

# Cambridge International AS & A Level

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**DESIGN & TECHNOLOGY**

**9705/12**

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)	Because it is easier to hold [1] in a vice. [1] <b>0–2</b>	<b>2</b>	AOVR Easier to mark out [1] if top has not been shaped. [1]
1(b)(i)	Notes and/or sketches show: Process of drilling the hole explained [0–3] Tools and equipment for marking the position of the hole e.g. Marking and drilling holes, pencil try square, rule and then drilling the hole e.g. pillar drill, forstner bit [0–2] Safety precaution when drilling the hole e.g. wear eye protection when using a pillar drill, work secured in a vice [0–1] <b>0–6</b>	<b>6</b>	
1(b)(ii)	Notes and/or sketches show: Process of making the elephant shape explained [0–3] Tools and equipment for marking out the elephant shape e.g. pencil, try square, template and cutting the elephant shape e.g. bandsaw, file/rasp, glasspaper, [0–2] Safety precaution when making the elephant shape e.g. wear eye protection when using a bandsaw, hold work securely [0–1] <b>0–6</b>	<b>6</b>	
1(c)	Notes and/or sketches show: Process of making and joining the elephant ear explained, templates [0–3] Tools and equipment for making two identical elephant ears e.g. felt tipped pen, bandsaw, wet and dry, brasso and attaching the elephant ear e.g. double-sided tape, screw [0–2] Safety precaution when making the elephant ear e.g. wear eye protection when using a bandsaw, hold work securely [0–1] <b>0–6</b>	<b>6</b>	Accept CAD/CAM Accept relevant glue

Question	Answer	Marks	Guidance
2(a)	Exemplar answers: Easy to shape/cut [1] Relatively inexpensive material [1]  <b>0–2</b>	<b>2</b>	AOVR <ul style="list-style-type: none"> <li>• can be joined with an appropriate adhesive [1]</li> <li>• can be painted [1]</li> </ul>
2(b)(i)	Notes and/or sketches show: Process of making the Styrofoam shape [0–3] Tools and equipment for joining the Styrofoam shape e.g. suitable adhesive, double sided tape and then cutting out the Styrofoam shape e.g. felt tipped pen, template, bandsaw, file, abrasive paper [0–2] Safety precaution when working with Styrofoam e.g. wear eye protection when using a bandsaw, work in a well ventilated area. [0–1]  <b>0–6</b>	<b>6</b>	<b>Please note:</b> The use of aerosol adhesive is incorrect as it could melt the Styrofoam.
2(b)(ii)	Notes and/or sketches show: Process of finishing the Styrofoam shape explained [0–3] Tools and equipment for preparing the Styrofoam shape for a finish e.g. file, abrasive paper and then applying a finish e.g. paintbrush [0–2] Safety precaution when finishing Styrofoam e.g. wear eye protection, work in a well-ventilated area [0–1]  <b>0–6</b>	<b>6</b>	<b>Please note:</b> It is possible to paint a sealer on the Styrofoam  The use of aerosol paint is incorrect as it could melt the Styrofoam.
2(c)	Notes and/or sketches show: Process of making and applying the sticker explained [0–3] Tools and equipment for making the sticker e.g. paper, computer, printer, craft knife and then applying the sticker e.g. use of self-adhesive paper, suitable adhesive [0–2] Safety precaution when making and applying the sticker e.g. use a safety rule with a craft knife, work in a well-ventilated room [0–1]  <b>0–6</b>	<b>6</b>	

Question	Answer	Marks	Guidance
3(a)	Exemplar answer: Improves grip [1] if turned by fingers. [1] <p style="text-align: right;"><b>0–2</b></p>	<b>2</b>	
3(b)	Notes and/or sketches show: Process of cutting the external thread explained [0–3] Tools and equipment for preparing the bar e.g. file, vice and then cutting the thread e.g. die stock, die, lubricant [0–2] Safety precaution when drilling the hole e.g. be aware that swarf can cut fingers, hold bar securely in a vice. [1] <p style="text-align: right;"><b>0–6</b></p>	<b>6</b>	
3(c)	Notes and/or sketches show: A clearance hole is just large enough to allow a bar [1] to pass through it. [1] A blind hole is stopped at one end [1] so a bar will not pass through it. [1] An internally threaded hole needs to be drilled smaller than the threaded bar [1] as a thread is then cut into the walls of the hole. [1] <p style="text-align: right;"><b>0–6</b></p>	<b>6</b>	
3(d)(i)	Notes and/or sketches describe: Motion named e.g. rotary and linear [1] Description of motion conversion [0–2] <p style="text-align: right;"><b>0–3</b></p>	<b>3</b>	
3(d)(ii)	Notes and/or sketches describe: Method of increasing leverage e.g. tommy bar [1] Description of method of increasing leverage [0–2] <p style="text-align: right;"><b>0–3</b></p>	<b>3</b>	

