Cambridge Assessment International Education

Cambridge International AS & A Level

DESIGN & TECHNOLOGY **9705/13**

Paper 1 **October/November 2023**

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 October/November 2023 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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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**:

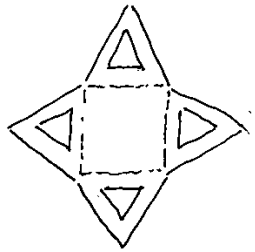
- marks are awarded for correct/valid answers, as defined in the mark scheme. However, credit is given for valid answers which go beyond the scope of the syllabus and mark scheme, referring to your Team Leader as appropriate
- marks are awarded when candidates clearly demonstrate what they know and can 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 answers: Hands attached to the clockface [1] but method allows them to rotate e.g. a screw mechanism [1] **0–2**	**2**	
1(b)(i)	**Marking out and cutting to shape and joining** Suitable method [0–3] e.g. pencil, try square, compass … **Tools, equipment or processes** Suitable method [0–2] e.g. coping saw, band saw, filing, sanding, drilling Safety precaution [0–1] **0–6**	**6**	Accept CAD/CAM techniques.
1(b)(ii)	**Method of making and applying the numbers** Suitable method [0–3] e.g. CAD for vinyl, plastic memory technique... **Tools, equipment or processes** Suitable method [0–2] e.g. use of a vinyl cutter Safety precaution [0–1] **0–6**	**6**	Other acceptable methods include: • stencil
1(c)	Sketches and/or notes show: **Method of making a batch of 2000 of one the plastic shapes** Suitable method [0–3] e.g. injection moulding, laser cutter Tools, equipment or processes [0–3] **0–6**	**6**	

Question	Answer	Marks	Guidance
2(a)	Exemplar answers: Readily available [1] Good strength to weight ratio [1] **0–2**	**2**	AOVR including: • easy to cut to shape and fold • can have a design printed on it
2(b)	Sketches and/or notes show: **Shape of development (net)** Any shape development shown [1] or development with fold lines [2] Correct shape development (four triangles and a square) [3] with fold and cut lines [4] Correct shape development drawn in good proportions [5] with all folds and cut outs correctly shown [6] **0–6**	**6**	Example of a development. 
2(c)(i)	Sketches and notes show: **Marking out, cutting, shaping and joining** Suitable method [0–3] e.g. draw on a CAD programme and laser cutter **Tools, equipment or processes** Suitable method [0–2] e.g. vee grooves and adhesive Safety precaution [0–1] **0–6**	**6**	Accept hand or CNC methods.
2(c)(ii)	Sketches and/or notes show: **Method** Suitable method [0–3] e.g. design and print and apply plastic film Tools, equipment or processes Suitable method [0–2] CAD program Safety precaution [0–1] **0–6**	**6**	

Question	Answer	Marks	Guidance
3(a)	Exemplar answer: So it can be cleaned [1] Easy to repair if a part fails [1] **0–2**	**2**	
3(b)(	Sketches and/or notes show: **Method** Suitable method [0–3] e.g. turning, cast in resin... **Tools, equipment or processes** Suitable method [0–2] Safety precaution [0–1] **0–6**	**6**	Accept CAD
3(c)(i)	Sketches and notes show: Explanation of the auger mechanism [0–3] Movement (rotary and linear) [0–3] **0–6**	**6**	
3(c)(ii)	Sketches and notes show: Understanding of a crank mechanism [0–3] Understanding of how the length of the crank impacts upon the user (mechanical advantage) [0–3] **0–6**	**6**	

Question	Answer	Marks	Guidance
Section B			
4(a)	Feature X supports (triangulation) [1] the arm [1] **0–2**	**2**	Also accept structural integrity.
4(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. mild steel bar [1] will be too heavy [1] **0–4**	**4**	Other acceptable answers include: 1 Not fastened to the ground. 2 No means of adjusting height or angle. 3 No frame to support the canvas. 4 Canopy too large for length of arm.
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 mild steel bar [1] with aluminium tube [1] which is lighter [1] **0–6**	**6**	
4(d)(i)	Situation has been analysed and relevant issues/points identified e.g. to avoid accidents [1] to check if the process is safe [1], to avoid claims for injury to workers [1] **0–3**	**3**	
4(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. accidents prevent people from working [1], unsafe working practices could mean the factory is closed by health and safety officers [1], legal claims are expensive and time consuming [1] **0–3**	**3**	

Question	Answer	Marks	Guidance
4(d)(iii)	Specific examples/evidence used to support conclusions e.g. training of staff on safe working practices [1], health and safety representatives in factories [1] **0–2**	**2**	

