

# Cambridge International AS & A Level

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**DESIGN & TECHNOLOGY**

**9705/13**

Paper 1

**October/November 2024**

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.

Cambridge International is publishing the mark schemes for the October/November 2024 series for most Cambridge IGCSE, Cambridge International A and AS Level components, and some Cambridge O Level components.

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This document consists of **16** 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 descriptions 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.

**PUBLISHED****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.

**Section A**

Question	Answer	Marks	Guidance
1(a)	Exemplar answer: Part A is a brace [1] to make the picnic bench more rigid. [1] <span style="float: right;"><b>0–2</b></span>	<b>2</b>	
1(b)(i)	Notes and/or sketches show: Process of cutting the slats to length and preparing to the required profile [0–3] Tools and equipment for cutting the slats from the plank e.g. pencil try square, rule, crosscut saw, radial arm saw and then preparing a slat to the required profile e.g. marking gauge, jack plane [0–2] Safety precaution when working with timber e.g. wear eye protection when using a radial arm saw, work securely held in a vice when planing [0–1] <span style="float: right;"><b>0–6</b></span>	<b>6</b>	Chamfers to be included for full marks on process.
1(b)(ii)	Notes and/or sketches show: Process of spacing out & fastening the slats to the cross rails [0–3] Tools and equipment for setting out the slats on the cross rail, pencil, try square, rule, jig, spacers and then for fastening the slats to the cross rail e.g. drill, drill bit, screwdriver [0–2] Safety precaution when working with timber e.g. wear eye protection when using a drill [0–1] <span style="float: right;"><b>0–6</b></span>	<b>6</b>	
1(c)	Notes and/or sketches show: Process of drilling the holes and assembling the parts with nuts and bolts [0–3] Tools and equipment for marking out the holes, pencil, try square, rule and then for drilling the holes and assembling e.g. drill, drill bit, spanner [0–2] Safety precaution when drilling the holes e.g. wear eye protection when using a drill, make sure work is securely held [0–1]	<b>6</b>	Only award the maximum mark of 3 marks for the process if it is clear how the holes are aligned.

Question	Answer	Marks	Guidance
2(a)	Exemplar answers: Corrugated card offers a degree of protection [1] Corrugated card has smooth surfaces on which to print of put stickers [1] <b>0–2</b>	<b>2</b>	AOVR <ul style="list-style-type: none"> <li>• easy to cut and fold [1]</li> <li>• relatively inexpensive [1]</li> <li>• readily available in large sheets or rolls [1]</li> <li>• flexible in scoring/folding [1]</li> </ul>
2(b)	Notes and/or sketches show: <b>Shape of development (net)</b> Any shape development shown [1] or correct shape to make the package (five surfaces) [2] Development shows some fold lines [1] or all fold lines in appropriate positions [2] Development shows some cut outs [1] or five appropriately sized cut outs [2] <b>0–6</b>	<b>6</b>	
2(c)	Notes and/or sketches show: Process of making and attaching the label [0–3] Tools and equipment for making the label e.g. computer, printer, craft knife, stencils and then for attaching the label e.g. use of self-adhesive paper, PVA [0–2] Safety precaution when making the label e.g. use a safety rule with a craft knife [0–1] <b>0–6</b>	<b>6</b>	
2(d)	Notes and/or sketches show: Process for making the clip e.g. injection moulding [0–3] Tools and equipment for making the clip e.g. mould, hopper, heat, pressure [0–2] Specific plastic named: PP/Nylon [0–1] <b>0–6</b>	<b>6</b>	AOVR <ul style="list-style-type: none"> <li>• Thermoplastic</li> </ul>

