Cambridge Assessment International Education

Cambridge International AS & A Level

DESIGN AND TECHNOLOGY **9705/12**

Paper 1 Written 12 **May/June 2022**

MARK SCHEME

Maximum Mark: 120

Published

This mark scheme is published as an aid to teachers and candidates, to indicate the requirements of the examination. It shows the basis on which Examiners were instructed to award marks. It does not indicate the details of the discussions that took place at an Examiners' meeting before marking began, which would have considered the acceptability of alternative answers.

Mark schemes should be read in conjunction with the question paper and the Principal Examiner Report for Teachers.

Cambridge International will not enter into discussions about these mark schemes.

Cambridge International is publishing the mark schemes for the May/June 2022 series for most Cambridge IGCSE, Cambridge International A and AS Level and Cambridge Pre-U components, and some Cambridge O Level components.

PUBLISHED

Generic Marking Principles

These general marking principles must be applied by all examiners when marking candidate answers. They should be applied alongside the specific content of the mark scheme or generic level descriptors for a question. Each question paper and mark scheme will also comply with these marking principles.

GENERIC MARKING PRINCIPLE 1:

Marks must be awarded in line with:

- the specific content of the mark scheme or the generic level descriptors for the question
- the specific skills defined in the mark scheme or in the generic level descriptors for the question
- the standard of response required by a candidate as exemplified by the standardisation scripts.

GENERIC MARKING PRINCIPLE 2:

Marks awarded are always **whole marks** (not half marks, or other fractions).

GENERIC MARKING PRINCIPLE 3:

Marks must be awarded **positively**:

- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can do
- marks are not deducted for errors
- marks are not deducted for omissions
- answers should only be judged on the quality of spelling, punctuation and grammar when these features are specifically assessed by the question as indicated by the mark scheme. The meaning, however, should be unambiguous.

GENERIC MARKING PRINCIPLE 4:

Rules must be applied consistently, e.g. in situations where candidates have not followed instructions or in the application of generic level descriptors.

GENERIC MARKING PRINCIPLE 5: Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).
GENERIC MARKING PRINCIPLE 6: Marks awarded are based solely on the requirements as defined in the mark scheme. Marks should not be awarded with grade thresholds or grade descriptors in mind.

Question	Answer	Marks	Guidance
	Section A		
1(a)	Exemplar answer Will not rust [1] Does not require maintenance [1] **0–2**	**2**	AOVR including: Does not require a finish
1(b)(i)	Sketches and/or notes show: **Cutting to shape and Folding** Suitable method [3] e.g. guillotine, grinder...and then folding bars/press, heat and fold Tools, equipment or processes [2] Safety precaution [1] **0–6**	**6**	
1(b)(ii)	Sketches and/or notes show: **Method and application** Suitable method [1] e.g. painting, vinyl lettering, stencil... Explanation of method [0–2] Tools, equipment or processes [0–2] Safety precaution [1] **0–6**	**6**	Accept hand or CNC methods.
1(b) (iii)	Sketches and/or notes show: **Method and construction** Suitable method [1] e.g. assembled with screws... Explanation of method (sides and base) [0–2] Tools, equipment or processes [0–2] Safety precaution [1] **0–6**	**6**	

Question	Answer	Marks	Guidance
2(a)	Exemplar answers: Flexible [1] Inexpensive [1] **0–2**	**2**	AOVR including: Easy to cut to shape Can be recycled Can have a design printed on it
2(b)(i)	Sketches and/or notes show: **Method and application** Suitable method [1] e.g. stencil, inkjet printer... Explanation of method [2] Tools, equipment or processes [0–2] Safety precaution [1] **0–6**	**6**	Accept hand or CNC methods.
2(b)(ii)	Sketches and notes show: **Marking out and Cutting to shape** Suitable method [3] e.g. pencil, set square...and then craft knife, circle cutter... Tools, equipment or processes [2] Safety precaution [1] **0–6**	**6**	Accept hand or CNC methods.
2(c)	Sketches and/or notes show: **Method** Suitable method [1] e.g. injection moulding... Explanation of method [0–3] Tools, equipment or processes [0–2] **0–6**	**6**	Accept hand or CNC methods.

Question	Answer	Marks	Guidance
3(a)	Exemplar answer: Can withstand compression [1] Tubes can be curved/bent [1] **0–2**	**2**	AOVR Lost fluid (leaks) can easily be topped up
3(b)(i)	Sketches and/or notes show: **Cutting and Planed** Suitable method [3] e.g. circular saw and then use of planer thicknesser Tools, equipment or processes [2] Safety precaution [1] **0–6**	**6**	Accept hand or machine methods.
3(b)(ii)	Sketches and/or notes show: **Marking out holes and Method of drilling** Suitable method [3] of drilling holes e.g. try square, rule, pencil...and then pieces clamped together and use of pillar drill Tools, equipment or processes [2] Safety precaution [1] **0–6**	**6**	
3(c)	Sketches and notes show: Parts assembled – syringe and tubing [0–2] Movement (up and down) [0–2] System may work [1] or will work [2] **0–6**	**6**	

Question	Answer	Marks	Guidance
	Section B		
4(a)	Feature X is designed to keep the cotton seat [1] in position [1] **0–2**	**2**	
4(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. cotton will get wet [1] and tear/not be nice to sit on [1] **0–4**	**4**	Other acceptable answers include: 1 Unstable/not fastened to the ground. 2 Concrete could be weak and have sharp edges. 3 Unsafe as people could fall through the gaps
4(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. replace the cotton [1] with nylon [1] which is waterproof/stronger [1] **0–6**	**6**	
4(d)(i)	Situation has been analysed and relevant issues/points identified Benefits of surface finishes e.g. a high quality finish makes a product look/feel expensive [1] people's view of a product is influenced by how it feels [1], rough surfaces can be dangerous [1] **0–3**	**3**	
4(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. people will pay more for a product with a high quality finish [1], customers are attracted to products with a high quality/appropriate finish [1], manufacturers wish to avoid legal claims from people who are hurt using their products [1] **0–3**	**3**	
4(d)(iii)	Specific examples/evidence used to support conclusions e.g. tactile surfaces in a car interior [1], sanded and sealed surfaces on wooden products prevent injury [1] **0–2**	**2**	

