



# Cambridge International AS & A Level

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**DESIGN AND TECHNOLOGY**

**9705/12**

Paper 1 Written

**May/June 2023**

MARK SCHEME

Maximum Mark: 120

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**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.

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This document consists of **15** printed pages.

**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:**

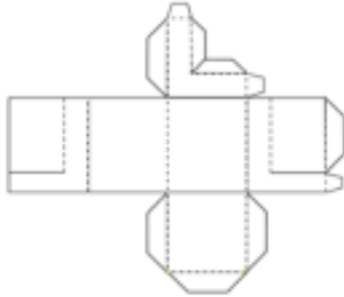
Marks should be awarded using the full range of marks defined in the mark scheme for the question (however; the use of the full mark range may be limited according to the quality of the candidate responses seen).

**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.

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Question	Answer	Marks	Guidance
<b>Section A</b>			
1(a)	Exemplar answers: A stable material [1] No weakness across the grain [1]	<b>2</b>	AOVR include: <ul style="list-style-type: none"> <li>• easy to cut to shape</li> <li>• accepts a finish</li> </ul>
1(b)(i)	Sketches and/or notes show: <b>Method of joining the arm to the upright</b> Suitable method (e.g. nut and bolt) and explanation of method [0–3] Tools, equipment or processes [0–2] Safety precaution [0–1]	<b>6</b>	
1(b)(ii)	<b>Method of making the weights</b> Suitable method (e.g. turning on a lathe, casting) and explanation of method [0–3] Tools, equipment or processes [0–2] Safety precaution [0–1]	<b>6</b>	
1(c)	Sketches and/or notes show: <b>Method of making 12 plastic trays</b> , suitable method (e.g. vacuum forming, laser cutter...) [0–3] Explanation of method [0–3]	<b>6</b>	

Question	Answer	Marks	Guidance
2(a)	Exemplar answers: Environmentally friendly Presents an environmentally friendly image for the manufacturer [1] Not directly in contact with food so no possibility of contamination [1]	<b>2</b>	AOVR including: <ul style="list-style-type: none"> <li>• easy to cut to shape</li> <li>• can have a design printed on it</li> <li>• reduced impact on the environment</li> </ul>
2(b)	Sketches and/or notes show: <b>Shape of development (net)</b> Any development drawn [1] that makes a box (six surfaces and some glue tabs) [1] One-piece box development with cut out corner [1] with appropriate, fold or cut lines [1] One-piece box development with cut out corner and inner sides [1] with appropriate glue tabs, fold and cut lines [1]	<b>6</b>	Example of development (net) 
2(c)(i)	Sketches and notes show: <b>Marking out and cutting to shape</b> Suitable method of marking out (e.g., pencil, set square...) and suitable method of cutting out (e.g. craft knife, circle cutter...) [0–3] Tools, equipment or processes [0–2] Safety precaution [0–1]	<b>6</b>	Accept hand or CNC methods.
2(c)(ii)	Sketches and/or notes show: <b>Method</b> Suitable method (e.g. vacuum formed shape, development (net), sleeve...) and explanation of method [0–3] Tools, equipment or processes [0–2] Safety precaution [0–1]	<b>6</b>	Accept hand or CNC methods.

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Question	Answer	Marks	Guidance
3(a)	Exemplar answer: A stable material [1] No weakness across the grain [1]	2	AOVR include: <ul style="list-style-type: none"> <li>easy to cut to shape</li> <li>accepts a finish</li> </ul>
3(b)(i)	Sketches and/or notes show: <b>Marking out and cutting out</b> Suitable method (e.g. four pieces of wood taped together) and cutting out, suitable method (e.g. cut the taped together wood on a bandsaw and drill). [0–3] Tools, equipment or processes [0–2] Safety precaution [0–1]	6	Accept hand or CNC methods.
3(b)(ii)	Sketches and/or notes show: <b>Marking out the slot and drilling and cutting</b> Suitable method of marking out the slot (e.g. try square, rule, pencil...) and suitable method for cutting) (e.g. pieces clamped together and use of pillar drill, cut with coping saw... ). [0–3] Tools, equipment or processes [0–2] Safety precaution [0–1]	6	Accept router, milling machining, laser...
3(c)	Sketches and notes show: Method (e.g. dowel/legs slots into a cut outs on the base). Method may work or will work [0–3] Explanation of method [0–3]	6	