Question	Answer	Marks	Guidance
3(a)	Exemplar answers: Flexible so can bend around the pulley wheels [1] Good in tension [1]  <b>0–2</b>	<b>2</b>	
3(b)(i)	Notes and/or sketches show: Process of making the acrylic housing explained [0–3] Tools and equipment for marking out the acrylic housing e.g. felt tipped pen, rule, try square and for making the acrylic housing e.g. bandsaw, strip heater, former, drilling holes [0–2] Safety precaution when making the housing e.g. use leather gloves when working with a strip heater [0–1]  <b>0–6</b>	<b>6</b>	The acrylic housing is likely to be made by either folding a strip of acrylic or fabrication.
3(b)(ii)	Notes and/or sketches show: Process of making the aluminium pulley wheel explained [0–3] Named method of making the aluminium pulley wheel e.g. casting and for making the aluminium pulley wheel e.g. casting box, sand, crucible [0–2] Safety precaution when making the aluminium pulley wheel e.g. use PPE when casting [0–1]  <b>0–6</b>	<b>6</b>	Also accept the use of a centre lathe as a means of making the aluminium pulley wheel.  Laser cutting three discs and joining together to form a pulley
3(c)(i)	Sketches and/or notes show: For example, pulley wheels rotate in the pulley system [1] When a weight just moves up it is linear motion in the pulley system [1] When a weight moves up and down it is reciprocating motion in the pulley system [1]  <b>0–3</b>	<b>3</b>	
3(c)(ii)	Sketches and notes show: Understanding that mechanical advantage makes it easier to lift the load [1] Half the effort [1] is required to lift the load [1] <b>or</b> The load moves half the distance [1] of the effort [1]  <b>0–3</b>	<b>3</b>	

**Section B**

<b>Question</b>	<b>Answer</b>	<b>Marks</b>	<b>Guidance</b>
4(a)	Feature X is a back support rail [1] that supports the weight of cushion/user [1] <b>0–2</b>	<b>2</b>	Velcro could hold cushion in place
4(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. insufficient back rails [1] so the cushion will slip through [1] <b>0–4</b>	<b>4</b>	Other acceptable answers include: <ul style="list-style-type: none"> <li>nails [1] are not an appropriate way of holding the frame together [1]</li> <li>can't steam bend [1] chipboard [1]</li> <li>Styrofoam [1] is unsuitable for the base as it is too weak [1]</li> <li>Extra support required for seat [1]</li> </ul>
4(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 second back rail [1] midway between the top rail and the base [1] to provide more support for the cushion [1] <b>0–6</b>	<b>6</b>	<ul style="list-style-type: none"> <li>replace the nails [1] with KD fittings [1] that are tightened with an Allen key [1]</li> <li>replace the chipboard [1] with laminated beech [1] that can be steam bent [1]</li> <li>replace the base [1] with plywood [1] that has great strength in all directions [1]</li> </ul>
4(d)(i)	Situation has been analysed and relevant issues/points identified Benefits of mass-producing items e.g. materials can be purchased in bulk [1], tooling costs are shared across the production run [1] justifies investing in expensive machinery [1] <b>0–3</b>	<b>3</b>	
4(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. cheaper to purchase materials in large quantities [1], the cost of tooling, such as formers, is shared across the total number of products made [1], if large quantities of the same product are to be made it is worth purchasing and setting up expensive CNC machinery, which will complete the task quickly and accurately [1] <b>0–3</b>	<b>3</b>	

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Question	Answer	Marks	Guidance
4(d)(iii)	Specific examples/evidence used to support conclusions e.g. mass-produced kitchen units (IKEA, Magnet...) are inexpensive [1] handmade bespoke furniture items are very expensive [1]	<b>2</b>  <b>0–2</b>	

Question	Answer	Marks	Guidance
5(a)	Feature X is a bracket [1] to hold the rack to a wall [1]	<b>2</b>  <b>0–2</b>	
5(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. dovetail joint unsuitable [1] for joining the shelf and ends [1]	<b>4</b>  <b>0–4</b>	Other acceptable answers include: <ul style="list-style-type: none"> <li>racks [1] will not slot together [1]</li> <li>acrylic [1] does not need to be painted [1]</li> <li>end/shelf [1] the wrong size [1]</li> </ul>
5(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. replace [1] the dovetail joint [1] with a cross-halving joint [1]	<b>6</b>  <b>0–6</b>	Other acceptable problems include: <ul style="list-style-type: none"> <li>add a cut out to the bottom of the end [1] so the shape at the top of the end [1] will slot into it [1]</li> <li>replace the acrylic [1] with MDF [1] as this is a suitable material for a paint finish [1]</li> <li>the widths of the shelves must match [1 – need to both be either 100 mm [1] or 150 mm [1] wide.</li> </ul>
5(d)(i)	Situation has been analysed and relevant issues/points identified e.g. does not need to look nice [1] must function well [1] reduces costs [1]	<b>3</b>  <b>0–3</b>	
5(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. shelving is not selected for its looks [1], needs to be strong and store lots of items [1], reduced cost of product will gain a market advantage [1]	<b>3</b>  <b>0–3</b>	