Question	Answer	Marks	Guidance
5(a)	Feature X is clear window [1] that allows the cake to be viewed [1] **0–2**	**2**	
5(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. cake will move around in the box [1] and get damaged [1] **0–4**	**4**	Other acceptable answers include: 1 Box will slide out of sleeve. 2 No graphics on the box (ingredients...) or flaps. 3 Box won't fit in sleeve.
5(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. add inserts to the box [1] that will prevent [1] the cake from moving [1] **0–6**	**6**	
5(d)(i)	Situation has been analysed and relevant issues/points identified e.g. damaged goods will be rejected by customers [1], wastes money [1], and leads to disappointed customers [1] **0–3**	**3**	

Question	Answer	Marks	Guidance
5(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. customers expect goods to be perfect when they arrive [1], returning, repairing and replacing damaged good is expensive [1], disappointed customers unlikely to repeat purchase [1] **0–3**	**3**	
5(d)(iii)	Specific examples/evidence used to support conclusions e.g. extensive packaging around electrical products (corrugated card, expanded polystyrene, shrink wrapped, retaining straps...) [1], increase in online sales means products are delivered by courier, not collected by customer, and require additional packaging [1] **0–2**	**2**	

Question	Answer	Marks	Guidance
6(a)	Feature X is a rubber grommet that prevents the cable being damaged [1] by the sharp edge of the hole in the case [1] **0–2**	**2**	
6(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. rain will get into the electrics [1] through the openings [1] **0–4**	**4**	Other acceptable problems include: 1 Completely enclosed so difficult to access parts if a fault occurs. 2 No means of fastening to the wall. 3 No PIR sensor.
6(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. put clear plastic panels in the openings [1] so light will pass through [1] but water won't get in [1] **0–6**	**6**	

Question	Answer	Marks	Guidance
6(d)(i)	Situation has been analysed and relevant issues/points identified e.g. people often work on only one small part of the product [1], tasks repetitive [1] processes often automated [1] **0–3**	**3**	
6(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. working on only a small part of a product can lead to less job satisfaction [1], repetitive tasks can cause injury/boredom [1], automated processes require staff to be trained/less staff [1] **0–3**	**3**	
6(d)(iii)	Specific examples/evidence used to support conclusions e.g. automated production in the car industry [1], cabinet makers replaced with CNC production of furniture parts [1] **0–2**	**2**	

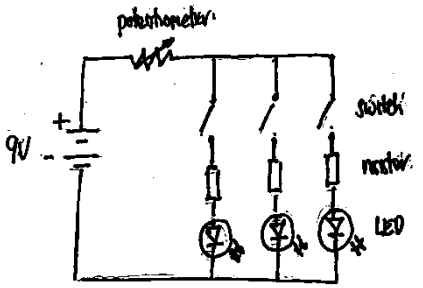
Question	Answer	Marks	Guidance
Section C			
7(a)	**Mirror stand** One pre-conceived idea presented **0–4** OR The development and selection of a range of ideas into a single design proposal which would appear to work but lacks some technical detail **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Must holds the mirror 500 mm above the floor to access 10–12 marks** e.g. stand fastens to the frame of the mirror Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
7(b)	**Bracket attaches the mirror to the stand** One pre-conceived idea presented **0–4** 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 **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Bracket must allow the mirror to tilt to access 10–12 marks** e.g. wing nuts can be slackened to adjust angle of mirror Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
7(c)	**Shoe rack** One pre-conceived idea presented **0–4** 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 **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Must holds four pairs of shoes to access 10–12 marks** e.g. rack has a bar that supports the shoes Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
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 **10–14** 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)	**Slot together robot** One pre-conceived idea presented **0–4** 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 **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Must meet size and construction requirements (four parts) to access 10–12 marks** e.g. 1000 mm high and minimum of four parts Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
8(b)	**Set of stickers** One pre-conceived idea presented **0–4** 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 **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Must show key facial features to access 10–12 marks** e.g. eyes, mouth ... **9–12** Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
8(c)	**A5 Leaflet holder** One pre-conceived idea presented **0–4** 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 **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Must attaches to the robot to access 10–12 marks** e.g. slot fittings, Velcro ... Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
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 **10–14** 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)	**Curtains open and close** One pre-conceived idea presented **0–4** 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 **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Curtains must be able to be stopped in any position to access 10–12 marks** e.g. switch allows curtains to be stopped at any position Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	
9(b)	**Raises and lowers the platform** One pre-conceived idea presented **0–4** 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 **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Must be able to raise the platform 50 mm** e.g. height adjustment of 50 mm included in design Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	

Question	Answer	Marks	Guidance
9(c)	**Lighting control system (circuit)** One pre-conceived idea presented **0–4** 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 **5–8** OR The development and selection of a range of ideas into a single design proposal which includes the technical detail to show that the proposed solution would clearly work. **9–12** **Lights must be able to be controlled independently and dimmed to access 10–12 marks** e.g. separate circuits for each colour light Clarity and quality of sketching and explanatory notes **0–4** Evaluation (reasons for selection) **0–4**	**20**	**Example of a basic circuit** 
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**	