Question	Answer	Marks	Guidance
<b>Section B</b>			
4(a)	Feature X is a label [1] to show details about and how to care for the plants [1]	<b>2</b>	
4(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. MDF will get wet [1] and fall apart [1]	<b>4</b>	Other acceptable answers include: 1 No drainage holes/not level so water will run out. 2 Structurally unstable. 3 Plastic trough won't fit into space in the stand. 4 Information label not visible when tray in stand.
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 MDF [1] with a polymer [1] which is waterproof [1]	<b>6</b>	
4(d)(i)	Situation has been analysed and relevant issues/points identified e.g. allows the manufacturer to purchase in quantity [1] avoids delays as materials are available [1], helps in production planning [1]	<b>3</b>	
4(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. purchasing in quantity will reduce costs [1], delays in production cost time and create unhappy customers [1], planning production makes the most efficient use of manpower and resources [1]	<b>3</b>	
4(d)(iii)	Specific examples/evidence used to support conclusions e.g. machines, such as a router, can be set up once and used to machine lots of components [1], economy of scale - the cost per component e.g. a woodscrew, decreases when a larger amount are purchased.[1]	<b>2</b>	

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>	<b>Guidance</b>
5(a)	Rubber strip will prevent the shape sorter [1] sliding around the table [1]	<b>2</b>	
5(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. shapes cannot be removed [1] from the holes [1]	<b>4</b>	Other acceptable answers include: 1 Edge of foamboard unsightly/material will damage quite quickly 2 Poorly spaced shapes/wasted space. 3 Wooden end caps don't hold the layers of foamboard. 4 Foamboard is easily damaged.
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 a small handle [1] to each shape [1] so that it can be lifted out [1]	<b>6</b>	
5(d)(i)	Situation has been analysed and relevant issues/points identified e.g. to check the design works [1], to communicate the idea to the client [1], to work out the tooling required for production [1]	<b>3</b>	
5(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. very costly and wasteful to make large volumes of a product with a design fault [1], customers generally want to see what a product looks like before purchasing [1], a prototype can be used to design formers, jigs... [1]	<b>3</b>	
5(d)(iii)	Specific examples/evidence used to support conclusions e.g. concept cars [1], very limited wasted materials in industry [1]	<b>2</b>	



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<b>Question</b>	<b>Answer</b>	<b>Marks</b>	<b>Guidance</b>
6(a)	Feature X is a lid [1] that allows batteries to be replaced [1]	<b>2</b>	
6(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. the switch is the wrong type [1] and would make it difficult to hold the toothbrush [1]	<b>4</b>	Other acceptable problems include: 1 Handle not ergonomically designed/no grip. 2 No means of changing the head. 3 No means of identifying the brushes. 4 Lack of stability
6(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 switch [1] with a push to start/push to stop switch [1] that is fully sealed to prevent water entering the workings of the toothbrush [1]	<b>6</b>	
6(d)(i)	Situation has been analysed and relevant issues/points identified e.g. reduces the energy use [1], better for the environment [1] less strain/wear/friction on moving parts [1]	<b>3</b>	
6(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. replacing batteries is expensive and they are difficult to recycle [1], customers want to be seen to be environmentally friendly [1], if parts wear out they are expensive to replace [1]	<b>3</b>	
6(d)(iii)	Specific examples/evidence used to support conclusions e.g. the energy rating of products clearly shown in electrical stores [1], specialist battery recycling facilities seen in many stores [1]	<b>2</b>	

Question	Answer	Marks	Guidance
<b>Section C</b>			
7(a)	<p><b>Pole attaches to a vertical surface</b> One pre-conceived idea presented <span style="float: right;">0–4</span></p> <p>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 <span style="float: right;">5–8</span></p> <p>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 <span style="float: right;">9–12</span> e.g. bracket with raw plugs</p> <p><b>Vertical adjustment of 300 mm must be included to access 10–12 marks</b> e.g. holes with pegs</p> <p>Clarity and quality of sketching and explanatory notes <span style="float: right;">0–4</span> Evaluation (reasons for selection) <span style="float: right;">0–4</span></p>	<b>20</b>	
7(b)	<p><b>Method of extending the pole</b> One pre-conceived idea presented. <span style="float: right;">0–4</span></p> <p>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 <span style="float: right;">5–8</span></p> <p>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 <span style="float: right;">9–12</span> e.g. telescopic pole</p> <p><b>Pole can be locked at different positions between 300 mm and 600 mm must be included to access 10–12 marks</b> e.g. thumb screw</p> <p>Clarity and quality of sketching and explanatory notes <span style="float: right;">0–4</span> Evaluation (reasons for selection) <span style="float: right;">0–4</span></p>	<b>20</b>	