Question	Answer	Marks	Guidance
5(d)(iii)	Specific examples/evidence used to support conclusions e.g. Dexion shelving very functional [1], purely functional products tend to be cheaper e.g. storage crates [1] <b>0–2</b>	<b>2</b>	

Question	Answer	Marks	Guidance
6(a)	Feature X is vents [1] that allow air to circulate and cool the electric motor [1] <b>0–2</b>	<b>2</b>	
6(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. no controls [1] so won't be able to switch on/off or change speeds [1] <b>0–4</b>	<b>4</b>	Other acceptable problems include: <ul style="list-style-type: none"> <li>• can't get bowl out [1] as whisks are in the way [1]</li> <li>• material [1] unsuitable for the whisks [1]</li> <li>• no power source [1] so electric motor will not turn [1].</li> </ul>
6(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g. add switches [1] that will allow the user to switch the food mixer on/off [1] and change the speed [1] <b>0–6</b>	<b>6</b>	Other acceptable problems include: <ul style="list-style-type: none"> <li>• hinge the top part of the food mixer [1] so that it can be lifted [1] and move the whisks clear of the bowl [1]</li> <li>• mild steel will rust [1] so make the whisks from stainless steel [1] which will not rust [1]</li> <li>• add a cable [1] so you can connect the food mixer to the main electricity [1] to run the motor [1]</li> </ul>
6(d)(i)	Situation has been analysed and relevant issues/points identified e.g. promotes care for the environment [1], attracts customers [1][1] economic advantage for the customer [1] <b>0–3</b>	<b>3</b>	

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<b>Question</b>	<b>Answer</b>	<b>Marks</b>	<b>Guidance</b>
6(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. potentially reduces harmful effects of using fossil fuels to generate energy [1] customers attracted by the energy rating of products [1], cheaper for the customer to run the product over a period of years [1] <p style="text-align: right;"><b>0–3</b></p>	<b>3</b>	
6(d)(iii)	Specific examples/evidence used to support conclusions e.g. energy ratings displayed on products when on sale [1], legislation requires products to meet certain minimum energy ratings [1] <p style="text-align: right;"><b>0–2</b></p>	<b>2</b>	

**Section C**

Question	Answer	Marks	Guidance
7(a)	<p><b>Bathroom storage unit designed that incorporates the mirror</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><b>Must fasten to a wall to access 10–12 marks</b></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>	
7(b)	<p><b>The two glass shelves</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><b>Must be adjustable to access 10–12 marks</b></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>	

Question	Answer	Marks	Guidance
7(c)	<p><b>Towel holder</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><b>Must attach to the bathroom storage unit to access 10–12 marks</b></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>	
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 show 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>	Candidates who draw the cabinet closed, so the system for supporting the shelves cannot be seen, would score a maximum of 9/14 marks.

Question	Answer	Marks	Guidance
8(a)	<p><b>Development (net) of package</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><b>Must be based upon the shape of a fruit to access 10–12 marks</b></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>	Development (net) must be shown
8(b)	<p><b>Graphics for the front of the package</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><b>Must be based on the word ‘Fruitee’ to access 10–12 marks</b></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>	
8(c)	<p><b>Design for a game</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><b>Must be suitable for age 4 - 5 children to access 10–12 marks</b></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>	

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Question	Answer	Marks	Guidance
8(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>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>Lightweight structure</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><b>Must be assembled without the use of tools to access 10–12 marks</b></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>	

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Question	Answer	Marks	Guidance
9(b)	<p><b>Food tray attaches to the structure</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><b>Must be height adjustable to access 10–12 marks</b></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(c)	<p><b>Lighting system for the shade</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><b>Must be not mains powered to access 10–12 marks</b></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>	

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Question	Answer	Marks	Guidance
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>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>	