**Section B**

Question	Answer	Marks	Guidance
4(a)	Feature X is designed to improve the grip [1] of the hands on the bat [1] <b>0–2</b>	<b>2</b>	
4(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. base of the wickets too narrow, [1] so the wickets will topple over [1] <b>0–4</b>	<b>4</b>	Other acceptable answers include: <ul style="list-style-type: none"> <li>• bails won't stay [1] on wickets [1]</li> <li>• can't vacuum form [1] a ball [1]</li> <li>• Chipboard is heavy [1] and absorbs moisture [1]</li> <li>• Too windy for vacuum formed ball [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. increase the length [1] and width [1] of the base so it is more stable [1] <b>0–6</b>	<b>6</b>	<ul style="list-style-type: none"> <li>• cut a groove [1] in the top of the wickets [1] so that the bails will stay in position [1]</li> <li>• change the manufacturing method [1] to rotational moulding [1] as that is good for hollow shapes [1]</li> </ul>
4(d)(i)	Situation has been analysed and relevant issues/points identified Reasons why manufacturers work to a detailed specification e.g. ensures the product meets the customer's needs [1], ensures the product performs as expected [1] ensures materials are used appropriately [1] <b>0–3</b>	<b>3</b>	
4(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. the product will not be wanted if it does not meet the customer's needs [1], products will not be successful if they do not perform as intended [1], appropriate use of materials and manufacturing processes helps to reduce costs [1] <b>0–3</b>	<b>3</b>	

Question	Answer	Marks	Guidance
4(d)(iii)	Specific examples/evidence used to support conclusions e.g. materials used to advertise products e.g. real wood [1], materials a significant part of production costs [1]  <b>0–2</b>	<b>2</b>	

Question	Answer	Marks	Guidance
5(a)	Feature X is a perforated line that allows the opening to be torn away [1] to give access to the tissues. [1]  <b>0–2</b>	<b>2</b>	<ul style="list-style-type: none"> <li>Perforated lid [1] to ensure tissues are not contaminated [1]</li> </ul>
5(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. can't vacuum form the cover as sides not sloping [1] so difficult to remove moulding from former 1]  <b>0–4</b>	<b>4</b>	<p>Other acceptable answers include:</p> <ul style="list-style-type: none"> <li>No surface graphics [1] on the package [1]</li> <li>Package will be loose in the cover [1] and holes may not align [1]</li> <li>Incorrect development (net) [1] – fold lines shown as cut lines/too small [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. add a draft angle [1] to the sides of the former [1] so that it is easy to remove the polymer cover after vacuum forming [1]  <b>0–6</b>	<b>6</b>	<p>Other acceptable problems include:</p> <ul style="list-style-type: none"> <li>Add surface graphics to the package to include such details as the product name, [1] instructions on use [1] and recycling advice [1]</li> <li>Shorten the length of the polymer cover [1] so that the package fits exactly [1] and the holes line up [1]</li> <li>Show fold lines with a dashed line [1] rather than a solid line, [1] which indicates a cut line [1]</li> </ul>



Question	Answer	Marks	Guidance
5(d)(i)	Situation has been analysed and relevant issues/points identified e.g. promotes creative thinking and allows new ideas to be tried out [1] models can be displayed to gather user views [1] allows new ideas to be seen three dimensionally [1]  <b>0–3</b>	<b>3</b>	Accept CAD
5(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g. customers/clients look for new and innovative products [1], concept ideas often displayed in exhibitions [1], reduces costs as only potentially successful ideas are fully developed [1]  <b>0–3</b>	<b>3</b>	
5(d)(iii)	Specific examples/evidence used to support conclusions e.g. innovative ideas for packaging in magazines [1], packaging of a product over time e.g. milk [1]  <b>0–2</b>	<b>2</b>	

Question	Answer	Marks	Guidance
6(a)	Design feature X is a screw fastening [1] to attach the side cover [1]  <b>0–2</b>	<b>2</b>	Also accept Protects the user from moving parts within
6(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g. no means of fastening the bandsaw to the bench [1] so likely to move around during use [1]  <b>0–4</b>	<b>4</b>	Other acceptable problems include: <ul style="list-style-type: none"> <li>• unsafe to use [1] as no blade guard [1]</li> <li>• would not cut well [1] as no blade tensioner [1]</li> <li>• would not cut straight lines [1] as no cutting guide (fence) [1]</li> <li>• Blade is the wrong way round [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 brackets to the bottom of the bandsaw [1] that allow it to be fastened to the bench [1] with nuts and bolts [1]	<b>6</b>	Other acceptable problems include: <ul style="list-style-type: none"> <li>• add a blade guard [1] that can be moved up and down the blade [1]</li> </ul>