Question	Answer	Marks	Guidance
5(a)	Feature X is a stop [1] to prevent the mobile sliding off the POS [1] **0–2**		
5(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. can't bend a radius [1] in foamboard [1] **0–4**		Other acceptable answers include: 1 Unstable/will topple over. 2 No surface graphics. 3 Mobile could easily be stolen.
5(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. change the material [1] to acrylic [1] so it can be heated and bent [1] **0–6**	**6**	
5(d)(i)	Situation has been analysed and relevant issues/points identified e.g. as a means of communicating with the client [1] provides a checklist for the designer [1] can be used to specify the materials/processes used to make a product [1] **0–3**	**3**	
5(d) (ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. the designer must satisfy the client's needs if a product is to be successful [1], will keep the designer 'on track' during the design process [1], products will meet the necessary safety standards [1] **0–3**	**3**	
5(d)(iii)	Specific examples/evidence used to support conclusions e.g. ISO 9001 standards awarded to a firm of architects [1], Kitemarks found on smoke alarms [1] **0–2**	**2**	

Question	Answer	Marks	Guidance
6(a)	Feature X is a flexible tube that connects different tools [1] to the vacuum [1] **0–2**	**2**	
6(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. no wheels on the vacuum cleaner [1] so difficult to move around [1] **0–4**	**4**	Other acceptable problems include: 1 No switches. 2 No power source. 3 No tools.
6(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. modify the moulding of the vacuum cleaner case [1] to include a means [1] of attaching wheels [1] **0–6**	**6**	
6(d)(i)	Situation has been analysed and relevant issues/points identified e.g. concise way of presenting complicated control systems [1], feedback allows designer to develop 'responsive' machines [1] amplification can improve safety [1] **0–3**	**3**	
6(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. if the key functions are clearly understood this helps the designer/manufacturer/customer [1] machines that are 'responsive' are desirable/efficient/economic [1], amplification allows low voltage switching to turn on high voltage circuits [1] **0–3**	**3**	
6(d)(iii)	Specific examples/evidence used to support conclusions e.g. car will brake if vehicle departs from lane [1], house security lights sense movement [1] **0–2**	**2**	

Question	Answer	Marks	Guidance
	Section C		
7(a)	**Provides a flat surface to be knelt on** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. cushioned flat surface **Handle to steady the user and aid can be moved around** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. tubular steel frame, handle and wheels Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
7(b)	**Tool holder** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. metal sheet with holes for the tools to be easily removed **Attaches to the gardening aid** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. wing nuts Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
7(c)	**Container that attaches to the gardening aid** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. plastic bucket **Place for gardening gloves** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. clip for gloves Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
7(d)	The drawing will exhibit a reasonable standard of outcome and show some of the required design features **0–5** OR The drawing will exhibit a good standard of outcome and show most of the design features required to make the product function as intended **6–9** OR The drawing will be completed to a high standard of outcome and fully shows the design features required to make the product function as intended **0–14** Some use made of colour and tone to enhance the visual impact of the drawing **0–2** OR Good use has been made of colour and tone to enhance the visual impact of the drawing **3–4** OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing **5–6**	**20**	

Question	Answer	Marks	Guidance
8(a)	**Brand name based on 'SoSoft'** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. Name or letters used **Branding** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. style of lettering and images appropriate for hand care products Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
8(b)	**Plastic tray** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. vacuum formed tray with indentations **Tray designed to hold the two products** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. products fit into the tray and will not move around Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
8(c)	**One-piece development** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. six connected surfaces with glue tabs **Holds the tray designed in (b)** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. correct size to hold the tray Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
8(d)	The drawing will exhibit a reasonable standard of outcome and show some of the required design features **0–5** OR The drawing will exhibit a good standard of outcome and show most of the design features required to make the product function as intended **6–9** OR The drawing will be completed to a high standard of outcome and fully shows the design features required to make the product function as intended **0–14** Some use made of colour and tone to enhance the visual impact of the drawing **0–2** OR Good use has been made of colour and tone to enhance the visual impact of the drawing **3–4** OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing **5–6**	**20**	

Question	Answer	Marks	Guidance
9(a)	**Mechanism powered by AA batteries** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. motor used to rotate blades **Shreds paper** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. rotating blades Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
9(b)	**Case** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. plastic moulding **Contains the mechanism designed in part (a)** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
9(c)	**Clamp** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. cam clamp **Fits on the waste-paper bin** One pre-conceived idea presented **0–2** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **3–4** OR The development and selection of a range of ideas into a single design proposal which would appear to technical detail to show that the proposed solution would clearly work **5–6** e.g. sizes and construction of the bin taken into account Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
9(d)	The drawing will exhibit a reasonable standard of outcome and show some of the required design features **0–5** OR The drawing will exhibit a good standard of outcome and show most of the design features required to make the product function as intended **6–9** OR The drawing will be completed to a high standard of outcome and fully show the design features required to make the product function as intended **0–14** Some use made of colour and tone to enhance the visual impact of the drawing **0–2** OR Good use has been made of colour and tone to enhance the visual impact of the drawing **3–4** OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing **5–6**	**20**	