketches.

Question 3

Only a few candidates could explain how folding sheet material increases its rigidity and its capability to support loading.

Question 4

This question was well answered. Most candidates could describe the energy conversions for a dry-cell battery and were able to give an appropriate and specific example. Similarly, candidates were generally able to give an appropriate example of the application of a solar cell. The last part was also well answered by many candidates, describing the energy conversion from kinetic energy (or mechanical energy) to electrical energy for a dynamo.

Question 5

Most candidates correctly identified the component as a transistor.

Question 6

Many candidates were able to describe the activation of the reed switch due to the magn of one of the reeds so that the circuit was made and the alarm activated.

Question 7

Nearly all candidates were able to identify an appropriate example of logic systems in common products, such as control systems for washing machines.

Question 8

Most candidates gave an appropriate example of linear motion, e.g. the opening on elevator doors. Though many candidates knew that rotary motion is described by a circular pathway, many struggled to describe this in a succinct way using appropriate technological terminology. Many candidates gave an appropriate example of oscillating motion, with the pendulum being a favoured response.

Question 9

(a) Many candidates correctly identified the third order lever.

(b) Many candidates correctly specified an appropriate example of a 3rd order lever.

Question 10

Many candidates gave appropriate examples of the use of a toothed pulley system such as the timing belt in a motor car engine.

Section B

Question 11

(a) (i) Most candidates correctly identified the parts of the ratchet and pawl system and were able to show the correct direction for the free rotation of the ratchet wheel.

(ii) Most candidates were able to give an appropriate example for a ratchet and pawl such as a fishing reel or on a crane winch.

(iii) This part was less well answered, with few candidates identifying a way of disengaging the pawl from the ratchet to facilitate release of the ratchet wheel, e.g. by allowing the pawl to be pushed out on an independent shaft.

(b) Most candidates were able to describe the conversion from rotary to linear motion for a screw thread.

(c) Most candidates were able to give reduced slip as an advantage of sprocket and chain mechanism.

(d) (i) This was well answered, with most candidates being able to calculate the velocity ratio for the given system.

(ii) Fewer candidates could go on to calculate the speed of the driven sprocket wheel.

(iii) Again, few candidates were able to determine the mechanical advantage for the system given its efficiency rating.

(e) (i) This part was not well answered, and not many candidates were able to sketch a plain bearing.

(ii) Most candidates were able to give an appropriate example of the use of ball bearings such as in a bicycle wheel hub.

(iii) Most candidates were able to state that lubrication can reduce friction but few were a how this is achieved by introducing a layer of lubricant between the two surfaces thu contact and lowering frictional forces.

Question 12

(a) Many candidates correctly identified light as the environmental change sensed by the LDR and were able to give an appropriate application such as a street lamp or a burglar alarm. Also, most candidates identified the thermistor as a temperature sensor. The last part was less well answered, with fewer candidates giving an appropriate use for the strain gauge, such as sensing structural deflection in girders.

(b) (i) Many candidates correctly sketched and labelled an LDR. Some sketches were of a very high standard and enhanced the responses given.

(ii) Most candidates were able to sketch the circuit symbol for the LDR.

(c) (i) Some candidates were able to sketch and label the LED component. Again, some sketches were very detailed and enhanced the quality and accuracy of the responses.

(ii) Most candidates explained the need for a series resistor to be connected to the LED to protect it from excessive current flow.

(iii) Most candidates were able to cite an appropriate use for LEDs such as power indicator signals for electrical equipment.

(d) (i) Most candidates were able to calculate the value of the series resistor but some candidates were confused over the value of the current and their answers were incorrect in terms of their decimal placement.

(ii) Most candidates were able to use the colour code table to determine the colour bands for the numerical value that they had calculated in part **(d) (i)**. However, very few candidates understood the term “nearest preferred value” and used this in the colour coding, e.g. for a numerical value of 450Ω the NPV resistor is 470Ω.

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(ii) Few candidates were able to explain how using a washer will spread the load from the nut and reduce damage to the surface under pressure.