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Question	Answer	Marks	Guidance
7(c)	<p><b>Spaces the hangers out</b> One pre-conceived idea presented <b>0–4</b></p> <p>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 <b>5–8</b></p> <p>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 <b>9–12</b> e.g. a number of plastic clips</p> <p><b>Prevents hangars falling off the end must be included to access 10–12 marks</b> e.g. the end clip firmly fastens to the end of the pole</p> <p>Clarity and quality of sketching and explanatory notes <b>0–4</b> Evaluation (reasons for selection) <b>0–4</b></p>	<b>20</b>	
7(d)	<p>The drawing will exhibit a reasonable standard of outcome and show some of the required design features <b>0–5</b></p> <p>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 <b>6–9</b></p> <p>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 <b>10–14</b></p> <p>Some use made of colour and tone to enhance the visual impact of the drawing <b>0–2</b> OR Good use has been made of colour and tone to enhance the visual impact of the drawing <b>3–4</b></p> <p>OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing <b>5–6</b></p>	<b>20</b>	

Question	Answer	Marks	Guidance
8(a)	<p><b>Pop-up card designed</b> One pre-conceived idea presented <b>0–4</b></p> <p>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 <b>5–8</b></p> <p>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 <b>9–12</b> e.g. Vee fold</p> <p><b>Based on the theme congratulations must be included to access 10–12 marks</b></p> <p>e.g. WELL DONE used as part of the pop-up</p> <p>Clarity and quality of sketching and explanatory notes <b>0–4</b> Evaluation (reasons for selection) <b>0–4</b></p>	20	
8(b)	<p><b>Tray for the four chocolates</b> One pre-conceived idea presented <b>0–4</b></p> <p>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 <b>5–8</b></p> <p>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 <b>9–12</b> e.g. vacuum formed tray with indentations</p> <p><b>Identification of flavours must be included to access 10–12 marks</b> e.g. names of flavours or first letters moulded into the vacuum formed tray</p> <p>Clarity and quality of sketching and explanatory notes <b>0–4</b> Evaluation (reasons for selection) <b>0–4</b></p>	20	

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Question	Answer	Marks	Guidance
8(c)	<p><b>Package holds the card and tray</b></p> <p>One pre-conceived idea presented <b>0–4</b></p> <p>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 <b>5–8</b></p> <p>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 <b>9–12</b> e.g. folded corrugated card sleeve</p> <p><b>Label used to seal the package must be included to access 10–12 marks</b> e.g. card package folds together and then the label final seals it</p> <p>Clarity and quality of sketching and explanatory notes <b>0–4</b> Evaluation (reasons for selection) <b>0–4</b></p>	<b>20</b>	
8(d)	<p>(d) The drawing will exhibit a reasonable standard of outcome and show some of the required design features <b>0–5</b></p> <p>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 <b>6–9</b></p> <p>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 <b>10–14</b></p> <p>Some use made of colour and tone to enhance the visual impact of the drawing <b>0–2</b></p> <p>OR Good use has been made of colour and tone to enhance the visual impact of the drawing <b>3–4</b></p> <p>OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing <b>5–6</b></p>	<b>20</b>	

Question	Answer	Marks	Guidance
9(a)	<p><b>Barrier width adjustable</b></p> <p>One pre-conceived idea presented <b>0–4</b></p> <p>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 <b>5–8</b></p> <p>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 <b>9–12</b> e.g. second half of barrier slides out</p> <p><b>Width can be set between 1200 mm and 2000 mm must be included to access 10–12 marks</b> e.g. measurements on the top of the barrier show the width</p> <p>Clarity and quality of sketching and explanatory notes <b>0–4</b> Evaluation (reasons for selection) <b>0–4</b></p>	<b>20</b>	
9(b)	<p><b>Means of moving</b></p> <p>One pre-conceived idea presented <b>0–4</b></p> <p>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 <b>5–8</b></p> <p>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 <b>9–12</b> e.g. wheels or rollers</p> <p><b>Temporary securing in new position must be included to access 10–12 marks</b> e.g. brakes added</p> <p>Clarity and quality of sketching and explanatory notes <b>0–4</b> Evaluation (reasons for selection) <b>0–4</b></p>	<b>20</b>	

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Question	Answer	Marks	Guidance
9(c)	<p><b>Audible and visual alarm</b></p> <p>One pre-conceived idea presented <b>0–4</b></p> <p>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 <b>5–8</b></p> <p>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 <b>9–12</b></p> <p>e.g. buzzer and LED activated by movement</p> <p><b>Alarm activated when a person approaches must be included to access 10–12 marks</b></p> <p>e.g. motion activated circuit</p> <p>Clarity and quality of sketching and explanatory notes <b>0–4</b></p> <p>Evaluation (reasons for selection) <b>0–4</b></p>	<b>20</b>	
9(d)	<p>The drawing will exhibit a reasonable standard of outcome and show some of the required design features <b>0–5</b></p> <p>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 <b>6–9</b></p> <p>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 <b>0–14</b></p> <p>Some use made of colour and tone to enhance the visual impact of the drawing <b>0–2</b></p> <p>OR</p> <p>Good use has been made of colour and tone to enhance the visual impact of the drawing <b>3–4</b></p> <p>OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing <b>5–6</b></p>	<b>20</b>	