



Cambridge International AS & A Level

DESIGN & TECHNOLOGY

9705/11

Paper 1

October/November 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 October/November 2022 series for most Cambridge IGCSE™, Cambridge International A and AS Level components and some Cambridge O Level components.

This document consists of **21** 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.

Section A

Question	Answer	Marks	Guidance
1(a)	Exemplar answers All round strength [1] Relatively cheap [1] Readily available material [1] Easy to cut to shape [1] Stable material [1] 0–2	2	Any other valid reason (AOVR)
1(b)(i)	Sketches and/or notes show: Marking out and cutting to shape Suitable method [0–3] Tools, equipment, or processes [0–2] Safety precaution [0–1] 0–6	6	Accept hand or CNC methods. Exemplar answer: <ul style="list-style-type: none"> • Use of template and pencil to mark out • Cut with a coping saw • Smoothed with glasspaper
1(b)(ii)	Sketches and/or notes show: A method e.g., glue or a suitable method of joining, e.g., screws [0–3] Tools, equipment, or processes [0–2] Safety precautions [0–1] 0–6	6	Exemplar answers include: <ul style="list-style-type: none"> • Screws • Pegs
1(c)	Sketches and/or notes show: Suitable method identified for batch production, e.g., injection moulding Description of method [0–3] Tools and/or equipment named [0–3] 0–6	6	Accept hand or CNC methods. Exemplar answers include: <ul style="list-style-type: none"> • Injection moulding • Use of laser cutter

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Question	Answer	Marks	Guidance
2(a)	Exemplar answers: Flexible [1] Available in a range of colours [1] Wipes clean [1] Can easily be cut [1] 0–2	2	Any other valid reason (AOVR)
2(b)(i)	Sketches and/or notes show: Marking out and cutting to shape Suitable method [0–3] Tools, equipment, or processes [0–2] Safety precaution [0–1] 0–6	6	Accept hand or CNC methods. Exemplar answer: <ul style="list-style-type: none"> • Use of ruler and felt tipped pen • Craft knife, safety rule and cutting mat
2(b)(ii)	Sketches and/or notes show: Rolled up and part A joined to part B Strip rolled into a cylinder and Part A joined to Part B (temporary or permanent method) [0–3] Tools, equipment, or processes [0–2] Safety precaution [0–1] 0–6	6	Exemplar answer: <ul style="list-style-type: none"> • Rolled around a circular shape • Polypropylene overlaps and held in position with double sided tape
2(b)(iii)	Sketches and/or notes show: Suitable method identified for small batch production, e.g., bending over a former [0–3] Tools and/or equipment named [0–2] Safety precaution [0–1] 0–6	6	Accept hand or CNC methods. Exemplar answer: <ul style="list-style-type: none"> • Use of a jig to cut mild steel to length • Use of a former to bend

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Question	Answer	Marks	Guidance
3(a)	Exemplar answers: Good conductor of electricity [1] Easy to bend [1] Will not rust [1] Looks attractive [1] 0–2	2	Any other valid reason (AOVR)
3(b)(i)	Sketches and/or notes show: Power source e.g., battery [1] Output e.g., buzzer [1] On/off switch [1] Circuit diagram drawn [1] Circuit diagram correct for the game [1] All symbols correct [1] 0–6	6	
3(b)(ii)	Sketches and notes show: Suitable method, e.g., soldering [0–3] Tools, equipment, or processes [0–2] Safety precaution [0–1] 0–6	6	
3(c)	Sketches and/or notes show: Suitable method identified, e.g., vacuum forming and description of method [0–3] Tools and/or equipment named [0–3] 0–6	6	Accept hand or CNC methods. Exemplar answer: • Vacuum formed

Section B

Question	Answer	Marks	Guidance
4(a)	Feature X is a handle [1] to steady yourself when climbing the steps [1] 0–2	2	
4(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g., too narrow at the bottom [1] so unstable (would easily fall over) [1] 0–4	4	Other acceptable answers include: <ul style="list-style-type: none"> • No bottom step • MDF not strong/weather resistant • Mild steel – heavy frame/will rust • No bracing at the back
4(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g., widen the bottom [1] by adding [1] extension bars [1] 0–6	6	
4(d)(i)	Situation has been analysed and relevant issues/points identified e.g., takes up less space when storing [1] easier to move [1] households have lots of items like this [1] 0–3	3	
4(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g., items often stored in small spaces such as a loft or garage [1], products may need to be transported to the house in a car after purchase [1], products are only used occasionally [1] 0–3	3	
4(d)(iii)	Specific examples/evidence used to support conclusions e.g., allows people to store DIY equipment that is not used very often [1], convenience of not having to wait for a tradesperson [1] 0–2	2	

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Question	Answer	Marks	Guidance
5(a)	Feature X is designed to make the package the depth [1] of the table tennis bat [1] 0–2	2	
5(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g., text wrong direction [1] so it would not read correctly when closed [1] 0–4	4	Other acceptable answers include: <ul style="list-style-type: none"> • No way of joining • Incorrect lines • One hanging hole • Text the wrong direction
5(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g., remove existing text from CAD design [1] add correct text and check [1] reprint [1] 0–6	6	
5(d)(i)	Situation has been analysed and relevant issues/points identified Benefits of using recycled materials e.g., recycled materials can be used to package non-food items [1] reuses existing materials so no need to fell further trees [1], promotes a ‘green’ image for the company [1] 0–3	3	
5(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g., no health or hygiene issues [1], cutting down trees is bad for wildlife [1], many people like to buy ‘green’ products [1] 0–3	3	
5(d)(iii)	Specific examples/evidence used to support conclusions e.g., recycled material symbol on many packages [1], increased recycling by households [1] 0–2	2	