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, as was the case for the vast majority of the work seen.
- Candidates should be encouraged to produce concise and focused projects. Some candidates still include a large amount of generic research material that is not relevant to the task chosen.

General comments.

All Centres are reminded that advice given in Centre Reports will help to ensure that Centre Assessment is carried out to the Awarding Body standard. Whilst most Centres fully complied with the requirements to forward the correct sample and accompanying documentation, it is important that the MS1 form and the Coursework Assessment Summary Form are carefully completed, and in particular additions are checked before the marks are submitted.

A wide range of interesting and innovative work was presented for moderation; the overall standard of work submitted was good with an increasing number of outstanding projects.

Most projects were appropriate, many had interesting and challenging briefs focusing on personal/family interests or community based themes.

Most folders submitted were detailed and concise. Some were exceptionally large: to avoid unnecessary waste, candidates should be encouraged to make full use of space available on a sheet.

Comments on specific headlines

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 making good use of photographs to produce a clear and detailed brief. To access the higher mark range for this section, candidates must consider the client or user group – who the product is for, which specific groups will use it, how it will help and the difference it will make.

2. Research into the Design Brief resulting in a Specification

There continues to be improvement in this area. The best work in this section included focused research relevant to the brief that would assist in the production of a specification and help to produce appropriate designs. Additional research relating to manufacturing methods is best located in the development of the proposed solution section.

Some candidates would have benefited from sifting through the research that they had gathered and only included information that was relevant. When including anthropometric data for example, they should only select those particular features that apply to the brief.

An analysis of existing products is an important area of research. To achieve the higher mark ranges, candidates must analyse a range of products, detail the strong and/or weak design features in order to explore or avoid when generating their own designs.

Most specifications were clear and justified. Some candidates focused on generic points such a
safe' or 'must not be too big' without the further clarification or direct link to the product to be designe

3. Generation and exploration of Design Ideas

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 or part solutions, each evaluated against relevant points of the specification.

There is an increasing 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. There is also an increasing number of candidates whose use 2D and 3D basic modelling to explore concepts. This is encouraged both in this section and in the development of the proposed solution section.

Centres tended to be slightly lenient in the assessment of this section; to achieve the higher mark ranges candidates must produce a wide range of appropriate solutions with imaginative interpretation. They must include a detailed evaluation of their ideas and show consideration of the requirements of the specification.

4. Development of Proposed Solution

Many candidates produced detailed developments, showing how decisions relating to the selection of materials and manufacturing processes were arrived at. Most made reasoned refinements to their design, incorporating form and function requirements with material and manufacturing decisions.

Some candidates, however, did not show any decision-making, simply stating the chosen material. To achieve the highest marks, candidates must show evidence of the trialling or testing of alternatives and of the decisions made.

5. Planning for Production

Most candidates produced very detailed plans for production. They clearly identified the stages of manufacture, many including detailed cutting lists, time allocations and Health and Safety considerations.

A number of candidates had referred back to their plan during the manufacture of their product and made appropriate changes.

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

Many Centres made excellent use of CAD in this section.

6. Product Realisation

There was a wide range of practical outcomes submitted, many manufactured to a very high standard. Most products were fully completed and were able to be tested in the environment for which the product was designed.

Most candidates used good quality photographs to show full details of their product. Many gave photographic evidence of key stages of manufacture of the product to emphasize the quality of making. The best work included evidence of the product in use, which was also used in the Testing and Evaluation section.

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

7. Testing and Evaluation

Many candidates achieved marks in the higher mark range by testing and using the product in its intended environment, and producing detailed evaluations. Evaluations should make clear reference to the specification. They went on to use sketches and notes to recommend modifications and possible improvements based upon their evaluation. Some candidates asked the user to evaluate their product; this is to be recommended.

Centres tended to be slightly lenient when assessing this section. The assessment cr candidates to carry out objective testing with reference to the specification and user. They mu detailed and meaningful conclusions leading to proposals for further development to access the hig range.