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Question	Answer	Marks	Guidance
		<b>0–6</b>	<p>when cutting different thickness materials [1]</p> <ul style="list-style-type: none"> <li>• add a screw device [1] that will move one of the wheels on which the blade runs up and down [1] to make the blade the correct tension [1]</li> <li>• add a fence [1] that can be adjusted to different distances from the blade [1] so that the material can be pushed up against it when cutting [1]</li> </ul>
6(d)(i)	<p>Situation has been analysed and relevant issues/points identified e.g. people might injure themselves [1], products won't work as intended if incorrectly used [1] the reputation of the manufacturer will be damaged [1]</p> <p style="text-align: right;"><b>0–3</b></p>	<b>3</b>	
6(d)(ii)	<p>Clear and appropriate explanations of why issues/points are considered relevant e.g. injuries might result in legal claims [1] customers may try to return products as not fit for purpose [1], manufacturers with a poor reputation will find it difficult to sell products [1]</p> <p style="text-align: right;"><b>0–3</b></p>	<b>3</b>	
6(d)(iii)	<p>Specific examples/evidence used to support conclusions e.g. instruction manuals included with products [1], manufacturers train retailers so they can advise on the use of products [1]</p> <p style="text-align: right;"><b>0–2</b></p>	<b>2</b>	

**Section C**

Question	Answer	Marks	Guidance
7(a)	<p><b>Display unit for three items of clothing</b> One pre-conceived idea presented</p> <p style="text-align: right;">0–4</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</p> <p style="text-align: right;">5–8</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</p> <p style="text-align: right;">9–12</p> <p><b>Display unit must rotate to access 10–12 marks</b> Clarity and quality of sketching and explanatory notes</p> <p style="text-align: right;">0–4</p> <p>Evaluation (reasons for selection)</p> <p style="text-align: right;">0–4</p>	<b>20</b>	
7(b)	<p><b>Rack for socks</b> One pre-conceived idea presented</p> <p style="text-align: right;">0–4</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</p> <p style="text-align: right;">5–8</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</p> <p style="text-align: right;">9–12</p> <p><b>Must fit onto the display unit designed in (a) to access 10–12 marks</b> Clarity and quality of sketching and explanatory notes</p> <p style="text-align: right;">0–4</p> <p>Evaluation (reasons for selection)</p> <p style="text-align: right;">0–4</p>	<b>20</b>	

Question	Answer	Marks	Guidance
7(c)	<p><b>Holder fits onto the rack designed in part (b)</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></p> <p><b>A4 sign must be easily changed to access 10–12 marks</b> 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>	

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Question	Answer	Marks	Guidance
8(a)	<p><b>One-piece development (net)</b> One pre-conceived idea presented</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><b>9–12</b></p> <p><b>Must include a means of depositing and removing coins to access 10–12 marks</b> Clarity and quality of sketching and explanatory notes</p> <p style="text-align: right;"><b>0–4</b></p> <p>Evaluation (reasons for selection)</p> <p style="text-align: right;"><b>0–4</b></p>	<b>20</b>	
8(b)	<p><b>Design for graphics</b> One pre-conceived idea presented</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><b>9–12</b></p> <p><b>Must be based upon the name ‘Haven’ to access 10–12 marks</b> Clarity and quality of sketching and explanatory notes</p> <p style="text-align: right;"><b>0–4</b></p> <p>Evaluation (reasons for selection)</p> <p style="text-align: right;"><b>0–4</b></p>	<b>20</b>	

Question	Answer	Marks	Guidance
8(c)	<p><b>Low-cost promotional item</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></p> <p><b>Must be designed to be mass produced to access 10–12 marks</b> 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(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>Mechanical device that propels the ball bearing forward</b> One pre-conceived idea presented</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><b>9–12</b></p> <p><b>Must fit in position A to access 10–12 marks</b> Clarity and quality of sketching and explanatory notes</p> <p style="text-align: right;"><b>0–4</b></p> <p>Evaluation (reasons for selection)</p> <p style="text-align: right;"><b>0–4</b></p>	<b>20</b>	
9(b)	<p><b>Device that prevents the ball bearing falling through the gap and propels it forward</b> One pre-conceived idea presented</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><b>9–12</b></p> <p><b>Must fit in position B to access 10–12 marks</b> Clarity and quality of sketching and explanatory notes</p> <p style="text-align: right;"><b>0–4</b></p> <p>Evaluation (reasons for selection)</p> <p style="text-align: right;"><b>0–4</b></p>	<b>20</b>	

Question	Answer	Marks	Guidance
9(c)	<p><b>Device gives a visual <u>or</u> audible warning</b> One pre-conceived idea presented</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><b>9–12</b></p> <p><b>Must be when the ball bearing comes to rest in a cup to access 10–12 marks</b> Clarity and quality of sketching and explanatory notes</p> <p style="text-align: right;"><b>0–4</b></p> <p>Evaluation (reasons for selection)</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><b>10–14</b></p> <p>Some use made of colour and tone to enhance the visual impact of the drawing</p> <p style="text-align: right;"><b>0–2</b></p> <p>OR Good use has been made of colour and tone to enhance the visual impact of the drawing</p> <p style="text-align: right;"><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</p> <p style="text-align: right;"><b>5–6</b></p>	<b>20</b>	