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Question	Answer	Marks	Guidance
6(a)	Feature X is a handle [1] used to wind the reel [1] 0–2	2	
6(b)	Problem one identified [1] and described [1] Problem two identified [1] and described [1] e.g., no plug [1] so could not connect to the mains [1] 0–4	4	Other acceptable problems include: <ul style="list-style-type: none"> • No means of connecting • No handle for carrying • Copper will conduct electricity if cable becomes damaged
6(c)	Explanation of how problem one could be overcome [0–3] Explanation of how problem two could be overcome [0–3] e.g., plug shown [1] in a suitable position on the mains cable [1] with explanation [1] 0–6	6	
6(d)(i)	Situation has been analysed and relevant issues/points identified e.g., can use anywhere [1], interchangeable [1] safer [1] 0–3	3	
6(d)(ii)	Clear and appropriate explanations of why issues/points are considered relevant e.g., can use away from a mains electric source [1] one battery can be used to power several different tools [1], no trailing flex to trip over [1] 0–3	3	
6(d)(iii)	Specific examples/evidence used to support conclusions e.g., portable power tools are increasingly become batter operated [1], battery powered tools do not present a risk of getting an electric shock [1] 0–2	2	

Section C

Question	Answer	Marks	Guidance
7(a)	<p>Joins shoes together 0–2</p> <p>One pre-conceived idea presented 3–4</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 5–6</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 e.g., plastic clip 0–2</p> <p>Identifies shoes</p> <p>One pre-conceived idea presented 3–4</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 5–6</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 e.g., coloured plastic discs attached to the clip</p> <p>Overall total given as 0–4 (lower), 5–8 (mid), 9–12 (high) 0–4</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
7(b)	<p>Stores shoes</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., rack 5–6</p> <p>Stores eight pairs of shoes</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., eight spaces 5–6</p> <p>Overall total given as 0–4 (lower), 5–8 (mid), 9–12 (high) 0–4</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
7(c)	<p>Design of bracket</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., bracket attaches to the horizontal bar on the climbing frame 5–6</p> <p>Method of attachment</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., metal brackets and wood screws</p> <p>Overall total given as 0–4 (lower), 5–8 (mid), 9–12 (high) 5–6</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
7(d)	(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	

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Question	Answer	Marks	Guidance
8(a)	<p>Point of sale display</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., several pieces of foamboard slotted together 5–6</p> <p>Holds the watch</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., part for watch strap to wrap around 5–6</p> <p>Overall total given as 0–4 (lower), 5–8 (mid), 9–12 (high) 0–4</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
8(b)	<p>Design for a leaflet</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., A4 folded sheet 5–6</p> <p>Promotes fitness training</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., shows how to time activities 5–6</p> <p>Overall total given as 0–4 (lower), 5–8 (mid), 9–12 (high) 0–4</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
8(c)	<p>Holds 20 of the leaflets designed in (b)</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., folded acrylic shape 5–6</p> <p>Attaches to the POS display</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., Velcro 5–6</p> <p>Overall total given as 0–4 (lower), 5–8 (mid), 9–12 (high) 0–4</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
8(d)	(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	

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Question	Answer	Marks	Guidance
9(a)	<p>Water feature</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., vase that fills with water and then overflows into the tray 5–6</p> <p>Movement</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., wheel that turns as water falls onto it 5–6</p> <p>Overall total given as 0–4 (lower), 5–8 (mid), 9–12 (high) 0–4</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
9(b)	<p>Attaches to hose</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., clamp that goes around the hose 5–6</p> <p>Adjustment to flow</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., hand screw tightens onto the hose and restricts the flow of water 5–6</p> <p>Overall total given as 0-4 (lower), 5-8 (mid), 9-12 (high) 0–4</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
9(c)	<p>Fastened to a wall</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., screws and raw plugs 5–6</p> <p>Can be adjusted to face the sun</p> <p>One pre-conceived idea presented 0–2</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 3–4</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 e.g., tilt and turn mechanism 5–6</p> <p>Overall total given as 0–4 (lower), 5–8 (mid), 9–12 (high) 0–4</p> <p>Clarity and quality of sketching and explanatory notes 0–4</p> <p>Evaluation (reasons for selection) 0–4</p>	20	

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Question	Answer	Marks	Guidance
9(d)	<p>(d) The drawing will exhibit a reasonable standard of outcome and show some of the required design features 0–5</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 6–9</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 0–14</p> <p>Some use made of colour and tone to enhance the visual impact of the drawing 0–2</p> <p>OR Good use has been made of colour and tone to enhance the visual impact of the drawing 3–4</p> <p>OR Very good use has been made of colour, tone and material representation to enhance the visual impact of the drawing 5–6</p>	20	